Genetic variants of the 11 beta-hydroxysteroid dehydrogenase type 1 gene influence metabolic syndrome

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Abstract

Background: Metabolic syndrome (metS) is the prominent public issue around the globe which contributes to several diseases, including type 2 diabetes, obesity, and insulin resistance (IR). At a recent time, IR due to cortisol excess has been implicated as part of metS etiology. The 11 beta-hydroxysteroid dehydrogenase type 1 (HSD11B1) gene that encodes 11 beta-hydroxysteroid dehydrogenase (11β-HSD1) enzyme has a pivotal role in maintaining serum cortisol level against IR. The aim of this study was to detect the frequency of HSD11B1 gene polymorphisms and their association with metS among the South Indian cohort.

Methods: Our study included 613 South Indians enrolled from the Kasturba Medical College hospital, Mangalore. Their biochemical and anthropometric data were recorded. The genotyping of NC_000001.10:g.209880259T>G and NC_000001.10:g.209875254G>A polymorphisms were carried out using amplification refractory mutation system-polymerase chain reaction (ARMS-PCR).

Results: NC_000001.10:g.209880259T>G polymorphism of the HSD11B1 gene was associated with metS. We observed significantly higher postprandial blood sugar (p=0.029) and lower high density lipoprotein (HDL) cholesterol (p=0.009) levels in control subjects with TG genotype compared to those with TT genotype of the NC_000001.10:g.209880259T>G. The control subjects with AA genotype of the NC_000001.10:g.209875254G>A had significantly lower diastolic blood pressure (DBP) compared to those with wild GG genotype (p=0.001). The control subjects with the combination of TG genotype of the NC_000001.10:g.209880259T>G and GG genotype of the NC_000001.10:g.209875254G>A had significantly higher blood pressure (p<0.001), blood sugar (p<0.05) and triglyceride levels (p=0.007), whereas those with the combination of TG genotype of the NC_000001.10:g.209880259T>G and GA genotype of the NC_000001.10:g.209875254G>A had significantly higher total cholesterol (p=0.008) and low density lipoprotein (LDL) cholesterol levels (p=0.029).

Conclusions: In conclusion, NC_000001.10:g.209880259T>G polymorphism of the HSD11B1 gene is associated with metS risk, including high blood sugar, blood pressure, and lipid levels. NC_000001.10:g.209875254G>A polymorphism is not associated with metS risk in South Indian cohort. The A allele of NC_000001.10:g.209875254G>A polymorphism appears to be protective against hypertension.

Key words: Metabolic syndrome; single nucleotide polymorphism; 11 beta-hydroxysteroid dehydrogenase type 1