EFFECT OF FATIGUE ON DYNAMIC BALANCE AFTER MAXIMUM INTENSITY CROSS-COUNTRY SKIING

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INTRODUCTION: Cross-country skiing stresses most of the joints, muscles and tendons in the body giving an overall workout. Skiing requires aerobic and anaerobic power, muscular strength and a variety of complex motor abilities including reaction time, agility, balance, coordination and attention demands (Emily & Arthur, 1989). Muscular fatigue is a key factor which can influence performance via impaired joint proprioception and postural control. Fatigue alters the force generation capacity of the muscle and ultimately leads to task failure (Mahyar et al, 2007). Injury risk increases as time duration of the skiing increases (Smith, Matheson & Meeuwisse, 1996). The maintenance of body posture and balance is an essential requirement for performance of daily tasks and sporting activities. Thus fatigue could affect a skier's performance through an effect on balance. Fast starts at the beginning of races and short intense efforts required for ascending hills could result in periods of fatigue that could affect balance and performance. Hence fatigue may either result in injury or affect the finish time of the skiers. The main purpose of this study was to evaluate how dynamic balance of the skiers can be influenced by fatigue states following maximum exercise

METHODS: Twelve experienced collegiate cross-country skiers participated in this study. All subjects were given oral and written instruction about the purpose of study and the methods used. An oversized treadmill was used for roller-skiing and a standardized force platform to measure dynamic balance. All subjects were asked to perform roller-skiing with a combination of V1 and/or V2 skating techniques on the oversized treadmill to the point of exhaustion to determine maximum oxygen uptake level. The dynamic balance was measured before and after the high intensity roller skiing test using a force platform (OR6-5-2000, AMTI, Watertown, MA, USA). All subjects were asked to step onto the force platform and maintain balance as soon as possible. The dynamic balance was measured using the time taken to reach stability i.e., from the point of the step onto the force platform until they achieved and maintained a steady state of vertical ground reaction force within 5 percent of their body weight. The data were recorded in AMTI NetForce 2.0 and were analyzed for the vertical force generation when the subjects stepped on to the force platform, using the body weight measured in Newton units. Trials post fatigue occurred within 60 s of fatiguing roller-ski exercise. Subjects performed three trials at 30 s intervals before and after roller-skiing.

RESULTS AND DISCUSSION: Data analysis revealed an interaction of trials and the fatigue state in balance measurement ($p<0.05$). Thus fatigue affected balance in skiers across the trials after high intensity exercise. Main effects differences across trials and fatigue state were not significant ($p = 0.635$ and $p = 0.059$ respectively). This may help to explain changes in performance with fatigue.

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