FREQUENCY OF HYPOMAGNESEMIA IN TYPE 2 DIABETIC PATIENTS

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ABSTRACT

Objective: To find out the frequency of hypomagnesemia in the patients of type 2 diabetes mellitus

Study Design: This study is a cross sectional study.

Material and Methods: This study was performed in the medical unit of Hayatabad Medical Complex Peshawar from Sep 2017 to Jul 2018. One hundred and eighty (180) patients both male and female age 40 to 70 years with type 2 diabetes mellitus, were enrolled for the study. Patients were selected from wards and OPD. Blood sugar fasting, random, HbA1C and serum magnesium levels were checked for all patients. A magnesium level of 1.5 to 2.8mEq/l was considered as normal. A level below 1.4mEq/l was considered as hypomagnesemia.

Results: A total of 180 patients were included in this study. Out of these 95 were female and 85 were male. Thirty four percent (34%)(No. 61) were having hypomagnesemia. There was no significant association of hypomagnesemia with age and sex of the patients, however hypomagnesemia was fond to be having a significant association with the duration of diabetes mellitus and other co morbid conditions like hypertension and cardiac failures.

Conclusion: Hypomagnesemia is frequently present in patients with type 2 diabetes mellitus and is more associated with the duration of diabetes.

Key Words: Type 2 diabetes mellitus, magnesium, hypomagnesemia, diabetic control.

INTRODUCTION

Magnesium ranks 4th among the most abundant cations in the body, which remains mostly inside the cells[1]. It participate in glucose transport as well as other oxidative processes.[2] Normal level of magnesium ranges from 0.75 to 0.95 nmol/l (1.7-2.3mg/dl). Hypomagnesemia is more prevalent in type 2 diabetic patients (13.5 – 47.7%) as compared to non diabetic patients (2.5 15%)[3]. In addition hypomagnesemia has been found to be associated with an increased risk of developing type 2 diabetes mellitus.[4]

Hypomagnesemia is linked to insulin resistance and poor glycemiccontrol in type 2 diabetic patients which responds to magnesium supplementation[5-6]. In addition to that, hypomagnesemia is also associated with various macrovascular complications and an increased in all cause mortality in type 2 diabetes mellitus[7].

Not only hypomagnesemia may be associated with increased incidence of diabetes mellitus in the genetically predisposed persons, but also hypomagnesemia is caused by different mechanisms in diabetes mellitus. Osmotic diuresis accounts for a portion of the magnesium loss[8]. It is believed that glucosurea which is associated with uncontrolled diabetes mellitus, impairs the renal tubular reabsorption of magnesium in the glumerolar filtrate[9]. Some studies have also shown that normal or higher magnesium intake is associated with lower incidence of type 2 diabetes mellitus[10]. Different studies has shown that those diabetics who have low serum magnesium level, have poor glycemic control, increased insulin resistance and rapid progression to macro and micro vascular complications[11]. The mechanism whereby hypomagnesemia may induce or worsen existing diabetes is not well understood. Nonetheless it has been suggested that hypomagnesemia may induce altered cellular glucose transport, reduce pancreatic insulin secretion and increase insulin resistance.

In light of these data and because of association of hypomagnesemia with adverse outcomes in diabetic patients, monitoring of magnesium level in diabetic patients should done regularly especially in the poorly controlled group. The aim of this study is to find out the frequency of hypomagnesemia in the patients of type 2 diabetes mellitus and find out its association with control of diabetic status.

MATERIAL AND METHODS

This cross sectional study was performed in the medical unit of Hayatabad Medical Complex Peshawar. The study duration was about 7 months from Mar 2018 to Oct 2018. About 180 type 2 diabetic patients were consecutively selected and enrolled for the study. Informed consent was taken from all the selected patients.

