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Effects of Non-dominant Side Strength Training on Athletic Performance of Modern Pentathlon Athletes

Wang, J.H., Qiu, J., Tan, C.H., Cao, G.H., Cao, Z.R., Zhang, B., Dong, H.Y.

Shanghai Research Institute of Sports Science

INTRODUCTION:

This study evaluates the changes in the strength of both sides of the lower limbs after stage training through unilateral lower limb resistance strength training intervention with the same load and different movement modes. It explores the impact of non-dominant side strength changes on the related sports performance of modern pentathlon athletes.

METHODS:

Fourteen athletes from the Shanghai modern pentathlon training team were selected as subjects for this study. The experimental intervention group was identified based on isokinetic strength test results. The experimental intervention involved seven participants in the experimental intervention group and seven participants in the experimental control group. The control group utilized bilateral load balance training for strength training, while the experimental group used unilateral strength training with both single and bilateral movement modes, maintaining a one-to-one correspondence, and the training load remained consistent. The training was conducted three times a week for a duration of 12 weeks.

RESULTS:

(1) Non-dominant knee flexor and extensor strength, non-dominant ankle dorsiflexor strength were significantly correlated with CMJ, SJ, lower extremity relative maximum strength, 2 sets of 14m kendo round trip, 100 m swimming, laser run. (2) After training intervention, the strength of knee flexor and extensor muscle on the non-dominant side and dorsiflexor muscle on the non-dominant side of ankle joint in the experimental group were significantly increased, and the difference between the two sides was significantly decreased ($P < 0.01$), and the Y balance in the experimental group was significantly improved. (3) The maximum power and average power of anaerobic power in the experimental group were significantly increased in 30s, and CMJ, SJ, reaction force, 1RM squat, relative 1RM squat, 30 m run, 3000 m run in the experimental group were significantly increased. The performance indexes of 2 sets of 14m Kendo round trip, 100 m swimming, 200 m swimming and laser running were significantly improved in the experimental group.

CONCLUSION:

Our findings suggest that (1) The strength of the non-dominant lower limb may significantly impact the Y balance, sports injury, anaerobic work, speed, strength, and specific sports performance indexes of modern pentathlon athletes. (2) Unilateral body strength training, utilizing both single and bilateral movement modes, can effectively improve the flexion and extension strength of the non-dominant knee joint and the plantar dorsiflexion strength of the ankle joint in modern pentathlon athletes. (3) The improvement in flexor and extensor muscle strength of the knee joint on the non-dominant side, along with dorsiflexor muscle strength of the ankle joint on the non-dominant side, can effectively promote the development of special strength, speed, anaerobic endurance, aerobic endurance quality, and specific sports performance of modern pentathlon athletes.

Topic: Training and Testing

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