

## **PLASMA MEASURES OF OXIDATIVE STRESS AND ANTIOXIDANT STATUS IN TYPE 2 DIABETES MELLITUS**

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**OBJECTIVE:** The aim of this study was to test the hypothesis that type 2 diabetes mellitus is associated with increased oxidative stress in Iranian subjects.

**MATERIALS:** The study population consisted of 59 patients with type 2 diabetes (mean age 62.5±8.7 years). Type 2 diabetes was diagnosed according to the American Diabetes Association criteria. Thirty-six patients had diabetes complications and 23 patients had no complications. For the normal control subjects, 55 age- and sex-matched healthy control subjects (mean age 63±5.7 years) were included. Plasma vitamin E was analyzed with HPLC. Malondialdehyde (MDA), plasma glutathione (GSH) and vitamin C were spectrophotometrically measured. Total cholesterol, triacylglycerol, LDL and HDL cholesterol, HbA1c, uric acid, blood urea nitrogen (BUN) were studied.

**RESULTS:** Plasma vitamin E-to-lipid ratio, glutathione and vitamin C levels were significantly decreased in type 2 diabetes compared with controls (all  $p<0.05$ ). Plasma vitamin C and glutathione levels in diabetic patients with complications were significantly lower than in those without complications. MDA concentration was significantly higher in patients compared with controls ( $p<0.005$ ) as well as diabetes with complications compared to diabetes without complications ( $p<0.05$ ). Plasma levels of vitamin E/total lipid was similar in diabetic patients with or without complications. Plasma concentration of uric acid was significantly lower in patients with diabetes than in control subjects.

**CONCLUSIONS:** Our results support the oxidative stress hypothesis for type 2 diabetes mellitus. We therefore suggest that oxidative stress is an early stage in the disease pathology, which may contribute to the development of complications. .

**Key words:** type 2 diabetes mellitus, vitamin E, vitamin C, glutathione