

Relation between hypomagnesemia and increased level of HbA1c in patients with diabetes mellitus

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Purpose

- Hypomagnesemia is common in patients with both T1DM and T2DM
- Low serum magnesium levels in children and adolescents with T1DM are associated with an increased risk of poor glycemic control
- We evaluated Mg levels and examined their possible association with glycemia control
- Dose restoration of Mg through medication can improve disease control?

Methods

- 36 patients with DM (type1, 31; type2, 5)
- Hypomagnesemia < 1.9 mg/dL
- Mg supplementation: Mg lactate 470 to 940 mg
- Magnesium was measured after 4 weeks from administration of oral magnesium

Results

Table 1. Clinical characteristics of the patients and control subjects

	Patients with DM
No. of patients (IDDM/NIDDM)	36 (31/5)
Gender (M/F)	13/23
Mean age at study (range)	16.3(2-25)
Time since diagnosis of diabetes	8±4.9
BMI SDS at study	0.09±1.16
HbA1c (%)	9.8±2.8
Cholesterol	186.6±43.2
Triglyceride	137±87.1
HDL	62.4±15.1
LDL	104.6±33.2
Magnesium	1.8±0.2
Hypomagnesemia % (n)	55.6% (20)

Table 3. Comparison after giving magnesium in 9 patients

	Baseline	Follow up	P-value
HbA1c	9.9(6.3-14)	9.3(6.6-12.5)	0.039
Insulin dose	0.83(0.54-1.04)	0.82(0.52-1.0)	0.359
Mg	1.7(1.6-1.8)	1.75(1.6-1.9)	0.5
Ca	9.5(8.4-9.9)	9.7(8.4-10.2)	0.625
Cholesterol	187.5(117-303)	189.3(119-313)	0.828
Triglycerides (median, range)	132.9(53.7-391.7)	124.6(36.1-377.7)	0.742
HDL	59.7(56.4-93.6)	57.1(42.9-78.2)	0.069
LDL	123(39-162.2)	113.3(41.2-214)	0.674
PTH	20.9(10-33.6)	17.6(9.9-20.9)	0.715

Table 2. Comparison of variables according to the presence of absence of hypomagnesemia

	Hypomagnesemia	Normomagnesemia	P-value
No.	16	20	
Age	17.9±5.4	14.3±6.3	0.072
M/F	6/19	7/9	0.493
Time since diagnosis of DM	8.8±4.5	7±5.3	0.270
BMI SDS	-0.15±1.05	0.39±1.26	0.169
HbA1c (%)	10.7±2.8	8.6±2.2	0.017
Magnesium	1.7(1.6-1.8)	1.95(1.9-2.1)	0.000
Calcium	9.7±0.6	10±0.5	0.109
Phosphorus	4±0.5	4.3±0.7	0.178
Calcium-to-magnesium ratio	5.8±0.5	5±0.4	0.000
Urine Ca/Cr ratio	0.07(0.05-0.13)	0.03(0.01-0.12)	0.175
Urine Mg/Cr ratio	0.09(0.06-0.10)	0.09(0.03-0.15)	0.974
PTH	21(11.4-37)	26.3(21.5-54.4)	0.201

Conclusions

- Low serum magnesium are associated with an increased risk of poor glycemic control
- Oral magnesium supplementation improves glycemic controls
- The type, dose, and time of administration of magnesium salts need to be determined

