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上肢筋力増加によるノルディックウォーキング中の心拍数-血中乳酸濃度関係の生理的適応について－運動処方への安全な運用を目的として－

(Adaptive changes in the heart rate-blood lactate accumulation relationship by increased upper limb muscle force during Nordic walking)

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Abstract

Nordic walking (NW), in comparison with normal walking (W), is thought to increase stimulation to respiratory and circulatory systems and increase energy consumption, while blood lactate accumulation (La) kinetics largely depend on individual differences. Thus, particular care should be taken when prescribing NW for exercise. The aim of this study was to examine the effects of personal body profiles on various physiological responses, including La, during NW. Twenty-eight young female subjects performed treadmill walk tests (incline 5%) after the measurement of body height, weight, and muscle strength. Heart rate (HR), oxygen uptake ($\dot{V}O_2$), and La were measured during the walk tests. HR at La of 4 mmol/L (HR_{OBLA}) was calculated. Subjects were divided to High group or Low group according to their body profiles to compare HR_{OBLA} and walk speeds at OBLA (V_{OBLA}). HR_{OBLA} was significantly ($p<0.05$) higher in the elbow extension strength (elbow EX)- High group compared to the Low group. Elbow EX Low group reached OBLA at lower HRthan the High group. In the next protocol, five subjects of elbow EX- Low group received strength training to the upper limbs for one month. In these subjects, HR_{OBLA} during NW increased significantly from 162.0±3.0 bpm to 167.2±2.7 bpm following training, indicating that elbow EX is an important factor for determining NW exercise intensity. Overall, these data suggest that arm strength should be considered when prescribing NW as an exercise.