



COMPARISON OF SERUM CALCIUM AND MAGNESIUM LEVELS IN OBESE AND NON-OBESE TYPE-II DIABETES –A tertiary care centre study.

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ABSTRACT

The Aim of the present study is a Comparison of Serum Calcium and Magnesium levels in Obese & Non-Obese Type 2 Diabetes Mellitus individuals. materials and methods 30 obese diabetics, 30 non obese diabetic type 2 and 30 normal individuals aged between 20-45 yrs were selected consequently. Result, In our study in obese type-II diabetes mellitus the mean of serum calcium and standard deviation is much low when compared to non-obese type-II Diabetes mellitus and non-diabetic controls.

KEYWORDS :

INTRODUCTION

Magnesium is the fourth most abundant action in the human body and the second most abundant intracellular action. It may exist as a protein-bound, complexed, or free action. It serves as a co-factor for all enzymatic reactions that require ATP and as a key component in various reactions that requires kinases that also an essential enzyme activator for neuromuscular excitability and cell permeability, a regulator of ion channels and mitochondrial function, a critical element in cellular proliferation and apoptosis, and an important factor in both cellular and humoral immune reactions^{2,3,4,5}.

METERIALS AND METHODS

According to WHO guidelines blood sugar levels were calculated from different patients from OP medical Department MGM Hospital, Warangal., which is a teaching hospital for KMC, after taking due consent from the patient under strict aseptic precautions, patient's blood sample was collected and centrifuged and sera is separated. This is sent for further evaluation.

30 obese diabetics, 30 non obese diabetic type 2 and 30 normal individuals aged between 20-45 yrs were selected consequently.

Following an explanation about the nature and purpose of study, those subjects who were willing to participate in the study were included.

A detailed assessment was done on a pre tested structures Performa was used to blood for relevant information from each individual.

BLOOD for testing FBS, PLBS, HbA1C, Serum calcium and magnesium levels using appropriate clinical methods in NIRALI diagnostics & CRYSTAL diagnostics in Hanamkonda.

Study design: comparative study of type 2 diabetic obese, non-obese and controls (normal individuals).

METHODS:

Serum calcium, Serum magnesium, FBS, PLBS < HbA1C, FLP and TSH levels are estimated.

RESULTS

STATISTICAL ANALYSIS

The results are analyzed according to one way analysis of Variance, Bartlett's test for equal variances and one-way Anova Graph Pod Prism 4.0 version, 2008.

The 'P' value of 0.05 or less was considered for statistical significance.

P- value is used to assess the degree of dissimilarity between two or more sets of measurement or one set of measurement and a standard.

- If the calculated P-value is below the threshold. Chosen for statistical significance.

When presenting p values some groups find it helpful to use the asterisks rating system as well as quoting the P value. Most authors refer to **statistically significant as P<0.05** and **statistically highly significant as P<0.001**.

In our study in the obese Type-II Diabetes patients the mean serum magnesium was 1.9 mg/dl and standard deviation was 0.2 mg/dl and it ranged from 1.0 - 2.3 mg/dL.

In non-obese type-II diabetes patients the mean serum magnesium was 1.9 mg/dl and standard deviation was 0.3 mg/dl and it ranges from 1.1 to 2.2 mg/dl.

In non-diabetic control the mean of serum magnesium was 2.2 mg/dl and Standard deviation was 0.19 mg/dl with ranges from 1.8 to 2.6.

DISCUSSION

A prospective study was conducted in M.G.M. Hospital, Warangal which included 30 patients with obese Type-II Diabetes mellitus, 30 patients' non-obese Type-II Diabetes mellitus and 30 non-diabetic controls.

In this study, we have estimated the levels of serum calcium and serum magnesium in all the three groups.

It has shown minimal differences in calcium and magnesium levels when compared between obese and non-obese diabetics and non-diabetic controls.

In our study in obese type-II diabetes mellitus the mean of serum calcium and standard deviation is much low when compared to non-obese type-II Diabetes mellitus and non-diabetic controls.

