

ISCHEMIC HEART DISEASE EVENTS IN DIABETIC PATIENTS HAVING HYPOMAGNESEMIA

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ABSTRACT

Diabetic patients having ischemic heart disease presenting at Jinnah Postgraduate Medical Centre Karachi were included in study to see the effect of magnesium deficiency associated with diabetes mellitus. Comparative study was carried out in total of 180 diabetic patients, 90 diabetic patients without ischemic heart disease events, 90 diabetic patient but having ischemic heart disease events, out of these 90,30 having attack of acute myocardial infarction, 30 having angina pectoris and 30 having unstable angina. Serum magnesium was significantly low ($p < 0.001$) & this correlates inversely with serum glucose, urinary magnesium & HBA1c ($p < 0.001$) which are significantly increased ($p < 0.001$) in patients having an events of ischemic heart disease. Serum Triglycerides, LDL-cholesterol significantly increased ($p < 0.001$) and total cholesterol also significantly increased ($p < 0.01$) while serum HDL-cholesterol significantly decreased ($p < 0.001$) in diabetic patients having events of ischemic heart disease.

Key words: IHD, Diabetes, Hypomagnesemia

INTRODUCTION

Diabetes Mellitus is the most frequent chronic disease associated with secondary magnesium deficiency. Some studies indicates that increase urinary loss of magnesium caused by osmotic diuretic might contribute to diabetic hypomagnesemia^{1,2}. The exact cause of hypomagnesemia in diabetes mellitus is not known but it is associated with poor diabetic control & correlates inversely with the degree of hyperglycemia³.

In type II non insulin dependent diabetic patient, hypomagnesemia can be both a consequence or cause of increase insulin resistance. Chronic supplementation in type-II diabetic patients improve both islet beta cell response & insulin actions. (Paolisso et al; 1989) favours the hypothesis that hypomagnesemia is closely related to

insulin resistance in these patients⁴.

Diabetic patients are more prone to develop arteriosclerosis that leads to ischemic heart disease. Magnesium stabilizes the plasma membrane and maintains the integrity of sub-cellular structures⁵. Patients in diabetes mellitus are more sensitive to aggregating agents such as ADP, collagen & epinephrine etc. Long term therapeutic supplementation in non-insulin dependent diabetics decreases the collagen ADP-induced aggregation of platelets⁶ and there is potential link between magnesium depletion & ischemic heart disease⁵.

Some studies report significantly depressed serum magnesium levels in patients presenting with acute myocardial infarction⁷. Chronic ischemic heart disease

without acute infarction is also associated with low myocardial magnesium concentration⁸. Magnesium deficiency potentiates vasospasm and intravenous magnesium relieves vasospasm, in variety of clinical situations⁹. (Goto et al; 1981)) found that patients with variant angina retained twice as much magnesium on magnesium loading test compared with patients with out athero-sclerotic disease¹⁰. Established diabetes has been associated with reduced serum and tissue magnesium including myocardial magnesium concentration¹¹. It is now an established medical fact that diabetes mellitus accentuates atherosclerosis and coronary arteries are more vulnerable to this morbid pathological changes, so hypomagnesemia that occurs in diabetic patients may linked in causation of ischemic heart disease. So this study was designed to find out possible role of magnesium, i.e. hypomagnesemia associated with diabetes mellitus and its relation to ischemic heart disease events. Some valuable changes in blood glucose & blood magnesium level were found which we report there.

PATIENTS & METHODS

The study included total 180 diabetic patients out of which 90 diabetic patients without any complaint of ischemic heart disease & 90 diabetic patients with ischemic heart disease, out of which 30, having attack of myocardial infarction, 30 with angina pectoris 30 with proved unstable angina. Patient with following criteria were selected. Age ranging 30-75 years. Duration of diabetes mellitus 2-15 years. Duration of ischemic heart disease 1-12 years. Most of the patients were male but female cases were also included in the study. Patients were selected from Medical indoors and outdoors of Jinnah Postgraduate Medical Centre Karachi: 24 hour urine was collected for estimation of urine magnesium. Estimation was done by titan yellow method. Blood samples were obtained in morning after overnight fast. Serum was extracted and analyzed for magnesium by titan yellow method, glucose by glucose oxides method, lipids and lipoproteins by enzymatic colorimetric method by using kits.

