Abstract

Title: Anthropometric factors of Czech artillery soldiers

Objectives: The aim of this paper is to evaluate somatotype and body composition of Czech artillery soldiers. It compares three different methods of determining body fat and searches for an easily measurable and reliable predictor of low bone density, whereas evaluating correlations between selected anthropometric factors.

Methods: Members of the 13th Artillery Regiment Jince were divided into three groups according to their classification, after which a stratified selection was used to maintain appropriate ratio of the groups. The study involved 189 men and 20 women (age 31.7 ± 6.4 years; height 178.4 ± 7.7 cm; weight 83.8 ± 13.6 kg). All participants were active professional soldiers at the time of the measurement. The data were obtained in the Jince Military Base and in the biomedical laboratory at the Faculty of Physical Education and Sports of Charles University. Each volunteer underwent four procedures - Heath-Carter somatotyping, Durnin-Womersley body fat estimation, a detailed bioelectrical impedance analysis (BIA) using Tanita MC-980, and a full-body dual-energy X-ray absorptiometry (DXA) using Horizon System. To determine mutual relations, Kendall rank correlation coefficient was used and the level of significance was set at $p = 0.05$.

Results: The average Czech artillery soldier is an endomorphic mesomorph with values of 4,6-6,2-1,6, has 25,3 % body fat (DXA), BMI 26,3 ± 3,5 kg/m^2 and bone mineral density T-score -0,1 ± 0,9. Compared to DXA used as a reference, the Tanita MC-980 BIA and Durnin-Womersley method measures 5,9 % and 3,3 % lower body fat mass, respectively. According to aquired data, it is not possible to determine a reliable predictor of low bone density using standard anthropometric methods. Largest correlation rate and effect size was found for bone mass estimated by BIA and for sum of humer and femur epidondyls width (both values $\tau = 0,18$; $p < 0,001$).

Keywords: anthropometrics, somatotype, body fat, osteoporosis, DXA, BIA, Czech Army