

## Abstract

**Introduction:** Primary hyperparathyroidism (PHPT) is the third most common endocrine disease after diabetes and thyroid disease. As a result of an increase in the autonomous production and secretion of parathyroid hormone by the parathyroid glands, there is a disturbance in the metabolism of calcium and phosphates. Hypercalcemia and hypophosphatemia with simultaneously elevated serum PTH concentration are characteristic. The incidence is highest between the ages of 50 and 60 and affects women 3-4 times more often than men in this age period. Primary hyperparathyroidism is often accompanied by secondary osteoporosis and, in postmenopausal women, also an increased prevalence of overweight and obesity.

**Objective:** The objective was to assess the incidence of osteoporosis and dietary habits in postmenopausal women with PHPT in relation to body composition and osteoporosis risk factors including 25-hydroxyvitamin D levels and changes in bone mineral density (BMD) in relation to body composition and vitamin D levels after successful parathyroidectomy.

**File and methodology:** The file consisted of 68 patients in the postmenopausal period with PHPT. The examination protocol consisted of a densitometric and biochemical examination and a questionnaire survey. Results from the densitometric examination and laboratory parameters were statistically compared using descriptive statistics. Pearson's correlation coefficient was used to examine the relationships between variables. We chose p value  $<0.05$  as the level of significance. Welch's t-test was also used to compare the distributions of monitored parameters before and after surgery.

**Results:** The results of the study showed the highest incidence of osteoporosis (in 4.8 % of patients) in areas with a predominance of cortical bone (distal 1/3 radius and whole-body BMD). At the same time, a high prevalence of vitamin D deficiency was demonstrated (82.1 % of patients). The lowest levels of 25OHD were in overweight and obese individuals. A survey of the eating habits of patients with PHPT revealed an insufficient daily intake of dietary calcium (in 84.5 % of patients). Postoperative changes in BMD in the individual measured areas of the skeleton after surgery were not dependent on preoperative 25OHD concentration ( $p = 0.068$ ), but there was a trend of higher BMD increase in the total proximal femur in patients with preoperative vitamin D deficiency (25OHD levels  $\leq 50$  nmol/l). Postoperative BMD changes also showed a significant dependence on the initial (preoperative) BMI values in the femoral neck area when a lower increase in BMD was recorded in obese patients ( $p = 0.007$ ).

**Conclusion:** The research demonstrated a high prevalence of osteoporosis in postmenopausal women with PHPT, where low BMD was noted especially in areas with a predominance of cortical bone. This result indicates a higher fracture risk compared to the population of

women with postmenopausal osteoporosis, where cortical bone loss is not common. The survey showed insufficient calcium intake in most women, which, with a high prevalence of vitamin D deficiency (detected in 82.1 % of women), undoubtedly contributes to cortical bone loss. At the same time, we confirmed a high prevalence of overweight and obesity. The results showed that obesity is a protective factor for BMD in the proximal femur region, but on the other hand negatively contributes to vitamin D deficiency and a smaller increase in BMD after surgery. Compliance with the recommended calcium intake and vitamin D supplementation to prevent its deficiency is also very important in the context of PHPT. Obesity in postmenopausal women with PHPT appears to be another risk factor in terms of the development of vitamin D deficiency, and thus other bone complications will lead to a greater increase in BMD.