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Patients with age 40 to 70 yearswere collected from wards and OPD. Proper history and clinical examination was performed on all selected patients.Patients, who were on parenteral nutrition, having mal absorption and those using diuretics or magnesium containing supplements, were excluded from the study. Patients having cirrhosis of liver, decompensated cardiovascular disease and CKD were also excluded from the study. Samples for magnesium level, fasting glucose, random glucose and HbA1C were taken from the patients on different times. The samples were sent to main laboratory of Hayatabad Medical Complex in 20 minutes.

RESULTS

This study included 180 patients with type 2 diabetes mellitus. The age range was 40 to 70 years (mean age 56+_7 years). Fifty two percent (no=94) were males and 48% (no=86) were females. The mean duration of diabetes mellitus in the study population was 13.35 ranging from 8 to 17 years. The mean fasting and random blood glucose level of study patients were 125.35+_ 7 and 255.45+_ 4.5 m/dl respectively while the mean serum magnesium level came out to be 1.8+_0.65mg/dl. The mean HbA1C level was 7.8+_ 1.55 %. Hypomagnesemia was found to be present in 33.89% (no=61) of the patients. On further stratification according to age, gender and duration of diabetes mellitus, association was found between the duration of diabetes and hypomagnesemia. However we found no association of hypomagnesemia with gender of the patients. Increased frequency of hypomagnesemia in older age group was probably due to increased duration of diabetes (table=1 & 2). The correlation of magnesium level with the HbA1C level in Table 3 shows that the frequency of hypomagnesemia was more with the uncontrolled diabetes mellitus.

DISCUSSION

The results of this study were consistent with that of others studies which also showed that hypomagnesemia occurs with increased frequency in type 2 diabetic patients[14,15]. According to this study, the frequency of hypomagnesemia in type 2 diabetic patients was 33.8% while some other studies showed to be 23%[12] and 29% respectively[11]. This frequency is more than that in non diabetic general populationwhich ranges from 2.5 to 14%[12].

This study shows the co relation of hypomagnesemia and type 2 diabetes mellitus, though it lacks the co relation of the same with the complications of diabetes. A study conducted in Brazil has shown that hypomagnesemia causes rapid progression to diabetic complications and oral magnesium supplementation is associated with better glycemic control[12]. Though the effects of magnesium supplementation on the control and complications of diabetes mellitus were out of the scope of this study, other literature showed both the co relation and effects of hypomagnesemia on the control and complications ofdiabetes mellitus[13]. Some animal studies has shown that magnesium supplementation

Table 1: Showing the co relation of hypomagnesemia with age

Hypomagnesemia	Age of the study population		Total
	40-55 years	56-70 years	
Yes	35%(n=26)	33%(n=35)	33.88%(n=61)
No	65%(n=48)	67%(n=71)	66.22%(n=119)
Total	74	106	180

Table 2: Showing the co relation of hypomagnesemia withthe duration of diabetes mellitus

Hypomagnesemia	Duration of diabetes mellitus		Total
	Up to 10 years	10 to 20 years	
Yes	30%(n=16)	35.4%(n=45)	33.88%(n=61)
No	70%(n=37)	64.5%(n=82)	66.22%(n=119)
Total	53	127	180

Table 3: Showing the co relation of hypomagnesemia with the diabetic control (HbA1c)

Hypomagnesemia	HbA1c level in the study participants		Total
	Below 8%	Above 8%	
Yes	29.6%(n=32)	40.2%(n=29)	33.88%(n=61)
No	70.3%(n=76)	57.33(n=43)	66.2%(n=119)
Total	108	72	180

could retard or prevent the induction of insulin resistance and so diabetes mellitus while a magnesium deficit can predispose to hyperglycemia[13].

CONCLUSION

The frequency of hypomagnesemia is significantlyhigher in type 2 diabetic patients as compared the non diabetic general population which contribute to poor control and complications of the disease. It is therefore recommended that serum magnesium level should be monitored in all type 2 diabetic patients and supplements should be given to the patients where ever required.

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