



STUDY REGARDING VITAMIN D DEFICIENCY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN NORTH INDIA

Shilpa Atwal*

Medical officer, Civil hospital, Sundernagar. *Corresponding Author

Jitender Thakur

Senior resident, SLBSGMCH, Nerchowk

ABSTRACT

Background: Vitamin D deficiency is common in general population in India in spite of adequate sunlight. We tried to study the prevalence of vitamin D deficiency in type 2 diabetes mellitus patients in North India.

Methods: 150 type 2 diabetes patients attending Civil Hospital Sundernagar outpatient department. Fasting plasma glucose, post prandial plasma glucose, 25(OH) D3 levels of these subjects were measured.

Results: Out of 150 type 2 diabetes patients 60 % were males and age group ranging from 35 to 80 years. Duration of diabetes vary from 0 to 25 years. Vitamin D deficiency was present in 62.7%, insufficiency in 30.6% and only 6.6% had normal vitamin D levels in type 2 diabetes. Vitamin D deficiency was common in females.

Conclusions: Vitamin D deficiency was present in about 62.7% of patients.

KEYWORDS : Vitamin D, Type 2 diabetes, insulin resistance

INTRODUCTION

The prevalence of Type 2 DM which is a chronic metabolic disorder is increasing steadily all over the world. Estimates worldwide indicate that, the global population of diabetic patients would have been 562 million by 2030(1). Although the population with T2DM is increasing worldwide, the major contribution is from developing countries. Hence the pathophysiology of this disease is being researched extensively. Peripheral Insulin resistance and β -cell dysfunction form the core pathophysiologic defects of T2DM. It is studied to be an interplay between genetic and environmental factors. Incidence of T2DM varies between geographical regions due to differences in lifestyle and risk factors. Major environmental risk factors are obesity, physical inactivity, intake of high calorie food and stress, the role of certain nutritional factors in pathogenesis of T2DM is an emerging concept at present. It is evident from several cross-sectional studies suggests that vitamin D plays an important role in the blood glucose homeostasis, and its deficiency may be a risk factor in development of T2DM. Vitamin D, in its active form is a hormone involved in bone metabolism and plethora of non-skeletal physiological processes. Several studies have proven a positive effect of vitamin D sufficiency on insulin secretion and sensitivity, which include its direct effect via activation of vitamin D receptor on pancreatic β -cells and insulin sensitive organs and indirect effect via regulation of calcium homeostasis (2,3). In the largest epidemiological study from the NHANES population, a dose-dependent inverse relationship has been observed between vitamin D and type 2 DM with the highest number of metabolic syndrome patients having the lowest quartiles of vitamin D(4). 1

Research methods and statistical analysis

Study design and participants- 150 North Indian type 2 diabetic individuals attending Internal Medicine OPD at Civil Hospital Sundernagar were assessed for fasting and post-prandial plasma glucose, 25(OH) vitamin D3 levels. Informed consent was obtained from all the participants. Inclusion criteria- All type 2 diabetes patients with age more than 35 and less than 80 years, duration of diabetes new to 25 years were included in the study.

Sample collection

Venous blood sample collected under aseptic precautions and vitamin D was estimated by chemiluminescence.

Exclusion Criteria

Patients Taking Vitamin D Supplementation Or Having Chronic Hepatic, Renal Or Metabolic Bone Disorders (including Parathyroid Related Problems) Were Excluded

From The Study Or Those Patients Having History Of Malabsorption Syndromes Such As Celiac Disease Or Active Malignancy Or With Active Infection Were Excluded From The Study. Patients Were Also Excluded If They Had Any Severe Medical Illness, Such As Sepsis, Severe Infection, Malignancy, Liver Cirrhosis, Heart Failure, Or Renal Failure.

Statistical Methods

Descriptive statistics were calculated and analysis was carried out in the present study. Results on continuous measurements were presented on Mean SD (Min-Max) and results on categorical measurements were presented in Number(%). Chi-square/ Fisher Exact test was used to find the significance of study parameters. The Statistical software namely SPSS 20.0 was used.

RESULTS

150 type 2 diabetes subjects were studied. 60% were males and age group ranging from 35 to 80 years. Duration of diabetes varied from 0 to 25 years. Vitamin D deficiency was present in 62.6%, insufficiency in 30.6% and only 6.6% had normal vitamin D levels.

Table-1: Prevalence of Vitamin D deficiency in type 2 diabetes

| VitaminD (ng/ml) | Number of type2 diabetes subjects | Percentage |
|------------------------------|-----------------------------------|--------------|
| Deficient (<20 ng/ml) | 94 | 62.7 |
| Insufficiency (>20-30 ng/ml) | 46 | 30.6 |
| Normal (>30 ng/ml) | 10 | 6.7 |
| Total | 150 | 100.0 |

Vitamin D deficiency was more common in females

Table-2: Correlation of gender with levels of Vitamin D levels in type 2 diabetes individuals

| Clinical variables | Deficient (<20 ng/ml) (n=94) | Insufficient(20-30 ng/ml) (n=46) | sufficient(>3 0 ng/ml) (n=10) | P value |
|--------------------|------------------------------|-----------------------------------|-------------------------------|---------|
| Male | 54(60%) | 28(31.1%) | 8(8.9%) | <0.001 |
| Female | 40(66.6%) | 18(30%) | 2(3.4%) | <0.001 |

DISCUSSION

Type 2 Diabetes Mellitus (T2DM) is a common endocrine disorder characterized by hyperglycemia and insulin resistance. Several factors play a role in its development including genetic, lifestyle, environmental and nutrition. Amongst nutritional factors, vitamin D is likely to have an important role in glycemic control and prevention of complications. The probable mechanisms is likely to be

through beta cell dysfunction and insulin resistance in cases with vitamin D deficiency.

Vitamin D deficiency is considered as pandemic in all age groups across the world. A cross-sectional study involving largest cohort of non-diabetic Americans (n = 6288) reported an inverse relationship between serum 25(OH) D concentration and fasting or post glucose load values. [4,5]. The present study has also shown a higher prevalence (62.7%) vitamin D deficiency in overall recruited subjects. This is in accordance with other studies indicating low serum vitamin D levels in 70% to 100% populations across India. The high prevalence of Vitamin D deficiency in this study could be explained by decreased sun exposure, limited outdoor activities, increased sunscreen use and decreased awareness about Vitamin D fortification. Although sun exposure is adequate in India, it is limited to only few months, and fortification of food with vitamin D is not routine in the country. Whether vitamin D status in patients with diabetes has a role in the pathogenesis of diabetes mellitus in patients' needs to be elaborated in further studies. It has been argued by Lo 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. [6,7]. Life style factors like in-door working or working in close environment with minimum sun exposure is also likely for high prevalence of vitamin D deficiency in our population. Normal office hours in India are usually from 10 am to 6 pm while maximum sun exposure and absorption is between 11 am to 2 pm with an UV index of 7-9 required for conversion of 7-dehydrocholesterol to pre-vitamin D3 [8]. But this seems to be unrealistic as being a tropical country summers in India are very hot, forcing most of its people to stay indoor during this time, resulting in low exposure to the sunlight contributing for very low vitamin D levels in our population.

CONCLUSIONS

Vitamin D deficiency was present in 62.7 % of type 2 diabetes individuals in OPD patients at civil hospital Sundernagar, India. Correction of vitamin D deficiency in type 2 diabetes may help in improving glycemic control. This has to be further validated by further studies in India.

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