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A CLINICAL ANALYSIS OF SERUM MAGNESIUM AND PHOSPHATE IN PATIENTS WITH TYPE II DIABETES MELLITUS

Dr. Najia Nazeer[1], Dr. Sadaf Ejaz[2], Dr. Muhammad Hassnain Saleem[3]
[1, 3] United Medical & Dental College, Karachi
[2] Dow University of Health Sciences, Karachi

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Abstract:
Objective: *To assess serum phosphate and magnesium levels depending on the study participants in patients with type 2 diabetes.*
Place and Duration: *In the Medicine department of Indus Hospital Karachi for six months duration from September 2019 to February 2020.*
Methodology: *This study involved 100 patients with diabetes and 100 non-diabetic patients. Serum phosphate, serum magnesium and fasting and postprandial blood sugar measured among the diabetic and control groups using SPSS version 16.0 for analysis.*
Results: *Serum phosphate (2.92-0.75) in patients with diabetes mellitus was significantly lower than in control subjects (3.38-0.49). Serum magnesium concentrations (0.9 x 0.15) were significantly lower in patients with diabetes mellitus compared to the control group (2.75 x 0.46)*
Conclusion: *The study shows that hyperglycemia can reduce the concentration of magnesium and phosphorus in serum.*
Keywords: *Magnesium, phosphate, type 2 diabetes.*

Corresponding author:
Dr Najia Nazeer,
United Medical & Dental College, Karachi

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INTRODUCTION:

Diabetes is a metabolic disease that affects many people around the world. Diabetes now appears to be a serious health problem with a significant global burden[1-2]. As a result, the WHO has called for the disease - assuming the characteristic prevalence remains constant, the number of people with diabetes worldwide is expected to double between 2000 and 2030, mainly based on demographic changes [emerging epidemics][3-4]. Genetic and environmental factors contribute to the pathogenesis of diabetes and act as a cause of disease among high-risk people due to hereditary predispositions. Previous studies showing the presence of glucose tolerance factor in yeast by defining the active ingredient as trivalent chromium have aroused interest in the state of other trace elements and macronutrients in health and diseases, including diabetes[5-6]. In many studies, trace elements of macronutrients with diabetes have been found to be directly related. It has been reported that the effect of insulin to reduce blood sugar has been developed by some trace elements such as chromium, magnesium, zinc valve, manganese and phosphate. Mg depletion has a negative effect on glucose homeostasis and insulin sensitivity in patients with type 2 diabetes mellitus, as well as 6-8% among the 35-60 age group on the evolution of complications such as retinopathy, thrombosis and hypertension[7-8]. In addition, mg serum under type 2 Diabetes9Phosphorus is a potent determinant element commonly distributed in the human body, regardless of the development of phosphorus. Diabetes can cause depletion of phosphates in the body due to osmotic diarrhea and reduced muscle mass[9-10]. Therefore, the goal of our study is to determine serum phosphate and magnesium levels in patients with diabetes mellitus and to monitor participants' relationship with age, gender and glycemic state.

MATERIALS AND METHODS:

This is an approach to cross-sectional studies in patients with diabetes held in the Medicine department of Indus Hospital Karachi for six months duration from September 2019 to February 2020. Patients were reported according to the following inclusion criteria: All patients with type 2 diabetes of both sexes aged 30 to 65 years.

Study area and study population: 100 patients with diabetes (50 males, 50 women), aged 30 to 65; and 100 healthy individuals (matching age and gender) were included in the study. All entities signed informed approval and filled out surveys. The study was approved by the department's ethics committee. The duration of the study is about 6 months.

Methodology: Blood samples were collected after a twelve-hour fasting period (Overnight fasting) under aseptic. Conditions, the obtained blood sample were centrifuged and plasma was separated. The plasma was analyzed for the fasting and postprandial blood sugar, estimated by GOD-POD method. samples were separated from whole blood collected into tubes without anticoagulant, after clotting was complete, the tubes were then centrifuged at 2700g for 10 minutes. Serum was removed and assayed for magnesium and phosphorus. Taussky, H.H., and Shorr, E.: a micro colorimetric method for the Determination of Inorganic Phosphorus. Gindler, E.M. and D.A. Heth, a Colorimetric determination with bound calmagite of magnesium in human blood serum. Student's t-test was performed to analyze the difference in means between groups. P value was considered significant when it is less than or equal 0.001.

RESULT:

The values FBS and PLBS checks and cases are shown in Table 1. 100% of the controls were found to be <10mg/dl and 62% <110mg/dl.

Table1: Blood sugar levels

Blood sugar variables	Levels	Controls	Cases	P Value
FBS(mg/dl)	<110	100	38	<0.001
	>110	0	62	
PLBS(mg/dl)	<130	100	14	<0.001
	>130	0	86	

The FBS value of patients by control increases as statistically significant (p130 mg/dl). Depending on the control group, there is a statistically significant increase in PLBS in patients (p<0.001). The levels of phosphorus in the control serum and the cases are shown in Table 2.

