

Associations of Serum Magnesium Levels With Diabetes And Diabetic Complications



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Background

Magnesium (Mg) deficiency is a common problem in diabetic patients. Deficiency of Mg may increase the incidence of diabetes and occurrence of diabetic complications. In this study our aim was to evaluate an association between serum Mg level, glycemic regulation and diabetic complications.

Material-Methods

In this retrospective study 673 diabetic patients were evaluated. According to Mg levels, the patients were divided in two groups; as normomagnesemic patients and hypomagnesemic patients.

Results

Among the cases, 57.8% of all cases were men while 42.2% were women. Mean age of all cases was 55.6 years. Mean duration of diabetes was 81±86.9 months. The mean glycosylated hemoglobin (HbA1c) was 9.0 ±2.4 % (4.5-18); mean magnesium level was 1.97 ±± 0.25 (1.13 to 3.0) mg / dl (Table 1). There were 55 (8.2%) patients with diabetic retinopathy and 95 (14.1%) patients with diabetic neuropathy. Five hundred patients (74.3%) had normoalbuminuria; 133 (19.8%) patients had microalbuminuria (MA) and 40(5.9%) patients had overt proteinuria. 171 patients (25.4%) had HbA1c levels equal or below 7%; and 502 patients (74.6%) had HbA1c levels above 7% (Table 2). There was no statistical difference in age or duration of diabetes between the groups formed according to Mg levels. Although there were no differences between the groups for retinopathy and neuropathy; MA was more common in hypomagnesemic patients (p = 0.004). HbA1c levels did not differ between the groups (p = 0.243). However there was a weak negative correlation between serum Mg and HbA1c levels (r = -0.110, p = 0.004) and also between serum Mg and urine protein level (r = -0.127, p = 0.018).

Table 1: Demographic and laboratory features of two groups by serum Magnesium (Mg) levels

Feature	All patients	Mg low (n=65)	Mg normal(n=608)	P value
Age(year)	55.6±10.4	56.71±10	55.44±10	0.292
Gender (F/M)	284/389	48/17	341/267	0.006
DM time (month)	81± 86.9	103±95	78±85	0.058
BMI(kg/m ²)	31.48±5.8	32.8±5.5	31.3±5.8	0.145
HbA1c(%)	9.0±2.4	9.3±2.2	8.9±2.4	0.243
MA(mg/day)	172.91±510.66	557.28±1032	133.20±406	0.004
MA(-)	500	39	461	
MA(+)	133	17	116	0.016
OP(+)	40	9	31	
Cre (mg/dl)	0.83±0.22	0.84±0.29	0.84±0.31	0.820
GFR(ml/min)	117.88±31.18	115.3±3.7	118±1.3	0.817

DM: Diabetes Mellitus; BMI(body mass index); F(Female); M(Male); HbA1c (glycosylated hemoglobin); Cre(Creatininin); MA (microalbuminuria); OP (overt proteinuria) ; GFR (Glomerular filtration rate). P value was referred to two groups as Mg low and Mg normal groups

Table 2: Serum magnesium levels and urinary proteinuria according to HbA1c

Feature	HbA1c ≤7%(n=171)	HbA1c >7%(n=502)	P value
Mg(mg/dl)	2.0±0.22	1.95±0.26	0.031
Microalbuminuria grup			
Microalbuminuria(-)	138	362	0.045
Microalbuminuria(+)	25	108	
Overt proteinuria	8	32	

Conclusion

Magnesium depletion is a common problem in patients with diabetes mellitus. It effects both glycemic regulation and the the occurrence of complications. Also poor glycemic regulation affects serum Mg levels.

