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Comparison of Vitamin D Level, Bone Metabolic Markers and Bone Mineral Density among Patients with Thyroid Disease: A Cross-Sectional Study

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INTRODUCTION

Thyroid hormone has direct effect on bone mineral homeostasis. Hyperthyroidism and hypothyroidism are both associated with reduced bone mineral density (BMD) leading to fracture. Low vitamin D in this group leads to increased risk for osteoporosis. The objective of this study is to evaluate serum vitamin D level, serum calcium, phosphate, bone turnover markers and bone mineral density in patients with thyroid disease.

METHODOLOGY

This is cross-sectional study. Subjects with thyroid disease age 20 to 40 years old in 2 tertiary hospitals in Kelantan were recruited from June 2017 until June 2018. Control subjects were recruited from volunteers without underlying thyroid disease. Patients with chronic illness, pregnancy, lactation and medications that affect vitamin D level and bone metabolism were excluded in the study. Participants were divided into 4 groups (hyperthyroid, hypothyroid, euthyroid and control). Serum vitamin D, serum calcium, serum phosphate, bone resorptive and bone formation markers were measured. BMD was measured using z-score and bone density in g/cm^2 of the left hip and lumbar spine.

RESULTS

A total of 199 subjects were recruited. 135 patients with thyroid disease (64 hyperthyroid, 53 euthyroid, 18 hypothyroid) and 64 control subjects were involved. Mean serum vitamin D in all groups were insufficient (<50 nmol/L). Subjects with thyroid disease had high serum vitamin D level compared to control groups, (euthyroid 49.55 (18.57) nmol/L, hypothyroid 45.74 (15.17) nmol/L, hyperthyroid 43.6 (20.83) nmol/L, and control 37.38 (17.21) nmol/L, p value: 0.006). Serum calcium and phosphate were normal in all groups. Bone turnover markers were significantly higher in hyperthyroid group and lower in hypothyroid group. There was no difference in the z-scores between groups. Bone density in g/cm^2 of the hip was significantly lower in the hyperthyroid group, p value: 0.002.

CONCLUSION

Serum vitamin D was not affected by status of thyroid disease. Serum calcium and phosphate were normal in all groups. Bone turnover markers were higher in the hyperthyroid and lower in the hypothyroid groups. Hip bone mineral density in g/cm^2 was lower in the hyperthyroid group.