

Abstract

Introduction: Current findings show that obesity may not only have a protective effect in terms of the osteoporosis development. Although higher mechanical load on bones in obese people increases bone mass density, inflammatory cytokines produced by adipose tissue, on the contrary, increase bone resorption. The reduction of body weight itself can contribute to the deterioration of the quality of bone mass.

Aim: The main aim of the study was to evaluate changes in BMD and selected parameters of body composition during a 2-month strict very low-calorie diet (VLCD) and a subsequent 4-month low-calorie diet (LCD) in premenopausal women with obesity.

Methods: The study was carried out at the workplaces of the III. Internal Clinic of the General University Hospital in Prague and the Institute of Endocrinology in Prague. Data were collected in the period from April 2021 to May 2023. 11 patients participated in the study with dietary intervention, data was processed from 10 of them. The average age was 44.1 ± 9.3 years, the average weight was 94 ± 10.4 kg. The control group consisted of 14 patients, 10 of them were included in the study. The average age in the control group was 40.7 ± 6.4 years, the average weight was 64.4 ± 7.5 kg. Patients of the intervention group were given a very low-calorie diet with an energy content of 4200 kJ for 2 months, and a low-calorie diet with an energy content of 6000 kJ for the following two months. Data were obtained from densitometry, bioelectrical impedance, and diet records.

Results: The patients experienced a statistically significant change in a number of parameters after the 6-month intervention. Body weight decreased by 13.1 ± 5.2 kg, which represents a loss of $14 \pm 5.4\%$ of body weight. Total BMC increased by $2.6 \pm 1.7\%$, total BMD increased by $2.2 \pm 1.5\%$. On the contrary, there was a statistically significant decrease in BMD of the total femur, by $1.4 \pm 1\%$.

Conclusion: After weight reduction, BMD decreased in some areas, most significantly in the hip area. Conversely, total bone mineral content and whole-body BMD increased after weight reduction. This suggests that these parameters respond not only to simple mechanical load on the bones, but also to the overall energy metabolism. Protective against the loss of BMD in the hip area could be physical activity, which, together with sufficient protein intake, also has a protective effect against the loss of active muscle mass during strict reduction regimes.

Key words: bone metabolism, osteoporosis, obesity, weight loss, VLCD