Table 2: Levels of serum phosphorus

Serum phosphorus	Control	Cases
Decreased (<2.5mg/dl)	0	62
Normal (2.5-4.5mg/dl)	100	38
Increased (>4.5mg/dl)	0	0
Total	100	100
Inference	62% of patient had the serum phosphorus is decreased in cases with P<0.001	

100% of controls showed a normal serum phosphorus level in the range of 2.5-4.5 mg/dl and in diabetic cases 62% showed decreased levels than the normal range, i.e. less than 2.5mg/dl and the remaining 38% of them were in normal range. (Table: 3). PPBS increased significantly compared to normal patients and serum phosphorus and magnesium significantly decreased compared to normal patients.

Table 3: Levels of serum magnesium

Serum magnesium	Control	Cases
Decreased (<1.0mg/dl)	0	56
Normal (1.0-3.5mg/dl)	100	44
Increased (>3.5mg/dl)	0	0
Total	100	100
Inference	56% of patient had the serum magnesium is decreased in cases with p<0.001	

Table 4: Levels of FBS, PLBS, Serum phosphorus and Serum magnesium

Biochemical parameters	Controls	Cases	P value
FBS (mg/dl)	89.74±9.82	155.5±86.6	<0.001
PLBS (mg/dl)	112.3±2.65	245.2±112.5	<0.001
Serum phosphorus (mg/dl)	3.38± 0.49	2.9±0.75	<0.001
Serum magnesium(mg/dl)	2.15± 0.46	0.9± 0.1	<0.001

DISCUSSION:

Diabetes is the most common chronic metabolic disorder with a high morbidity rate characterized by impaired metabolism of glucose and other energy-producing fuels, as well as the late development of vascular and neuropathic complications. Diabetes consists of a group of disorders that contain various pathogenic mechanisms in which hyperglycemia is a common denominator. The role of hyperglycemia, on the other hand, plays an important role in complications associated with the disease. Accelerated atherosclerosis, retinopathy, nephropathy, neuropathy and diabetic feet[11-12]. In our study, 100 cases of diabetes were discussed in previous groups compared to 100 healthy control. Blood sugar level: Blood sugar is the main blood sugar level in mammals. Typically, 65-110mgldl (FBS) and 160 mg/dl (PPBS) are equal to a high-carb meal after the normal range. In general, FBS > 126 mg/dl and PLBS > 200 mg/dl or higher repeated levels of thought-provoking diabetes. The patient's FBS is 155.56, with high variability in plasma glucose, which diagnoses diabetes when measuring plasma glucose levels under control, 86.67 mg/dl was well above the American Diabetes Association (ADA) criteria for diabetes and PLBS diagnosis with a higher limit of 245, diabetes and PLBS above 112.53, and 89.74 in the control group were 9.82 and 112.32 for FBS and PPBS had blood sugar values. These values are well associated with clinical diagnosis[13]. Serum phosphorus: Serum

phosphorus is an element widely distributed in the human body. It occurs in organic and inorganic forms, but only inorganic phosphorus is measured. Intracellular phosphate is also a component of nucleotide derivatives such as NADP, ATP, GTP, etc., which is involved in the formation of nucleic acid, the formation, as well as indirect metabolism of proteins, carbohydrates, fats, genetic transcription and cell growth. It also has an important role as a body buffer mechanism. Many studies have shown that phosphate levels in poorly regulated patients with diabetes have decreased and levels increase when blood sugar levels are controlled. Gartner et al. In young studies with diabetes, plasma phosphor levels decreased from 221 mg/dl to 95.5 mg/dl, serum inorganic phosphorus decreased to 4.9-5 mg/dl and serum phosphorus was lowered in patients with diabetes[14]. Serum magnesium: Mg is mainly an intracellular cation, and noncellular fluids have less than 1% of the total body content. Serum mg does not represent more than 0.3% of total MG14 body. However, serum or plasma mg measuring is the simplest and most commonly used test. In human studies, a diet low in Mg causes a predictable decrease in serum mg. However, low Mg values are reported in various blood cells and tissues associated with normal serum/plasma mg levels. Therefore, the plasma mg concentration is soulless, but there appears to be a very specific low mg indicator. Approximately 55% of the total mg in serum is Mg2 + free ionized, 15% are associated with anys (e.g. bicarbonate, citrate and sulfate) and 30% per protein, especially albumin. Therefore, it can be said that the concentration of mg in serum may decrease due to lower serum albumin levels in diabetics with microalbuminuria[15]. A surprising finding in our study was the high prevalence of low plasma mg concentrations in people with diabetes. Mg serum concentrations of 44% of diabetics were below the reference range, with the incidence of low magnesium, as was the case with polyclinic patients in the USA with type 2 diabetes.

CONCLUSION:

Our findings suggest that low magnesium status and phosphorus in type 2 diabetes mellitus. Phosphorus and magnesium depletion may increase the risk of secondary complications, preventing low magnesium and phosphorus status in diabetes may therefore be beneficial in the management of the disease.

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