Table-I. Diabetic with I.H.D

Parameters	Diabetic without I.H.D 90	Myocardial Infarction 30	Angina Pectoris 30	Unstable Angina 30
Age (years)	11.8±0.90	49.9±2.8	47.70±2.1	48.8±2.60
Weight (Kgs)	62.50±0.85	60.09±0.30	56.26±2.50	61.5±1.6
Duration of Diabetic Mellitus	6.10±0.20	9.20±2.10	8.80±0.80	7.50±0.6
Duration of I.H.D		4.1±0.30	3.50±0.80	4.10±0.50

Table-II

Parameters	Diabetic without I.H.D 90	Myocardial Infarction 30	Angina Pectoris 30	Unstable Angina 30
Serum glucose mmol/lit	6.5±1.2	8.85±1.42***	8.96±0.35***	8.68±0.20***
Serum magnesium meq/l	1.52±0.20	1.42±0.02***	1.45±0.3***	1.40±0.01***
Urine magnesium Meq/day	4.49±0.08	8.91±0.58***	8.65±0.41***	9.2±0.04***
HbA1c (gm/dl)	8.10±0.35	9.75±0.61***	9.57±0.62***	10.61±1.50***
Total cholesterol (mg/dl)	224.80±4.80	238.60±5.90***	236.10±6.91***	240.50±8.35**
Serum Triglyceride (mg/dl)	138.70±7.35	29.60±1.21***	1866.81±10.50***	190.00±9.65***

HDL-Cholesterol (mg/dl)	30.10±2.50	29.60±1.21***	30.05±0.95***	28.60±0.80***
LDL-Cholesterol (mg/dl)	139.80±4.85	180.50±5.52***	175.31±6.21***	182.60±7.72***
N.S=Non-significant *P<0.05, **P<0.01 ***P<0.001				

RESULTS

In patient with diabetes mellitus with I.H.D serum magnesium was found to be significantly decreased ($P<0.001$) as compared to patients having diabetes mellitus without I.H.D. In patients having diabetes mellitus with ischemic heart disease, serum glucose, urinary magnesium, HbA1c is significantly increased ($P<0.001$). These parameters are inversely proportion to the serum magnesium. Serum TGS, LDL-Cholesterol significant high ($P<0.01$) & total Cholesterol significant high ($P<0.01$) in patients having diabetes mellitus & ischemic heart disease. While HDL-Cholesterol Significant low ($P<0.001$).

DISCUSSION

Our results suggest that significant low level of serum magnesium in patients having diabetes mellitus with ischemic heart disease & this inversely correlates with the serum glucose. Our results concise with the results of already published studies¹².

Our results also shows significant urinary magnesium loss, this may be due to osmotic di-uresis in which our results concise with the other studies^{1,2}. Serum magnesium also inversely correlates with HbA1c glycosylated Hemoglobin which shows the severity of hyperglycemia and state of diabetic control. Our finding correlates with the findings also previously studied¹³. Serum total cholesterol serum TGs, LDL-cholesterol significantly increased while HDL cholesterol significantly decreased. This shows effect of magnesium on lipid metabolism. Our results correlates with the studies already done¹⁴.

CONCLUSION

Our results shows possible role of magnesium in the events of ischemic heart disease associated with

diabetes mellitus. This may be the evidence that the hypomagnesaemia associated with diabetes mellitus may predispose to the development of ischemic heart disease. The diabetic patients may be benefitted by giving oral magnesium supplementation to reduce the incidence of ischemic heart disease.

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