

各種跳躍動作における下肢筋腱複合体の形態的变化と跳躍能力との関連

Association between morphological changes in lower limb muscle-tendon units and jumping ability in various jumping actions

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概要

本研究では筋腱複合体の構成要因である筋腱接合部に着目し、跳躍中の筋腱接合部動態と跳躍高の関連を検討することにより、各種跳躍動作中の筋腱複合体動態と跳躍能力の関係を明らかにすることを目的とした。健康な大学生18名(男子:8名, 女子10名)を対象に足関節の底背屈運動および4種(反動付垂直跳, リバウンドジャンプ, ドロップジャンプ, 助走付ジャンプ)の跳躍実験を実施した。底背屈運動および跳躍実験の際に踏切脚に超音波装置を装着し、筋腱接合部の動態を観察した。跳躍準備時の筋腱接合部行程, 離地時の筋腱接合部行程, アキレス腱長, 最大底背屈時の筋腱接合部行程に対する跳躍時の筋腱接合部行程の割合を計測し、それぞれの項目について跳躍高との相関関係を検討した。その結果、跳躍準備時の筋腱接合部行程では男子群の垂直跳, 女子群のリバウンドジャンプで有意な負の相関が、離地時の筋腱接合部行程では男子群のリバウンドジャンプ, 女子の垂直跳で有意な正の相関が示された。さらに、最大時に対する跳躍時の筋腱接合部行程では女子のドロップジャンプで有意な正の相関が示された。よって、助走を伴わない跳躍では跳躍能力に筋腱複合体の影響が考えられるが、助走を伴う跳躍では跳躍能力には筋腱複合体以外の影響が示唆された。

キーワード: 筋腱複合体, 各種跳躍動作, 形態変化

Abstract: Focusing on the muscle-tendon junction, which is a muscle-tendon unit component, the association between dynamics of the muscle-tendon junction during jumping and jumping height was investigated to clarify the relationship between dynamics of the muscle-tendon units during various jumping actions and jumping ability. The subjects were 18 healthy university students (male: 8, female: 10). Experiments on plantar flexion motion of the ankle joint and 4 types of jumping (counter movement vertical jump, rebound jump, drop jump, and running jump) were performed. An ultrasonic device was attached to the take-off leg and dynamics of the muscle-tendon junction were observed. The distance of movement of the muscle-tendon junction during preparation for jumping and taking off, Achilles tendon length, and the rate of the distance of movement of the muscle-tendon junction during jumping to that in the maximum plantar flexion were measured and the correlation of each item with the jumping height was investigated. The distance of movement of the muscle-tendon junction during preparation for jumping was significantly correlated inversely with the jumping height in the vertical jump in the male group and rebound jump in the female group, and that during taking off was significantly correlated positively with the jumping height in the rebound jump in the male group and vertical jump in the female group. In addition, a significant positive correlation was noted in the rate to that in the maximum plantar flexion in the drop jump in the female group. These findings suggested that the muscle-tendon unit influences the jumping ability in jumps without approach running, but a component other than the muscle-tendon unit influences the jumping ability in the running jump.

Key words: muscle-tendon unit, various jumping actions, morphological changes