

Abstract

Title:

Comparison of loads during movement on the roller skis with or without additional weight

Objectives:

The aim of this study was to compare the changes in heart rate (HR), VO_2 and energy expenditure (EE) when moving on roller skis with or without weight in different inclinations in a laboratory conditions.

Methods:

A randomised cross-over study was conducted on 10 male students of Military Department at the Faculty of Physical Education and Sports of Charles University (mean \pm SD: age 22.6 \pm 1.59 years, weight 76.8 \pm 5.55 kg, height 180.2 \pm 2.4 cm). The study was performed in a biomedical laboratory at the University, José Martího 269, 162 52, Prague. Each volunteer underwent two tests on treadmill ergometer using modified roller skis. The tests consisted of 15 minutes walking at a constant speed 3 km/h, incline started at 15% and was raised by 5% every 5 minutes. Once out of two times, volunteers carried an additional weight of 15 kg backpack in random order. Significance level was set to $p < 0.05$ and the data were processed using analysis of repeated measurements (ANOVA).

Results:

Results show that the energy demands are substantially higher with the additional weight. Shown as mean difference between weight and weight-free groups. At 15% incline - HR 13.9%, VO_2 17.9%, EE 18.6%. At 20% incline the difference in HR was lower (12.59%) and higher in VO_2 (20.3%) and in EE (21.3%). At 25% incline the differences were lower than at 20% - HR 9.38%, VO_2 19.1%, EE 20.3%. Statistical significance ($p < 0.05$) was found for mean differences of EE in steady state at all incline levels (15%, 20%, 25%). It was not found for any other measured value at any incline level.

Keyword:

ski mountaineering, movement on the skis, energy expenditure, heart rate, load