

SUMMARY

The number of reports on the effects of diabetes is still increasing because the diabetes is one of the major diseases of industrialized and non industrialized societies. There is currently a great interest in the potential contribution of increased oxidative stress to the pathogenesis of diabetes as well as its complications. Thus, the goal of this study was to determine if combination of vitamins C and E (nutritive antioxidants) had any beneficial effects on the physiological changes of diabetic rats.

In this regards five rat groups (12 rats each) were used:

- **Group I:** the control group,
- **Group II:** Rats supplemented with vitamins C (50 mg/kg b.w.) and vitamin E (250 mg/kg b.w.) for 10 days.
- **Group III:** Rats treated with streptozotocin (STZ) (45 mg/kg b.w.).
- **Group IV:** Rats supplemented with vitamins C (50 mg/kg b.w.) and vitamin E (250 mg/kg b.w.) for 10 days before STZ-diabetic induction.
- **Group V:** Rats supplemented with vitamins C (50 mg/kg b.w.) and vitamin E (250 mg/kg b.w.) for 10 days post STZ-diabetic induction.

According to the results of this study, the WBCs count showed a significant decrease in Group III related to that of Group I and this

might be due to the toxic effect of STZ. The WBCs count showed significant increases in Group II, Group IV and Group V as compared to that of Group III and this might be due to beneficial effects of vitamins C and E. There were non significant changes in RBCs count, Hb content and MCH in all treated groups. Hematocrite value showed a significant increase in Group II compared to other groups. MCV showed a significant increase in Group II as compared to those of Group III and Group IV. MCHC showed a significant increase in Group II related to those of diabetic groups. Platelets count showed a significant decrease in Group II related to diabetic groups.

Blood gases and blood acid-base status parameters revealed that all treated groups might have metabolic acidosis. The STZ-diabetic rats group and rat groups supplemented with vitamins C and E showed decreases of pH and HCO_3^- and compensated by decreasing arterial blood PCO_2 . On the other hand, the metabolic acidosis of rats supplemented with vitamins C & E before or post STZ-diabetic induction showed some ameliorations that indicated by returning the blood pH to nearly the normal value of the control group.

The oxygen equilibrium curves (OEC) of II, III, IV and V rat groups were located to the left of that of the group I, and this shift in OEC might be due to decrease of 2,3-diphosphoglycerate and increase glycosylated hemoglobin.

The activity of superoxide dismutase and reduced glutathione content were significantly decreased in diabetic groups (III, IV and V) as compared to non diabetic groups (I and II). Catalase activity of

diabetic groups increased significantly compared to non diabetic groups. The changes in antioxidant enzymes activity might be due to increased free radicals during diabetes. Treatment with vitamins C and E before or post STZ-diabetic induction caused amelioration of these enzyme activities.

The levels of blood glucose, total lipids, cholesterol, triglycerides, LDL-cholesterol, urea, creatinine, alanine aminotransaminase (ALT) and aspartate aminotransaminase (AST) showed significant increases in all diabetic rat groups compared to non diabetic rat groups and these might be due to the direct or indirect effects of insulin action. HDL-cholesterol, albumin, globulin, total proteins and uric acid concentrations were significantly decrease in all diabetic groups compared to non diabetic groups and these might be due to the direct or indirect effects of insulin action. The treatment of diabetic groups with vitamins C and E before or post STZ-diabetic induction caused great amelioration of these tested parameters and that might be due to the amelioration of insulin action. Group II showed significant increase of plasma glucose level compared to that of the group I and that might be due to that glucose and vitamin C shared structural similarities and may compete for glucose for the active membrane transport system in some tissues. Group II showed significant decreases of plasma cholesterol, LDL-cholesterol and HDL-cholesterol than that of the group I and that might be due to the role of vitamin C in the hydroxylation of cholesterol and converted it to bile acids and its role in regulated the activity of protein lipase and the role of vitamin E in transporting cholesterol through cell membrane. Group II showed significant

decreases in total proteins, albumin and globulin than that of the group I and that might be due to improve insulin action that accelerated amino acids transport through uptake of amino acids by cells.

The insulin activity decreased in all diabetic rat groups as compared to non-diabetic groups and these might be due to destruction of B-cells by STZ. Treatment with vitamins C and E caused amelioration of insulin action and that might be due to the effects of vitamins C and E as antioxidant enzymes.

It can be concluded that, the supplementation with C and E vitamins before or post STZ-diabetic induction improved the hematological, blood respiratory function and biochemical parameters in diabetic rats.