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OXIDATIVE STRESS AND CARDIOVASCULAR RISK FACTORS IN TYPE 2 DIABETES PATIENTS

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In recent years, diabetes and its associated complications have come to represent a major public health concern. It is a complex disease characterized by multiple metabolic derangements that impairs cardiac function by disrupting the balance between pro-oxidants and antioxidants at the cellular level. Oxidative stress arises from an imbalance between the production of reactive oxygen and nitrogen species (ROS and RNS) and the capability of biological system to readily detoxify reactive intermediates. The subsequent generation of ROS and accompanying oxidative stress are hallmarks of the molecular mechanisms responsible for cardiovascular disease. Therefore, this study was carried out to assess the relationship between known cardiovascular risk factors and antioxidant status as an indication of oxidative stress among type 2 diabetic patients.

Eighty type 2 diabetes patients (25 males and 55 females) were recruited as subjects. Plasma antioxidant capacity was determined by the “ferric reducing ability of plasma (FRAP)” assay. Glutathione peroxidase, superoxide dismutase, uric acid, glycated haemoglobin (HbA1c), fasting plasma glucose and lipid profile were measured using commercially available reagent kits. Insulin level was assessed using Insulin- ELISA kit. Castelli risk indices I and II for cardiovascular diseases and insulin resistance (HOMA-IR) were derived. Ethical clearance was obtained from the Sri Lanka Medical Association. Relationship between rates of obesity and hypertension with lipid patterns was assessed. The data were analysed using SPSS software.

FRAP showed significant negative correlations with BMI ($r = -0.2$; $p = 0.046$) and waist- to-hip ratio ($r = -0.4$; $p = 0.039$) after adjusting for age, diabetes duration and fasting plasma glucose concentration. FRAP value and HOMA-IR ($r = -0.4$; $p = 0.002$) were negatively correlated after adjusting for diabetes duration, BMI and systolic blood pressure. Moreover, FRAP demonstrated a significant negative association with diastolic blood pressure ($\beta = -0.7$; $p = 0.013$). The superoxide dismutase level had a significant negative association with LDL-cholesterol ($\beta = -7.2$; $p = 0.048$). Glutathione peroxidase was negatively associated with HbA1c ($\beta = -3.2$; $p = 0.046$) triacylglycerol ($\beta = -1.2$; $p = 0.049$), LDL-cholesterol ($\beta = -2.4$; $p = 0.033$) and Castelli Indices I ($\beta = -1.4$; $p = 0.27$) and II ($\beta = -3.4$; $p = 0.027$).

In conclusion, the study revealed that the plasma antioxidant capacity, superoxide dismutase and glutathione peroxidase levels are negatively associated with cardiovascular risk factors such as insulin resistance, BMI, LDL-C, triacylglycerol, waist-to-hip ratio and hypertension. It indicates that the depleted antioxidant status leading to oxidative stress is positively associated with known cardiovascular risk factors (obesity, dyslipidemia and blood pressure).

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