

Vitamin D status and vitamin D receptor (VDR) gene polymorphism (FokI rs2228570) in patients with autoimmune hypothyroidism

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Abstract

Background: Autoimmune hypothyroidism is one of the most common causes of hypothyroidism, and vitamin D insufficiency has been linked to autoimmune diseases including autoimmune hypothyroidism, but its interplay with vitamin D receptor (VDR) gene variation remains poorly defined in the Bangladeshi population.

Objectives: To investigate vitamin D status in Bangladeshi patients with newly detected autoimmune hypothyroidism and examine its association with the VDR FokI gene polymorphism (rs2228570).

Methods: This Case-control study was conducted in the Department of Endocrinology, BMU, enrolling 135 patients with autoimmune hypothyroidism and 135 age- and sex-comparable euthyroid controls by non-random purposive sampling. Serum FT4, TSH, anti-TPO and anti-Tg antibodies were measured by chemiluminescence, 25-OH-vitamin D3 by HPLC-UV, and VDR FokI genotyped from whole blood. Data were analyzed using chi-square, Fisher's exact, Mann-Whitney U, Spearman correlation, and logistic regression under codominant, recessive, over-dominant, and log-additive genetic models, along with multivariable logistic regression.

Results: Vitamin D deficiency (14.81% vs 2.96%) and insufficiency (24.44% vs 8.89%) were significantly more common among cases than controls ($p < 0.001$), and vitamin D correlated inversely with TSH, anti-TPO and anti-Tg, and positively with FT4 (all $p < 0.05$). The TC genotype was most frequent in both groups; under the dominant model, T-allele carriage (TC+TT vs CC) was significantly associated with autoimmune hypothyroidism (OR=1.809, 95% CI 1.059-3.126, $p = 0.031$), the best-fitting genetic model tested. However, vitamin D status did not differ across genotypes. On multivariable analysis, the CC genotype was independently protective (AOR=0.35, $p = 0.010$), while family history of thyroid disease (AOR=11.45, $p < 0.001$), obesity (AOR=3.77, $p = 0.008$) and vitamin D deficiency (AOR=4.47, $p = 0.060$) were the strongest independent predictors of autoimmune hypothyroidism.

Conclusions: Vitamin D deficiency/insufficiency and VDR FokI T-allele carriage were significantly associated with autoimmune hypothyroidism, with the CC genotype independently protective and family history and obesity as key co-predictors. These findings support a model in which vitamin D status and VDR-mediated immune signaling act as partially independent, clinically important contributors to autoimmune hypothyroidism in this population. [*J Assoc Clin Endocrinol Diabetol Bangladesh*, 2026;5(Suppl 1): S36]

Keywords: Autoimmune hypothyroidism, FokI polymorphism, Vitamin D receptor (VDR) gene, Vitamin D status

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