The present study was planned with an objective to establish 'Interrelationship between Magnesium and Antioxidant Potential in Diabetes Mellitus'. The important observations of the study are summarized below:

**Experimental studies**

- Magnesium deficiency led to a significant decrease in the body weights of magnesium deficient rats as compared to the control rats, suggesting that magnesium is indispensable for growth. Diabetic rats also showed significant reduction in the body weight.

- Significant decrease in serum magnesium was observed in the magnesium deficient rats in the second week whereas in diabetic rats, decreased levels of magnesium in serum were visible only by fourth week. RBC magnesium levels were not decreased until fourth week in both the groups. Urine magnesium excretion was drastically reduced in the magnesium deficient rats whereas in diabetic rats, urinary magnesium excretion was increased almost three times of control rats. The results suggest disturbances in magnesium homeostasis in experimental diabetes.

- Tissue magnesium status was also disturbed in the magnesium deficient rats as shown by decreased magnesium levels in liver, heart, and muscles of magnesium deficient rats. In diabetic rats, magnesium levels were decreased only in muscle, confirming magnesium deficiency in diabetes.
ATPase and Ca\(^{2+}\) ATPase in RBCs and Na\(^{+}\) K\(^{+}\) ATPase and Ca\(^{2+}\) ATPase in some but not all organs of the experimental rats.

**Supplementation Studies**

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Supplementation of magnesium in the magnesium deficient as well as diabetic rats caused significant recovery in the body weights as compared to control rats.

- Serum and RBC magnesium level were also restored to normal levels in the supplemented groups. Urine magnesium levels were increased in the magnesium deficient rats, but in diabetic rats, no significant alteration could be demonstrated in urinary magnesium.

- Magnesium supplementation led to marginal but significant decrease in the blood glucose and plasma insulin levels. In magnesium deficient rats however, the blood glucose levels could not be restored to normal levels suggesting some irreversible alterations in the glucose homeostasis by magnesium deficiency.

- Magnesium supplementation almost restored the vitamin C levels in magnesium deficient and diabetic rats and significantly increased thiol levels without any significant change in vitamin E levels. MDA levels were also decreased significantly in both the groups. TRAPc was also found to be significantly increased with the supplementation of magnesium in magnesium deficient as well as diabetic rats.

- Magnesium supplementation caused decrease in plasma triglyceride levels in magnesium deficient and diabetic rats whereas no change in cholesterol or HDL-cholesterol levels could be observed.

- Magnesium supplementation for four weeks caused significant correction in serum calcium and potassium levels. A significant

Summary
The results of this study show that magnesium deficiency causes accelerated oxidative stress and is also associated with dyslipidemia and ionic alterations. The study also indicates that mechanism responsible for the oxidative stress and ionic alterations in diabetes may be partly mediated through magnesium deficiency. The study demonstrates that magnesium deficiency produces a deleterious effect on glucose handling, which seems to be further aggravated by hyperglycemia. It seems very important to point out that magnesium deficiency and hyperglycemia aggravate each other in a true pathogenic vicious cycle. The implication of magnesium as an important factor in glucose metabolism might at least partially explain its postulated role in late diabetic complications. Repletion of magnesium was associated with restoration of antioxidant levels, decreased oxidative stress, correction of altered ionic homeostasis and impaired ATPase activity further supporting the viewpoint of the study. The potential role of magnesium as therapeutic agent has not been well appreciated in the past.

In finale, it would be prudent to consider magnesium deficiency as a contributing factor in many diabetic complications and in exacerbation of the disease itself. One of the most abundant of earth's metallic element and quantitatively the fourth most plentiful cation in human beings, magnesium may have wider metabolic implications than suspected hitherto.