

Hypomagnesaemia During Diabetic Pregnancy: A Risk Factor For Ischaemic Heart Disease

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Summary:

Interrelations between magnesium and other appropriate factors were studied in 18 pregnant diabetic women and 15 control pregnant females. Serum magnesium (\pm SD) was significantly lower in diabetic pregnant women (1.5 ± 0.08 mEq/L) than in the control pregnant women (1.7 ± 0.05 mEq/L). Serum magnesium correlated best with blood glucose concentrations ($r = -0.32$, $P < 0.001$). Magnesium of diabetics with 2% glycosuria was found to be lower significantly than those with 1% glycosuria or no glycosuria. Other significant associations were also observed with age and serum albumin.

Introduction:

Hypomagnesaemia is a relatively common finding in diabetes¹, occurring in about 25% of diabetic out patients². Its origins are not known but it is associated with poor diabetic control³. In diabetic pregnancy deficiency of magnesium may be due to low magnesium contents of diet or abnormal loss of magnesium in deficiency of magnesium may be due to low magnesium contents of diet or abnormal loss of magnesium in urine. It has been suggested that hypomagnesaemia is a factor predisposing to the development and severity of diabetic retinopathy⁴. There is also an evidence that magnesium may be implicated in the pathogenesis and prognosis of ischaemic heart disease in diabetic subjects⁵.

Magnesium is an essential for cell biochemistry, serving as cofactor in more than 300 enzymatic reactions. Being one of the most abundant of earth's metallic elements and quantitatively the

fourth most plentiful action in vertebrates, magnesium may have wider metabolic implications than hitherto suspected. We report here its metabolic changes with various correlations in pregnant women with diabetes mellitus.

Patients and Methods:

We studied 18 diabetic pregnant female patients and 15 control pregnant women, age ranging between 22 to 45 years. The duration of pregnancy was 6-8 months. They were selected from medical and obstetrical units of B.V. Hospital, Bahawalpur. Four patients were receiving insulin and 14 oral hypoglycaemic agents. All had normal liver and renal functions. Those having malabsorption and diarrhoeal conditions were excluded from the study.

The age, weight and blood pressure of patients and controls were recorded. The urine samples of diabetics were tested for glucose using Clinistix. Blood samples were obtained in the morning after and over night fast. Serum was extracted and analysed for magnesium by Pye Unicam SP-9 Atomic Absorption Spectrophotometer and glucose by glucose oxidase method. Serum electrolytes, urea and albumin were also determined by usual routine laboratory methods.

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Results:

Table-I demonstrated that serum magnesium levels were lower in the diabetic pregnant female patients than in the control subjects, mean values (\pm SD) being 1.5 ± 0.08 mEq/L and 1.7 ± 0.05 mEq/L respectively; this difference was highly significant ($P < 0.001$).

TABLE I: General characteristics and magnesium levels in diabetic pregnant women and controls. The values are represented as mean + SD.

Parameters	Patients	Controls
Number	18	15
Age (years)	34.2 \pm 4.5	35.6 \pm 4.8
Weight (kg)	65.4 \pm 8.7	64.2 \pm 8.1
Blood Pressure (mmHg)		
Systolic	122.8 \pm 16.5	120.6 \pm 15.9
Diastolic	76.2 \pm 8.6	78.2 \pm 10.8
Duration of Pregnancy (months)	7.4 \pm 1.6	- -
Duration of diabetes (years)	3.6 \pm 0.7	- -
S. Magnesium (mEq/L)	1.5 \pm 0.08*	1.7 \pm 0.05

*The difference was highly significant; $P < 0.0001$ as compared to controls.

The correlations with other variables are shown in Table-II. In the diabetic pregnant patients, serum magnesium correlated best with the serum glucose. Highly significant correlations with age ($P < 0.001$) and slightly significant correlations with serum albumin ($P < 0.01$) were also demonstrated. There was no significant correlation with serum potassium and sodium, the known duration of diabetes, serum urea or body weight. In the control subjects, significant correlations were again observed with age and serum albumin but not with serum glucose. In contrast to the diabetic patients, there were also significant correlations with serum potassium, sodium and body weight (Table-II).

TABLE-II: The correlations between serum magnesium and other variables in diabetic pregnant female patients and control subjects.

Variables	Diabetic Patients		Control Subjects	
	r	p	r	p
S. Glucose	0.32	<0.001	0.05	N.S.
Age	0.23	<0.001	0.32	<0.001
S. Albumin	0.11	<0.01	0.20	<0.01
S. Potassium	0.06	N.S.	0.26	<0.001
S. Sodium	0.08	N.S.	0.28	<0.001
Duration				
Diabetes	0.06	N.S.	-	-
S. Urea	0.04	N.S.	0.01	N.S.
Body Weight	0.06	N.S.	0.14	<0.05

N.S. = NON-SIGNIFICANT

Discussion:

We observed significant lower levels of serum magnesium in diabetic pregnant women than the control subjects. Our findings confirm some of the previous studies^{1,3}. Hypomagnesaemia occurred most frequently in young, poorly controlled diabetics. The strongest correlation was the negative one observed with serum glucose and the association with presence of degree of glycosuria was also significant. Some authors found the mean serum magnesium to be lower in diabetics than in controls, although in contrast to our study, magnesium correlated positively with weight and negatively with age and duration of diabetes mellitus⁶.

Despite these uncertainties, our findings have some potential importance in relation to the well-established links between magnesium depletion and ischaemic heart disease. We feel that it is at least conceivable that the hypomagnesaemia occurring in diabetics may predispose to their marked increased incidence and morbidity of ischaemic heart disease. Further studies are needed to assess soft tissue magnesium contents in diabetes and to see whether it is involved in the development of vascular complications in diabetes mellitus.

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