Vitamin C Supplement Modulates Heat Shock Protein 72 Gene Expression in Skeletal Muscle of Rats with Type 2 Diabetes.

Abstract:

Oxidative stress has been ascribed a role in the pathogenesis of diabetes and its complications and stress proteins have been shown to protect organisms in vito and in vivo against oxidative stress. This study examined the HSP72 gene expression in skeletal muscle of type 2 diabetic rats compared to control and the possibility to increase its level by oral administration of vitamin C (100 mg/Kg/day for 8 weeks). In addition, Gastrocnemius muscle glucose uptake, malondialdehyde (MDA) as a measure of lipid peroxidation, blood glucose and insulin as well as the insulin-resistance index (HOMA-IR) were assessed. The amount of HSP72 m RNA in muscles of diabetic rats was lower than in control non –diabetic group (20.3±6.37 versus 42.32±6.65µg/g tissue) and its expression increased significantly by vitamin C administration .there was an insignificant increase in muscle insulin-stimulated glucose uptake after vitamin C administration in diabetic rats compared to diabetics not receiving vitamin C.

The concentration of MDA increased significantly in diabetics compared to control group. Administration of vitamin C in diabetic rats prevented MDA significant rise compared to control receving vitamin C and decreased its HOMA-IR compared to the diabetic group not receiving vitamin C. The plasma glucose level following vitamin C administration in the diabetic group, showed a significant negative correlation with the expression of HSP 72.

In conclusion, the finding of decreased levels of HSP72 expression and decreased insulin – stimulated glucose uptake in skeletal muscle of type 2 diabetic rats raises the possibility that heat shock proteins may be involved in the pathogenesis of skeletal muscle insulin resistance in type 2 diabetics. Administration of vitamin C could be used in diabetics to increase heat shock protein HSP72 expression and to improve insulin resistance.

Key words: HSP72 , vitamin C, type 2 diabetes, muscle glucose uptake.