

Abstract of Doctoral Thesis

Title : The study of relationship between toe muscular strengths and athletic performance in athletes

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In various physical performances, the foot is the first body part that receives the stress caused by movement stimulation, and the muscular strength of the toes plays an important role in the physical performance. However, it remains unclear as to how the toe muscular strengths are related to physical performance. Therefore, the purpose of this study was to clarify the relationship between the toe muscular strengths and physical performance of jumping, sprinting, and change of direction in athletes.

【Influence of ankle joint and MPJ angle on toe pushing force. (Research subject I)】

Focused on the barefoot and non-barefoot athletes, who are expected to have different joint angle-force relationships in the toe pushing force, we examined whether the ankle and MPJ angles affect the toe pushing force. As a result, the presence or absence of wearing shoes during competitive activities does not affect the toe pushing force and the joint angle-force relationship, and the toe pushing force is affected by both the ankle joint and MPJ joint angles.

【Relationship between toe muscular strengths and physical performance. (Research subjects II to IV)】

The purpose of this study was to clarify the relationship between toe muscular strengths and jumping, sprinting, and change of direction in athletes. As a result, it was found that there was a correlation between toe pushing force and rebound jump and change of direction performance. There was no correlation between all the exercise performances for the toe flexor strength with the MPJ in the plantar flexed position. The findings of this study support that the role of toe pressing force controls the physical performance while finely adjusting the muscle output at the end of the body in response to a given movement stimulus.

The knowledge obtained in this doctoral thesis is to clarify the relationship between athlete's toe muscular strength and exercise performance, which has not been clarified so far, and to verify the relationship between toe muscular strengths and physical performance. This suggests that it is important to measure and evaluate using the toe pushing force that causes the MPJ to be in the dorsiflexed position.