Title: Energy balance during a training course for Belgian Paratroopers
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Summary

Summary: The training of Belgian paratroopers is a challenge to prepare candidates to accomplish demanding military missions. To succeed in the training course, high-level performances are mandatory. It is well-known that adequate energy supply is a prerequisite for optimal performances and recovery. The aim of the present study was to estimate energy balance during a training course for Belgian paratroopers.

Methods-Results: Energy expenditure was measured during 13 days with accelerometer (ActiGraph GT3X+, ActiGraph LLC, Pensacola, FL, USA), and rest metabolic rate in $kcal.d^{-1}$ with the Tinsley equation = 25.9 * fat-free mass in kilogram + 284 (1). Participants had only access to the French individual combat rations of 3.600 $kcal.d^{-1}$, and body fat mass was measured with quadripolar impedance (Omron BF508, Omron, Osaka, Japan).

In total 36 male candidates participated to the study. Mean (SD) was for age 25,3 (4,27) years, for BMI 24,4 (1,83) kg/m^2, and for fat mass 11,9% (3,80). Mean (SD) rest metabolic rate was 2.070 (146,4) $kcal.day^{-1}$ and for physical activity 2.964 $kcal.day^{-1}$ (556,0). Mean (SD) total energy expenditure, i.e., the sum of rest metabolism, thermal effect of food and physical activity, was 5.241 $kcal.day^{-1}$ (654,9). Mean daily energy intake was 3.600 $kcal.day^{-1}$, giving a mean (SD) negative energy balance of 1.641 (654,9) $kcal.day^{-1}$.

The negative energy balance increased with increasing body weight, and can be described by the linear regression equation: energy expenditure in $kcal.day^{-1}$ = 42,095 x body weight in kilogram – 862,4 (R^2 = 0,46). This equation means for a body weight of 70 kg a negative energy balance of 2.084 $kcal.day^{-1}$, versus 2.926 $kcal.day^{-1}$ for a participant with a body weight of 90 kg.

Conclusions: As conclusion, energy intake during this training course is not optimal as indicated by the negative energy balance, which means that the participants had to perform in suboptimal conditions. When supplying the same military rations of 3.600 $kcal.d^{-1}$ to all participants, those with a higher body weight will have a more negative energy balance. This emphasized the importance of individually tailored nutritional approach.

Reference

1. Tinsley GM, Graybeal AJ, Moore ML. Resting metabolic rate in muscular physique athletes: validity of existing methods and development of new prediction equations. Appl Physiol Nutr Metab. 2019 Apr;44(4):397-406.