

Abstract

Title of master thesis

Effect of ski-mountaineering equipment on energy expenditure of skiing.

Work objectives

The aim of this study was to determine the effect of weight ski equipment energy performance when walking on snow.

Methods

The study included 6 skialpinists a mean age of 30 ± 5.5 years. Energy intensity was measured on the basis of breathe oxygen (VO_2) and exhaled (VCO_2). The measurements were used 3 types of ski-hiking equipment (light - medium x 3160 g – 7754 g x heavy – 9600 g). Each test first completed section in a time of 6 minutes flat terrain (0°), after which he immediately set out to climb the 360 m long route at an angle (20°). These two sections (0° and 20°) graduated in random order for each type of equipment and at a constant speed of $1 \text{ m}\cdot\text{s}^{-1}$.

Results

The results show that energy intensity decreases significantly when using ultralight ski equipment. We found that the climb at an angle of 20° is the difference in oxygen consumption (VO_2) between moderate and light equipment 9.6% between heavy and light equipment 17.7% and medium-heavy and heavy equipment 7,4%. The average VO_2 test with light equipment was $44.4 \pm 3.7 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$, with moderate equipment $48.7 \pm 5.6 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ and heavy equipment $52.2 \pm 4.8 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. At 0° inclination and moderate use of heavy equipment were recorded increase compared to those using light equipment by 11.8%. For heavy then an increase of 32.9% compared to those using light equipment and heavy equipment was increased by 18.9% compared to those using medium heavy equipment. VO_2 with lightweight equipment amounted to $17.2 \pm 4.4 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. For medium heavy equipment $19.0 \pm 3.5 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ and heavy equipment $22.6 \pm 8.3 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$.

Conclusion

We found a significant effect of weight equipment performance requirements walking on alpine skis.

Key words

Ski – mountaineering, bioenergetics, technical equipment.