

Genetic Insights: TCF7L2 Polymorphisms in Young Bangladeshi with Type 2 Diabetes Mellitus

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Abstract

Background: The prevalence of youth-onset type 2 diabetes mellitus (T2D) is increasing worldwide, including Bangladesh. Variants in the transcription factor 7-like 2 (TCF7L2) gene are strongly associated with T2D, but their role in young individuals remains uncertain.

Objectives: To examine the frequency and association of TCF7L2 polymorphisms-rs7903146 (C>T) and rs12255372 (G>T)-in Bangladeshi youth with phenotypic T2D.

Methods: In this cross-sectional study, 163 youth-onset phenotypic T2D patients and 149 age-group matched controls with normal glucose tolerance (NGT) were recruited at BMU (March 2022-September 2024). Demographic, clinical, and biochemical data were recorded. Genotyping was performed by Sanger sequencing, though sequencing failed in 67 (rs7903146) and 44 (rs12255372) samples due to insufficient DNA. Genotype and allele frequencies were compared; Hardy-Weinberg equilibrium, linkage disequilibrium, and genetic models were analyzed.

Results: For rs12255372, polymorphic genotypes were more frequent in NGT (GT 59.5%, TT 17.1%) than T2D (GT 47.8%, TT 11.2%), while the wild genotype (GG) was higher in T2D (41.0% vs. 23.4%, $p=0.012$). Significant associations were observed under co-dominant ($p=0.011$) and dominant ($p=0.003$) models. The minor allele frequency of rs12255372 was higher in NGT (46.8% vs. 35.1%, $p=0.008$). By contrast, rs7903146 showed no significant differences in genotype ($p=0.334$) or allele frequencies ($p=0.142$). Haplotype analysis indicated that the T-C haplotype (rs12255372-T, rs7903146-C) was significantly less common in T2D (OR 0.24, 95% CI 0.12-0.48, $p<0.001$). Logistic regression confirmed rs12255372 polymorphism (GT+TT) as protective [OR 0.48, 95% CI 0.27-0.85, $p=0.012$], while rs7903146 showed no association.

Conclusion: TCF7L2 polymorphisms are present in Bangladeshi youth; rs12255372 confers protection against T2D, whereas rs7903146 shows no significant association. [*J Assoc Clin Endocrinol Diabetol Bangladesh*, 2025;4(Suppl 1): S42]

Keywords: Young diabetes, T2D, TCF7L2, Genetic polymorphism.

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