博士学位論文内容の要旨

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| 氏　　名 | 安彦（アビコ）　鉄平（テッペイ） |
| 所　　属 | 人間健康科学研究科　人間健康科学専攻 |
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| 課程・論文の別 | 学位規則第4条第1項該当 |
| 学位論文題名 | Difference in the Electromyographic Onset of the Deep and Superficial Multifidus during Shoulder Movement while Standing<br>（立位における上肢運動時の腰部多裂筋深層線維および浅層線維の筋反応時間の検討） |
| 論文審査委員 | 主査　教　授　竹井　仁<br>委員　教　授　新田　收<br>委員　教　授　浅川　康吉 |

**【論文の内容の要旨】**

【Purpose】The present study aimed to investigate whether the EMG onsets of the deep fibers of the multifidus (DM) and superficial fibers of the multifidus (SM) change according to the direction of shoulder movement and the position of the center of foot pressure (CFP).

【Method】Intramuscular and surface electrodes recorded the electromyographic onset of the DM, SM, rectus abdominal, and anterior and posterior deltoid. Eleven healthy participants performed rapid, unilateral shoulder flexion and extension in response to audio stimuli at three CFP positions: quiet standing, extreme forward leaning, and extreme backward leaning. The EMG onset for each muscle was visually identified. The mean onset of the EMG burst of postural muscles relative to the deltoid was obtained for each standing position. We used the two-way repeated measures analysis of variance with the main effect being direction and CFP positions for each muscle. Post-hoc analysis was performed using the Bonferroni test.

【Results】It was found that the electromyographic onset of the DM and SM relative

to the deltoid was dependent on the direction of arm movement. Additionally, of all electromyographic onsets recorded, only that of the DM occurred earlier in the extreme forward leaning position than in the extreme backward leaning position during shoulder flexion.

【Discussion】These results suggest that the electromyographic onset of DM was influenced by the biomechanical disturbance such as shoulder movement and CFP position. They may indicate that the DM functions in a direction-dependent manner to maintain the CFP and standing posture. Additionally, we showed that there is a functional difference between the DM and SM because the DM is highly sensitive.