VITAMIN D STATUS AND BONE MINERAL DENSITY IN PATIENTS WITH HYPOTHYROIDISM AND HYPERTHYROIDISM: FINDINGS FROM AN OBSERVATIONAL STUDY IN UZBEKISTAN

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Abstract

This study compared vitamin D status and bone mineral density (BMD) in 50 patients with thyroid dysfunction, including 28 with hypothyroidism and 22 with hyperthyroidism. Serum 25(OH)D and calcium levels were measured, and lumbar spine and total hip BMD were assessed by DXA. Patients with hyperthyroidism had lower vitamin D levels and significantly lower BMD than those with hypothyroidism ($p < 0.05$), while serum calcium was higher. These findings suggest that hyperthyroidism may be associated with reduced vitamin D status and impaired bone health.

Keywords: vitamin D, bone mineral density, hypothyroidism, hyperthyroidism, thyroid dysfunction, osteoporosis

Background and Aim

Vitamin D is essential for calcium homeostasis and skeletal health. Patients with thyroid disorders may be at increased risk of alterations in bone mineral density (BMD), particularly in the setting of increased bone turnover associated with thyroid hormone excess. However, the relationship between vitamin D status and skeletal health in patients with thyroid dysfunction remains clinically relevant. This study aimed to compare vitamin D status and BMD in patients with hypothyroidism and hyperthyroidism.

Methods

This observational study included 50 patients with thyroid dysfunction treated at the Republican Specialized Scientific and Practical Medical Center of Endocrinology named after Academician Y.H. Turakulov in Tashkent, Uzbekistan. Participants were divided into two groups according to thyroid function: hypothyroidism ($n = 28$) and hyperthyroidism ($n = 22$). The mean age of the study population was 32.9 ± 4.07 years.

Serum 25-hydroxyvitamin D [25(OH)D] and calcium concentrations were measured. BMD of the lumbar spine (L1–L4) and total hip was assessed by dual-energy X-ray absorptiometry (DXA). Thyroid function was evaluated using serum TSH, free T4, and free T3. Statistical analysis was performed using SPSS version 25.0, with $p < 0.05$ considered statistically significant.

Results

Mean serum 25(OH)D concentration was lower in patients with hyperthyroidism than in those with hypothyroidism (18.0 ± 6.0 vs. 22.5 ± 7.5 ng/mL). Patients with hyperthyroidism also demonstrated lower BMD at both measured skeletal sites. Lumbar spine BMD was 0.85 ± 0.08 g/cm² in the hyperthyroidism group compared with 0.98 ± 0.06 g/cm² in the hypothyroidism group, corresponding to approximate T-scores of −1.8 and −0.4, respectively. Total hip BMD was 0.78 ± 0.07 g/cm² versus 0.92 ± 0.05 g/cm², with approximate T-scores of −1.6 and −0.2, respectively. The between-group differences in BMD were statistically significant ($p < 0.05$). Serum calcium was higher in the hyperthyroidism group (2.60 ± 0.08 vs. 2.25 ± 0.06 mmol/L).

Conclusions

In this preliminary observational cohort, hyperthyroidism was associated with lower vitamin D levels and substantially lower BMD compared with hypothyroidism. The findings emphasize the importance of assessing skeletal health and vitamin D status in patients with thyroid dysfunction, particularly in those with hyperthyroidism. Further studies with larger samples and correlation analyses are needed to clarify the independent contribution of vitamin D status and thyroid hormone excess to reduced BMD.