



## Magnesium and lipids in diabetes mellitus

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**M**agnesium deficiency has a role in the perturbation of lipid metabolism in diabetic patients. In various investigations, reduced magnesium levels have been detected in diabetic patients despite a good nutritional status (1-5), which probably results from glycosuria-related hypermagnesiuria, hyperinsulinemia or nutritional factors (5-10). Various studies have shown a link between hypomagnesemia and reduction of tyrosine-kinase activity at the insulin receptor level. This may result in impairment of insulin action and development of insulin resistance which has been progressively accumulated in previous years (11-16). Investigations suggest that magnesium supplementation can be useful in the treatment of diabetes and in prevention of development of its chronic complications (17-19). Experimental investigations have also shown that hypomagnesemia inhibits prostacyclin receptor function (20), producing an imbalance between prostacyclin and thromboxane effects (21). Low magnesium level has a role in the perturbation of lipid metabolism in diabetic patients (20-25). We have previously shown the correlation of serum magnesium with dyslipidemia in hemodialysis patients (26). Few studies have reported the beneficial effects of magnesium supplementation on plasma cholesterol, LDL-C and HDL-C levels. In our another study on 122 type II diabetes mellitus patients, significant inverse associations of serum magnesium with cholesterol and also with serum LDL-C was detected (27). Magnesium is found to play an important role in carbohydrate metabolism, and its imbalance has been implicated in diabetes mellitus both as a cause and a consequence (2-8). Hypomagnesemia has been detected in both animal (26-28) and human subjects with type 1 or type 2 diabetes mellitus. Moreover, serum magnesium levels have been found to be inversely correlated with the severity of diabetes (5-12). Furthermore, diabetic patients have additional risk factor for hypomagnesemia (7-14). In a study conducted by Lal *et al.*, on 40 patients of type 2 diabetes mellitus and 54 age and sex matched non-diabetic controls, the diabetic patients were supplemented with 600 mg of magnesium oxide daily for 12 weeks. They were evaluated every 4 weeks and investigated for the above parameters. Mean serum magnesium at

### ■ Implication for health policy/practice/research/medical education

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baseline in the diabetic patients was significantly lower than that of in controls. They detected a significant fall in serum total cholesterol, LDL-C and triglyceride level and a rise in HDL-C, 4 to 8 weeks after initiation of magnesium supplementation. They speculated that magnesium supplementation resulted in a favorable effect on the lipid profile (29). Effectiveness of chronic magnesium supplementation on reduction of plasma cholesterol and LDL-C, and an increase of HDL-C was also shown in the studies of Corica *et al.* (30) and Baydas *et al.* (31). The association between lipid abnormalities and hypomagnesemia has not been fully understood in human studies. The result of our previous studies further emphasize on the importance of magnesium in diabetes patients, however the clinical impact of these findings merit further examination.

### Author's contribution

AG is the single author of the paper.

### Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the author.

### Conflicts of interests

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