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ESTIMATION OF SERUM 25- HYDROXY VITAMIN D AND ZINC IN PATIENTS OF DIABETES MELLITUS TYPE 2.

Dr. Garima Sehgal[1]*, Dr. Tejinder Singh[2] and Jaswant Kaur[3]

[1,2]Senior Resident, Department of Biochemistry, Govt. Medical College, Amritsar.
[3]Assistant Professor, Department of Biochemistry, N C Medical College, Panipat.

***Corresponding Author: Dr. Garima Sehgal**

Senior Resident, Department of Biochemistry, Govt. Medical College, Amritsar.

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ABSTRACT

Diabetes mellitus is chronic disease characterized by defective insulin production or utilization. Type-2 diabetes mellitus has mainly peripheral insulin resistance as a cause with or without insulin secretary defects. Vitamin D plays a role in calcium metabolism. Vitamin D deficiency may be associated with a range of diseases, including cardiovascular disease and type 2 diabetes and has been associated with impaired insulin action, through direct effect of vitamin D on the β-cell function. In particular, type-2 diabetes mellitus has been shown to be associated with abnormalities in the metabolism of Zinc, Chromium, Magnesium and Manganese. The serum levels of Zinc and Magnesium are usually low in diabetic patients. **Aim:** To evaluate serum 25 –Hydroxy vitamin D and serum zinc levels in type 2 diabetes mellitus patients. **Material and Methods**: This hospital-based study was conducted on 45 diagnosed type 2 Diabetes mellitus patients and 25 non-diabetic age and gender matched controls. Blood sample was collected in plain vial and serum 25-hydroxy vitamin D levels were evaluated by ELISA technique and serum zinc were estimated calorimetrically. **Results**: The Mean values of serum 25-hydroxyvitamin D levels in study group and control group were 16.31± 14.03 and 26.63 ± 16.54 respectively. The decrease in Vitamin D levels in study group as compared to control group shows statistically significant association (p value < 0.07). The Mean values of serum Zinc levels in study group is 61.9± 11.6 and control group is 96.4 ± 8.10 respectively. The decrease in serum Zinc level in study group as compared to control group show statistically significant association (p value of <0.01). **Conclusions**: In this study we observed significant decrease of serum 25-hydroxy vitamin D and serum zinc in type 2 diabetes mellitus patients.

KEYWORDS: Type 2 Diabetes Mellitus, 25-Hydroxy Vitamin D, and Serum Zinc.

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is the commonly seen endocrine disorder characterized by hyperglycemia.[1] The International Diabetes Federation (IDF) estimates around 61.3 million diabetic individuals (2011) in India that is further set to increase to 101.2 million with a global estimate of 552 million by the year 2030.[2] There are several factors that seem to play a role in its development including genetic, lifestyle, environmental and nutritional conditions**.** Amongst nutritional factors, vitamin D is likely to have an important role either in glycemic control or in attenuating diabetic complications.[3] The probable mechanisms indicating the role of vitamin D in glucose homeostasis is likely to be through beta cell dysfunction and insulin resistance in cases with vitamin D deficiency.[4] A negative correlation between serum glucose and insulin levels with 25OHD and a positive correlation with insulin sensitivity has been observed in several human and animal model studies.[5] Speculations on the role of trace elements in human disease were aroused in 1929, when glaser and halpern noticed that yeast extracts potentiate the action of insulin.[6] The proposed mechanism of trace elements enhancing insulin action includes activation of insulin receptor sites, serving as cofactors or components for enzyme systems involved in glucose metabolism[7], increasing insulin sensitivity and acting as antioxidants preventing tissue per oxidation.[8] Zinc is required for insulin synthesis and storage and insulin is secreted as zinc crystals, it maintains the structural integrity of insulin unknown whether difference in trace elements status is a consequence of diabetes and hyperglycemia or alternatively whether their deficiencies contribute to the expression of the disease.[9] This study was conducted to assess the levels of 25 hydroxy- Vitamin D and Zinc levels in patients of Diabetes Mellitus.

MATERIAL AND METHODS

A Hospital based cross-sectional study was carried out in Department of Biochemistry, Guru Nanak Dev Hospital Amritsar on 70 subject including 45 diagnosed cases of type-2 diabetes mellitus and 25 healthy age and gender matched subjects as control. Our study, 25-Hydroxyvitamin D, serum Zinc levels and glycosylated

hemoglobin levels were evaluated in 50 cases and 25 controls. Prior Permission from ethical committee was taken.

Inclusion Criteria included Patients of type II diabetes mellitus on diet modification /or oral hypoglycemic agents treatment and Patients aged between 35-80 years.

Exclusion Criteria included Insulin therapy Consumption of zinc Vitamin D or Calcium, Renal failure, nephrotic syndrome Liver disorder with Ascites, Hypo albuminemia, Coagulation disorders and treatment with drugs like Carbamazepine, phenobarbital sodium valproate isoniazid which interfere with Vitamin D metabolism.

