

Vitamin D Deficiency in Patients with Type-2 Diabetes Mellitus: A Cross-Sectional Study.

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Abstract: - Objectives: To assess the level of vitamin D in subjects with T2DM.

Materials and Methods: Forty patients had been previously diagnosed with t2DM and were taking either oral medication for glucose control or by injecting insulin. selected randomly from Medicine OPD of Kulai district hospital, Tripura, from July to November 2015, and routine assessment of serum 25-hydroxy vitamin D concentration done.

Result: Out of 40 patients, 30(75%) were males and 10 (25%) were females. The average serum 25-hydroxy vitamin D concentration was 24.5 ng/ml (± 9.2). