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Anti-diabetic study of vitamin B6 on hyperglycemia, oxidative stress and DNA damage in alloxan induced diabetic rats: Therapeutic strategies

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The objective of this study is to assess the anti-diabetic and antioxidant potential of pyridoxamine using rat as the animal model. It is an organic compound ($C_6H_5NO_2$) and essential human nutrient which acts as a strong antioxidant for ROS generated in biological sample. The basic and more destructive features of diabetes are hyperglycemia and oxidative stress that leads to other complications associated with diabetes. In view of this, the present study was conducted to examine the effect of pyridoxamine on various antioxidant parameters like lipid peroxidation, protein carbonylation and DNA damage in diabetic rats. A total of 25 animals were divided into five groups viz. normal control, normal control received pyridoxamine (dose of 15 mg per kg of body weight), diabetic group induced through single intraperitoneal injection of alloxan (120 mg per kg of body weight) and diabetic rats treated with the pyridoxamine (10 mg per kg of body weight) and other diabetic group treated with the pyridoxamine (15 mg per kg of body weight). The dosing is carried out through oral gavaging for 1-month daily. Fasting blood glucose was examined for confirmation of diabetes. After 1 month all groups were sacrificed and several parameters like glucose metabolic enzymes, lipid peroxidation, protein carbonylation and various antioxidant parameters were assayed in the liver, kidney and pancreas. Damage and recovery in liver and kidney were also confirmed through histopathological studies. DNA damage due to ROS was also examined through comet assay. Intracellular ROS production was also checked in lymphocytes of diabetic and treated rat blood samples through microscopy. Our results showed noticeable improvement in various oxidative stress parameters like SOD, Catalase, GSH, along with glucose metabolic enzymes viz. hexokinase, G6Pase and FBPase. The most important biological parameter of the oxidative environment is lipid peroxidation, also found restored in treated samples. Protein carbonylation was also normalized. DNA damage and ROS production was also positively affected.

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