Vitamin D levels were present in type 2 diabetic patients in Turkey . A negative correlation was determined in vitamin D levels and BMI, but as vitamin D deficiency was so low, 25 (OH) D levels did not worsened as obesity increased. This is stated by **Ahmet Cimbeç6**, in their study of **Relation of obesity with serum 25 hydroxy vitamin D3 levels in type 2 diabetic patients which is consistent with the present study**.

Serum levels of vitamin D inversely and PTH positively are associated with BMI after adjusted for age, gender and serum

calcium in both type 2 diabetic patients and healthy subjects. These associations were statistically significant for serum concentration of vitamin D and calcium only in diabetic patients. So the status of vitamin D is considered as an important factor in type 2 diabetic patients. Department of Nutrition and Biochemistry, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran. In their study the relationship between serum 25-hydroxy vitamin D concentration and obesity in type 2 diabetic patients and healthy subjects. **Our findings are consistent with this study.**

Among white participants, low serum magnesium level is a strong, independent predictor of incident type 2 diabetes. That low dietary magnesium intake does not confer risk for type 2 diabetes implies that compartmentalization and renal handling of magnesium may be important in the relationship between low serum magnesium levels and the risk for type 2 diabetes stated by **W.H. Linda Kao⁷**. In their study of Serum and Dietary Magnesium and the Risk for Type 2 Diabetes Mellitus **similar findings were noted in the present study also.**

Low serum magnesium levels are related to diabetes mellitus (DM) **F. Guerrero-Romero, M. Rodriguez-Moran⁸**. In their study of Low serum magnesium levels and metabolic syndrome **this result coincides with our study.**

Our findings suggest a significant inverse association between magnesium intake and diabetes risk. This study supports the dietary recommendation to increase consumption of major food sources of magnesium, such as whole grains, nuts, and green leafy vegetables stated by **Ruy Lopez-Ridaura⁹. AMERICAN DIABETES ASSOCIATION** in their study of Magnesium Intake and Risk of Type 2 Diabetes in Men and Women **which is consistent with the present study.**

Total grain, whole-grain, total dietary fiber, cereal fiber, and dietary magnesium intakes showed strong inverse association with incidence of diabetes stated by **Katie A Meyer¹⁰**, in their study of Carbohydrates, dietary fiber, and incident type 2 diabetes in older women. **These findings are consistent with our study.**

The presence of diabetes and the degree of metabolic control are essential in accounting for the lower levels of magnesium that exist in obese subjects stated by **Albert Lecube A¹¹**, their study of Diabetes is the main factor accounting for hypomagnesaemia in obese subjects. **Similar findings were noted in our present study.**

Magnesium deficiency (1) is a common factor associated with insulin resistance and vascular disease, (2) impairs energy metabolism efficiency and reduces the capacity for physical work, (3) exerts negative effects on blood glucose homeostasis stated by **Jui-Hua Huang¹²**, in their study of correlation of magnesium intake with metabolic parameters, depression and physical activity in elderly type 2 diabetes patients: a cross-sectional study. **This study is consistent with our study.**

The main findings of the present study not only support that decreased serum 25(OH)D concentration is significantly associated with prevalent T2DM and elevated HbA1c stated by **Shaum M¹³**. This also consistent with our study.

SUMMARY

A prospective study of 90 patients including 3 groups i.e. 30 obese diabetes mellitus patients. 30 non-obese diabetic control were investigated for estimation of serum calcium and serum magnesium levels estimation in the age group of 20-45 years was done.

In our study serum calcium and serum magnesium levels were grossly decreased in obese type-II diabetic patients when compared to non-obese type-II diabetic patients and non-diabetic controls.

According to this result, the patients may be given proper Calcium supplementation or Vitamin D supplementation in the early pre-diabetic state can prevent the progression in to type-II diabetes mellitus or it may even delay onset of type –II diabetes mellitus.

The patient may be given proper magnesium supplementation since childhood to enhance insulin secretion and to prevent type-II diabetes mellitus.

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