EFFECTS OF RESISTANCE TRAINING ON MUSCLE HISTOLOGY AND CROSS-COUNTRY SKI PERFORMANCE

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Previous research has demonstrated that heavy resistance exercise can increase the endurance performance in runners (Paavolainen et al., 1999) and that upper body training can induce the same effect in cross-country skiers (Hoff et al., 2002, 1999; Østerås et al., 2002; Terzis et al., 2005). This study aimed at evaluating effects of two intensive resistance exercise programs and to relate these effects to cross-country ski race performance, roller-ski test performance and adaptations of the vastus lateralis muscle in male and female elite junior cross-country skiers. Altogether 37 well-trained male and female cross-country skiers volunteered to participate in the study. The subjects were randomly allocated to follow a 9-wk intervention program or a 5-mo intervention program. Each of these programs had to subgroups: maximal resistance training with 3x6 reps (MRT) or an endurance-like resistance training program with 3x30 reps (ERT). Generally, improvements in roller board test performance positively predicted enhanced roller-ski time-trial test performance (P = 0.04), whereas enhanced performance in push-ups (P = 0.004) and increased cross-sectional area of the type IIAX muscle fibres (P = 0.03) positively predicted cross-country ski race performance. Gender differences in predictions of cross-country ski race performance were observed: Training by 3x30 reps predicted performance improvement among females (P = 0.05), whereas training by 3x6 reps predicted performance improvement among males (P = 0.03). Effects of upper body resistance training generally appeared to be important for cross-country ski race performance. Strength test performance rose from pre-to-post training measurements in all subjects. Minor changes were found in vastus lateralis muscle fibre type composition.

Keywords: Strength Training, Cross Country Skiing