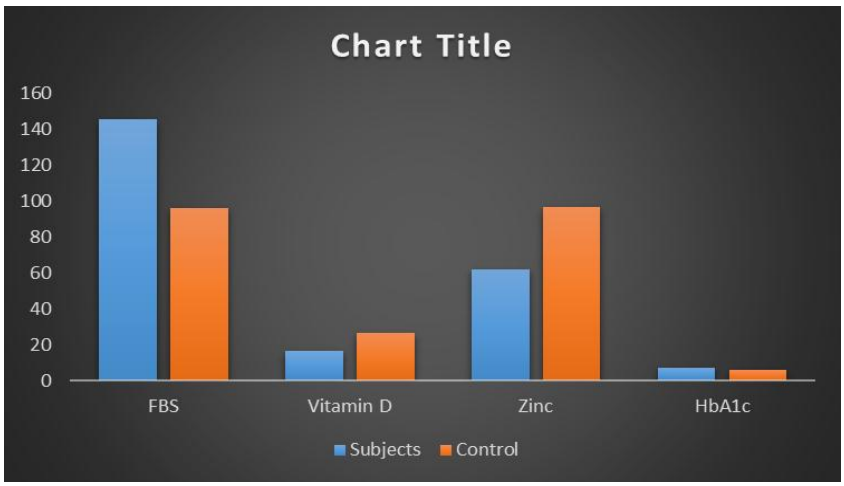
Blood sample were collected in plain vial and EDTA vial for estimation of 25-Hydroxy Vitamin D, Serum Zinc and HbA1c. Serum concentration of 25(OH) D was measured by enzyme linked immunosorbent assay (ELISA) method. Serum Zinc estimation: Colorimetric kit method. Estimation of HbA1c was performed by Ion Exchange method. Vitamin D deficiency was defined as serum 25(OH) D concentration of less than 20ng/ml, insufficiency as 20ng/ml <25(OH) D<30 ng/ml and sufficiency was defined as 25(OH) D higher than 30 ng/ml. HbA1c value interpretation was on the percentage basis with normal or non-diabetic person have Hba1c of 4.2-6.2%, Diabetic person with good control have 5.5-6.8%.Diabetic person but they needed active medication have HbA1c of 6.8-7.6% and person with bad control have > 7.6%. Normal Value for Serum Zinc Levels were 0.66 to 1.10 microgram /ml The data were collected and analyzed using student t test. A p value of <0.005 was regarded for significance.

RESULTS

The general characteristics of the individuals have been described in [Table]. Student t test was used to evaluate the results.

Parameters	Subjects	Control	P Value	Significance
FBS	145.22±44.37	95.72±11.68	<0.005	HS
Vitamin D	16.31± 14.03	26.63 ± 16.54	<0.007	HS
Zinc	61.9± 11.6	96.5± 9.8	<0.001	HS
HbA1c	6.86± 0.85	5.80 ± 0.66	<0.001	HS

*HS (Highly Significant),S (Significant)



The study group of diabetes mellitus type 2 patients, 25(OH)D3 levels were lower than in the control group. Mean value of25(OH)D3 levels being 16.31± 14.03 ng/ml and 26.63 ± 16.54 ng/ml in the study and control group, respectively(p <0.007). In the study group about 16 people with T2DM of 45 (35.6%) were Vitamin D deficient as opposed to 7 of 25 (32.9%) in control non diabetic group. Mean value of Serum Zinc levels in Subjects and Control were 61.9± 11.6 and 96.5± 9.8µg/dl respectively.

DISCUSSION

The increasing incidence of T2DM is taking a great toll of health resources. India being a vast tropical country geographically spreading from 8.4° N latitude to 37.6° N latitude, it is expected that sufficient sunlight is received throughout the year.[10] Numerous studies have demonstrated the essential roles of trace elements as chromium, zinc, magnesium, selenium, vanadium, molybdenum and manganese in insulin action and carbohydrate metabolism.[11] In our study, it was observed that mean serum zinc level was significantly low in diabetics as compared to control subjects, which correlates with other studies in different parts of the world. The possible explanation for decreased level of zinc observed in diabetics can be due to increased excretion and/or decreased gastrointestinal absorption of zinc. The diverse effect of vitamin D on glucose and calcium homeostasis.[12] The present study has also shown a higher incidence (35.6%) of vitamin D

deficiency in overall recruited subjects indicating that both T2DM (91.4) subjects and nondiabetic control subjects (32.9%) were equally deficient. This is likely to be due to increased skin pigmentation, low exposure to direct sunlight, obesity and malabsorption, as has been observed by several studies from India.[13] been argued by Luo et al. that to meet an adequate requirement of vitamin D, people in India require sun exposure almost double than Caucasians due to increased skin pigmentation.[14] Although in a review by Pittas et al. an association between T2DM and low vitamin-D levels has been demonstrated.[15] Luo et al. also showed that within T2DM subjects, regardless of a common finding of vitamin D deficiency, low vitamin D is associated neither with increased prevalence of the metabolic syndrome, nor is there any association with glycemic control.[14] mechanisms like activation of vitamin D receptor and calcium homeostasis involving impaired pancreatic-β cell function and insulin resistance inT2DM have been suggested.[16] Our study also concluded that mean serum zinc level was significantly low in diabetics as compared to control subjects, which correlates with other studies[17,18] in different parts of the world. The possible explanation for decreased level of zinc observed in diabetics can be due to increased excretion and/or decreased gastrointestinal absorption of zinc. Sharma[19] reported an inverse correlation between serum zinc level and poor glycemic control and a strong association with retinopathy.

CONCLUSIONS

Decreased levels of Vitamin D and zinc is the cause or consequence of diabetes mellitus remains yet to be analysed, but its strong association with type 2 diabetes mellitus signifies the role played by Vitamin D and zinc in glucose disposal. The poor glycemic control and the association with type 2 diabetes mellitus strongly suggest that serum Vitamin D and zinc estimation should be a part of the screening panel in the risk detection for type 2 diabetic patients. Many workers have documented that the Vitamin D and zinc supplementation, in addition to the other nutritional treatments, play an important role in delay and prevention of the complication of type 2 diabetes mellitus.

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