Protective effect of magnesium sulfate on beta-cell mass in STZ-induced diabetic rat

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Introduction: Diabetic nephropathy is a serious complication of T1D (type one diabetes). Persistent hyperglycemia and subsequent hypomagnesaemia is believed to develop kidney damage by activation of oxidative stress. We conducted to investigate the renoprotective effect of magnesium sulfate ($MgSO_4$) on renal histopathology and oxidative stress in diabetic rats.
Methods: The study included 70 male rats. The animals were divided into seven groups: control (CRL), control receiving $MgSO_4$ (CRL+Mg1 & CRL+Mg8), diabetic (DM1&DM8) and diabetic receiving $MgSO_4$ (DM+Mg1 & DM+Mg8). Rats were given 20 mg/kg (i.p). STZ for 5 consecutive days in MLD to induce T1D. At day 10 treatment groups were received $MgSO_4$ (10 g/l) in drinking water .The blood glucose, BUN and creatinine levels were measured. Renal tissue levels MDA were measured by thiobarbituric acid method. Renal histopathology was done using H&E staining method.
Results: Treatment with $MgSO_4$ significantly decreased the blood glucose in DM+Mg1 and DM+Mg8 groups as compared with DM1 and DM8. Magnesium treatment also decreased serum BUN and tissue level of MDA significantly in both short and long term treatment. The body weight loss and kidney weight to body weight ratio was improved by $MgSO_4$. Histological results showed there were no differences between DM and DM+Mg groups.
Conclusion: The renal dysfunction and oxidative stress can be improved by magnesium sulfate administration. It is suggested that protection against development of diabetic nephropathy by $MgSO_4$ treatment involves changes in the blood glucose and oxidative stress.

Keywords: Type 1 Diabetes; STZ; Diabetic nephropathy; Oxidative stress