

The Level of Serum Magnesium in the Newly Detected Patients with Glucose Intolerance and its Comparison with Serum Magnesium Levels of Healthy Volunteers Matched for Age and Gender

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ABSTRACT

Background: Hypomagnesaemia is related with resistance to insulin, diabetes mellitus (DM) and its related complications. Then again, patients with diabetes frequently have decreased levels of magnesium. The current examination plans to assess serum magnesium levels in patients with any level of recently analyzed glucose intolerance. For instance, the aim of this study was to correlate serum magnesium levels in people with impaired fasting glucose, impaired glucose tolerance (IGT) or diabetes mellitus and healthy control group of individuals of a similar sex was made.

Methods: A case-control study was directed at the Medicine department of Faisalabad Medical University and Allied Hospital, Faisalabad for six-months duration from April 2020 to September 2020. Patients with newly diagnosed glucose intolerance (DM 54, IGT 2) and healthy control group of a comparable age (56 subjects) and gender explicit controls were studied. Serum magnesium levels were estimated altogether study members and contrasted among the control group.

Results: This examination assessed a sum of 56 glucose intolerant patients (cases) and 56 healthy volunteers (controls) of a similar age and sex. There were 24 Males and 32 females in the studied group and 27 males and 29 females in the control group. The age range varies from 25 to 60 years of age. The level of serum Mg was normal in 31 individuals in studied group and 44 individuals in the control group, and low in 25 individuals in diseased group and 11 individuals in the control group. The mean levels of Mg in the serum of the patients were lower than in the control group, yet the variance was not significant ($p = 0.359$). Serum Mg fixations were negatively related with fasting blood glucose (FBG), glucose and glycosylated hemoglobin (HbA1c) following 2 hours ($r = -0.527$, -0.560 and -0.549 , individually). Nonetheless, no significant connection was found between serum Mg fixation and irregular blood glucose levels in the control group ($r = 0.179$).

Conclusion: Serum magnesium levels were lower in DM and IGT patients in accordance with age and sex compared with healthy volunteers, and serum magnesium levels were negatively corresponded with blood glucose levels.

Keywords: Glucose intolerance, Diabetes mellitus, Impaired glucose tolerance, Fasting glycemia disorders and Serum magnesium.

INTRODUCTION

Diabetes mellitus (DM) is a worldwide general medical issue. Around the world, 347 million individuals have DM1 and it is assessed that this number will twofold in the following twenty years and 150% more in low economic nations¹⁻². Type-II diabetic patients are traditionally prediabetic [impaired glucose tolerance (IGT and impaired fasting glucose (IFG))³. The resistance to insulin is quite possibly the most enteropathogenic factors adding to the advancement of DM2. Low levels of magnesium (Mg) in serum have been accounted for in people with diabetes mellitus, and particularly those in South Asia are at high danger⁴⁻⁵. In addition, hypomagnesaemia is associated with resistance of insulin accordingly adding to the advancement of diabetes⁶. Hypomagnesaemia is additionally connected with diabetic complications. Uncontrolled diabetes mellitus makes an endless loop bringing about osmotic diuresis and hypomagnesaemia⁷⁻⁸. Mg supplementation keeps up great glycemic control and

can forestall or postpone complications⁹. The patients with impaired glucose tolerance have been evaluated and institute to have low levels of serum Mg. So, Mg substitution will assistance and accomplish better outcomes. This examination was intended to assess the serum Mg levels of recently analyzed glucose intolerant patients, to contrast these values with the serum levels of healthy volunteers of a similar age and sex, and to associate serum Mg levels with their glycemic status.

MATERIALS AND METHODS

A case-control study was directed at the Medicine department of Faisalabad Medical University and Allied Hospital, Faisalabad for six-months duration from April 2020 to September 2020. Patients with recently analyzed glucose intolerance (DM 54, IGT 2) and healthy control group of a similar age (56 subjects) and gender explicit controls. Serum magnesium levels were estimated altogether study members and contrasted among the

control group. Rejected from the study were patients determined to have type 1 diabetes, gestational diabetes (GDM) and other types of DM, patients utilizing diuretics or intestinal medicines, loose bowels or retching, malabsorption condition, known instances of parathyroid problems, and electrolyte imbalance influences. The study was affirmed by the Ethics Review Committee. Data was gathered sequentially and intentionally from patients with some level of glucose intolerance as per the qualification standards [based on the last Oral Glucose Tolerance Test (OGTT) acted in the last three months]. The selectees were given information about the motivation behind the investigation, and in the wake of acquiring educated assent, serum Mg was determined after obtaining written informed consent. Mg levels has been determined by the Hospital Laboratory. Other important laboratory and clinical information were acquired from patient records readied as a component of routine administration. Similar number of healthy volunteers of a similar age and sex were utilized as a control. The information was investigated utilizing the Social Science Statistical Package (SPSS) form 21.0 and proper statistical tests were performed. The outcomes are introduced in tables and figures, separately.

