

論文の欧文要旨

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(Title)

Trunk muscles of judokas: characteristics and relations with low back injuries

(Abstract)

In judokas, while the trunk region is important for both athletic performance and medical problems, the characteristics of judo-specific trunk muscles and low back pain (LBP) are unclear. Based on this background, this doctoral dissertation aimed to enhance judokas' athletic performance by understanding trunk muscle strength (TMS) and low back injuries in elite judokas. Chapters 2–4 analyzed TMS and its relationship to the athletic performance of judokas as a functional aspect of the trunk region. Then, Chapters 5–7 analyzed lumbar radiological abnormalities (LRA), TMS, and their relationships to LBP in judokas as a medical aspect of the trunk region.

Chapter 2 investigated TMS depending on the weight category of elite judokas. The absolute TMS of all directions was stronger in the heavier weight category than in lighter weight category. However, relative TMS (normalized by body weight) of judokas decreased in the heavyweight category, except for rotations, suggesting that the rotator will become more vital to judokas.

Chapter 3 analyzed the relationship between TMS and elite judokas' athletic performance. This chapter observed stronger extensor, extensor per body weight, and extensor/flexor ratio in the middleweight category. In addition, both sides of the rotator were stronger in the heavyweight category. Thus, TMS is associated with athletic performance in elite judokas, except for lightweight judokas. In particular, trunk extension and rotation are essential for middleweight and heavyweight judokas, respectively.

Chapter 4 compared elite judokas' cross-sectional areas (CSAs) of trunk muscles and TMS with wrestlers to determine the detailed characteristics of judokas' trunk muscle sports specificity. The CSAs of the quadratus lumborum and obliques were larger in the judokas than in the wrestlers. On the contrary, the CSAs of rectus abdominis were smaller in the judokas than

in the wrestlers. In addition, this chapter confirmed that the extensor and flexor strengths were weaker in the judokas than in the wrestlers. Therefore, the sport-specific characteristics of the judokas' trunk muscles differed, even from wrestling with athletic similarities. In particular, judokas need to strengthen trunk rotation and lateral flexion motions.

Chapter 5 investigated the prevalence of nonspecific LBP (nsLBP) and LRA in elite judokas. nsLBP prevalence was between 30% and 40%, with no difference between the light, middle, and heavyweight categories. On the other hand, LRA prevalence was over 90% in the middle and the heavyweight categories compared to 65.5% in the lightweight category. Furthermore, LRA prevalence in those with nsLBP (79.3%) was similar to that in those without nsLBP (83.0%), suggesting a lack of direct association between nsLBP and LRA. However, the prevalence of LRA in judokas with nsLBP in each category was 50.0%, 100%, and 88.9%, respectively; hence, there was an apparent difference between the lightweight and the other two heavier categories.

Chapter 6 analyzed the relationship between weight category-dependent TMS and LBP in elite judokas. Judokas with LBP showed significantly weaker extensors and both sides of rotators than the judokas without LBP only in the TMS (normalized by body weight) of the heavier weight category. TMS of heavyweight judokas with LBP is characterized by lower trunk extensor and rotator strength. The relatively high load on the lumbar region caused by heavier body weight is probable for its relationship with LBP and low TMS, especially for rotator muscles. Both sides of the rotators are associated with not only athletic performance but also LBP.

Chapter 7 examined the impact of TMS on LBP occurrence in lightweight elite judokas by using LRA because the LRA impact on LBP is not the same in the lightweight judokas compared with the other two heavier weight categories. This chapter revealed the associations between LBP and TMS in lightweight judokas only in the absence of LRA. Lightweight judokas with LBP without LRA show weaker extensor, flexor, and both sides of the rotators. Moreover, judokas with more severe LBP show lower TMS, especially for the extensor, dominant-rotator, and dominant/non-dominant rotator ratio. The same tendencies were not observed for lightweight judokas with LRA. Therefore, weak TMS has an impact on LBP occurrence in lightweight judokas without LRA.

This doctoral dissertation concluded that trunk muscles are related to

athletic performance and low back injuries, including LBP, in elite judokas, depending on weight category. These findings suggested that rotational TMS is critical.