

Title: Vitamin D deficiency and the vitamin D receptor (VDR) gene polymorphism rs2228570 (FokI) are associated with an increased susceptibility to hypertension among the Bangladeshi population

Author Names: Imrul Kayes Nabil, Zimam Mahmud, Sonia Tamanna, Md Mostafijur Rahman, Gowhar Rashid, Md Sarowar Hossain, Humaira Binte Asad, Mohammad Amjad Kamal, Md Zakir Hossain Howlader

Abstract: Vitamin D receptor (VDR) gene is implicated in hypertension vulnerability due to its role in regulating the renin-angiotensin system (RAS) and blood pressure. In this case-control study, a carefully selected cohort of 111 hypertensive individuals and 100 healthy controls underwent serum analysis using HPLC to measure 25-hydroxy vitamin D levels. Polymorphic variations in the VDR gene were detected and characterized using the PCR-RFLP method. At first, lower 25-hydroxy vitamin D levels were observed in hypertensive individuals compared to controls ($p < 0.001$). The genotype frequency of the VDR gene TaqI showed no significant difference between cases and controls ($p > 0.05$). Similarly, no significant difference was found in the VDR gene BsmI genotype frequency between hypertensive patients and controls ($p > 0.05$). However, a statistically significant distinction was observed in the VDR gene FokI genotype frequency between cases and controls ($p < 0.01$). The odds ratios for FokI genotypes (CC, CT, TT, and CT+TT) were 1.0, 0.590, 1.566, and 0.963, respectively. Furthermore, serum 25-hydroxy vitamin D levels were significantly higher in control subjects compared to hypertensive patients across all genotypes of VDR ($p < 0.001$). Hypertensive patients, excluding those with the FokI VDR gene CC genotype, exhibited significantly higher systolic blood pressure levels compared to the control group ($p < 0.05$). Similarly, hypertensive subjects displayed elevated diastolic blood pressure levels compared to the control group ($p < 0.001$). Overall, the results suggest the presence of a potential inverse correlation between serum 25-hydroxy vitamin D levels and hypertension. The association analysis conducted indicated that there is no significant association between TaqI and bsmI genotypic variants and the risk of developing hypertension. However, it was observed that VDR gene polymorphisms do have a clear association with hypertension susceptibility, as evidenced by the significantly higher occurrence of FokI genotypic variants in hypertensive patients. Our study therefore introduces the possibility of utilizing 25-hydroxy vitamin D deficiency and VDR gene polymorphisms as a biomarker for hypertension.

Keywords: Vitamin D receptor (VDR) gene 25-hydroxy vitamin D (25(OH)D) Hypertension PCR-RFLP Gene polymorphism

<https://pubmed.ncbi.nlm.nih.gov/38483874/>