RESULTS

This examination assessed a sum of 56 glucose intolerant patients (cases) and 56 healthy volunteers (controls) of a

similar age and sex. The main highlights are introduced in Table 1. There were 24 Males and 32 females. The age range varies from 25 to 60 years of age.

The Demographic features are given in Table-I

Studied Group		Control Group	
Males	24(42.8%)	Males	27(48.2%)
Females	32(57.14%)	Females	29(51.8%)
Age Range		Age Range	
25-40	40(71.4%)	25-40	38(67.8%)
40-60	16(28.5%)	40-60	18(32.1%)

The level of serum Mg was normal in 31 individuals in studied group and 44 individuals in the control group, and low in 25 individuals in diseased group and 11 individuals in the control group. The mean levels of Mg in the serum of the patients were lower than in the control group, yet the variance was not significant ($p = 0.359$).

Serum Mg fixations were negatively related with fasting blood glucose (FBG), glucose and glycosylated hemoglobin (HbA1c) following 2 hours ($r = 0.527$, -0.560 and -0.549 , individually). Nonetheless, no significant connection was found between serum Mg fixation and irregular blood glucose levels in the control group ($r = 0.182$).

Table-II shows the clinical features of the groups

Characteristics	Cases (N-56)	Controls (N-56)	p value
Age in years	44.02±10.17	42.97±11.31	0.84
M: F	1:1.5	1:1.4	—
BMI (kg/m ²)	28.01±1.80	24.86±2.59	0.379
Systolic BP (mm Hg)	134.09±15.07	121.40±11.10	0.001*
Diastolic BP (mm Hg)	84.10±5.12	77.24±8.54	0.003*
DM:IGT	54:2	—	—
Fasting Blood glucose (m.mol/L)	9.10±1.82	—	—
2-h BG (m.mol/L)	13.92±7.19	—	—
Random Blood glucose (m.mol/L)	—	6.49±0.39	—
HbA1c (%)	7.90±0.86	—	—
Mg (m.mol/L)	0.65±0.15	0.86±0.14	0.359
Ca (mg/dL)	8.78±0.28	8.52±1.27	0.004*
Serum.Creatinine (mg/dL)	0.90±.161	0.78±.080	0.002*
ALT (U/L)	51.38±11.01	40.82±14.50	0.001*

Table-III shows the Magnesium levels

Mg level in the Studied group		Mg level in the control group	
Normal	31(55.35%)	Normal	44(78.57%)
Low	25(44.64%)	Low	11(19.64%)

DISCUSSION

Mg is the 2nd most significant intracellular cation in the humanoid. It is a fundamental component of numerous enzymes and goes about as a cofactor in more than 300 enzymatic reactions⁹⁻¹⁰. Evidence recommends that low Mg levels are related with insulin resistance and consequently add to the advancement of DM¹¹. The hypomagnesaemia related with neuropathy, and other diabetic complexities in the diabetic populace. Renal discharge of magnesium is expanded in diabetic patients because of diminished magnesium reabsorption brought about by glucose-induced osmotic diuresis conceivably because of insulin resistance¹². The aftereffects of this examination showed

that patients with recently analyzed glucose intolerance had low Mg levels and a converse connection among Mg and glycemic control. Practically comparable outcomes were acquired in an examination directed in Canada. Serum Mg levels of patients were contrarily related with HbA1c across all investigations, and this is a predictable outcome¹³⁻¹⁴. A dietary enhancement can help diabetics in spite of the debate, as the adjustment of hypomagnesaemia positively affects glycemic control level in diabetics¹⁵⁻¹⁶. Most investigations of the 25 mg serum portion and diabetes mellitus have been acted in patients with diabetes mellitus. A big part of patients with type-II DM goes unseen, and 33% to half of patients with type-II DM experience at least one complication at analysis¹⁷⁻¹⁸.

Evidence recommends that revising hypomagnesaemia enhances control of diabetes mellitus and delay, perceives and treats complexities¹⁹. Hypomagnesaemia correction will fundamentally improve the general patient results in the beginning phases of the infection. The early evaluation of Mg levels in glucose impaired patients and the case-control plan of this investigation were the fundamental qualities of this examination²⁰⁻²¹. Nonetheless, this examination had a few impediments. This was a single-center study with few members. Patients with IFG were excluded from this investigation. A bigger, multicenter study with more members will give a more agent answer to this inquiry.

CONCLUSION

In this investigation, in spite of the fact that there was no significant distinction between serum Mg levels of healthy volunteers of similar age and sex and patients with recently analyzed glucose intolerance; serum Mg levels were lower among patients with glucose intolerance (DM and IGT). Amongst individuals with impaired glucose tolerance, there was a negative relationship between serum Mg level and blood glucose level.

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