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## ABSTRACT

Diabetes mellitus is a complex metabolic disorder associated with hyperglycemia either due to the reduced secretion of insulin hormone or insulin does not perform its function properly. Both genetic and environmental risk factors are involved in the onset of disease. The present project was designed to evaluate the genetic association of *MMP-9* gene with the onset of diabetes mellitus and its pattern of inheritance among families in Pakistani population. For this purpose blood samples were taken from 17 families including cases and controls. Three SNPs from *MMP-9* gene *rs 2274756 (TaqI)*, *rs 3918242 (SphI)* and *rs 17577 (StyI)* were selected for genotypic analysis. Genotypic analysis of each individual was performed by PCR-RFLP techniques. Females were at higher risk for diabetes mellitus as compared to males. Obesity and positive family history appeared to be important risk factors for the onset of disease. Genotypic analysis of *MMP-9 SNPs* showed that all selected SNPs *rs 2274756 (TaqI)*, *rs 3918242 (SphI)* and *rs 17577 (StyI)* were significantly associated with the onset of diabetes mellitus. The genotype CT and TT for *rs 3918242 (C/T)* in patients and non-diabetic controls were found to be highly associated with diabetes mellitus. For *rs 17577 A/G*, both homozygous GG and heterozygous AG mutations were identified in association with diabetes mellitus. In case of *rs 2274756 (A/G)*, heterozygous mutation AG was significantly associated with the onset of disease. The phenotypic and genotypic pedigree analysis showed the association of all the three SNPs in patients and their relatives indicating these *MMP-9 SNP's* may cause the disease in next generations at any stage of their life. In conclusion, diabetes mellitus is causing serious health hazards effecting large number of Pakistani population and *MMP9* gene polymorphisms (*rs 2274756 (TaqI)*, *rs 3918242 (SphI)* and *rs 17577 (StyI)*) play a significant role in the onset of diabetes mellitus. Hence, diabetes mellitus is effectively contributing to positive family history among Pakistani population.