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## **Association of Superoxide Dismutase with expression profiles of DNA repair and antioxidant genes in newly diagnosed Type 2 Diabetes Mellitus**

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**Objectives:** Type 2 Diabetes Mellitus (T2DM) is a multifactorial disease with major global health burden. Although, previous studies have highlighted the role of oxidative stress in development of T2DM, the findings are quite contradictory. Several studies report increase in Superoxide dismutase (SOD) activity in T2DM while others report its decrease. This study was planned to compare the levels of SOD in newly diagnosed T2DM patients with that of healthy non-diabetic controls. Further, gene expression profile of selected DNA repair (XRCC1, OGG1) and antioxidant (SOD1, SOD2) was planned in the study group to establish a relation between SOD activity, glycaemic status, and gene expression changes.

**Methods:** 30 newly diagnosed T2DM subjects and 30 age and sex-matched healthy controls participated in the study. Fasting blood glucose (FBG), glycated haemoglobin (HbA1c), high sensitivity C-reactive protein (hs-CRP) and lipid profile were estimated in auto-analyzer. Total SOD activity was estimated by spectrophotometry. Gene expression profiling of DNA repair genes (XRCC1 and OGG1) and antioxidant genes (SOD1 and SOD2) was done via Real-Time PCR.

**Results:** Except for HDL, all biochemical parameters were significantly different among study groups. The mean  $\pm$  SD of SOD was significantly lower in cases ( $599.8 \pm 178.9$  U/ml) ( $p < 0.05$ ) than in controls ( $691.3 \pm 127.3$  U/ml). Receiver operating characteristic (ROC) curve analysis showed an area under the curve (AUC) of 0.6 for SOD with p-value of 0.027. The fold change of XRCC1, OGG1, SOD1 and SOD2 in diabetics vs non-diabetics were 1.15, 1.50, 0.43 and 0.41 respectively. Among the four genes, expression of SOD1 was significantly different among study group ( $p < 0.05$ ).

**Conclusions:** Our study is first to correlate expression changes in DNA repair and antioxidant genes with SOD levels in newly diagnosed T2DM. Antioxidant genes were downregulated in diabetics with significant differences in SOD1. The SOD activity correlated with expression changes with a significant decrease in diabetics.