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Role of Inulin-type fructans on serum and levels of triglycerides and cholesterol in alloxan-induced diabetic nephropathy rats

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Objectives: Kidney disease as a major cause of mortality in patients with diabetes mellitus. Inulin-type fructans (ITFs) are a type of fermentable dietary fiber that can confer beneficial health effects through changes in the gut microbiota. Inulin-type fructans based formulations have major significance in insulin delivery system due to their ability to protect the insulin from enzymatic degradation and its efficient inter-epithelial transport.
This study was designed to investigate the role of ITFs administration on serum and levels of triglycerides and cholesterol, in kidney of female diabetic rats.

Methods: The Wistar female rats were divided into three groups: Control (C), Diabetic (DM); Diabetic ITFs (DITFs), treated with diet containing 100mg/kg of ITFs. After 5 weeks of experiment, glucose, insulin, creatinine , urea , gonadal fat and kidney mass were evaluated. Serum and kidney concentrations of triglycerides and cholesterol concentrations were quantified. The expression levels of transforming growth factor-β (TGF-β) and α smooth muscle actin (α-SMA) in kidneys were observed using immunohistochemical staining.

Results: After the 5 weeks, experimental groups shower ($P < 0.05$): Lower body mass; lower serum insulin; higher food intake and higher blood glucose, creatinine, triglycerides and urea levels. Immunohistochemistry revealed that there was a significant increase in TGF-β and α-SMA expression levels in the renal tubulointerstitium and the extracellular matrix in diabetic group. Glutathione peroxidase and superoxide dismutase activities in serum, liver, and kidney were all significantly less in the diabetic rats than in the controls. DITFs treatment of the diabetic rats resulted in significant increases in GPX activity in the kidneys and livers, and CAT activity in the sera and livers. DITFs treatment normalize TGF-β and α-SMA expression levels and restore blood glucose, creatinine, triglycerides and urea levels compared to control group.

Conclusions: Inulin-type fructans alleviated the consequences of the experimental diabetic disease, suggesting protection to hypertriglyceridemia and lipid peroxidation.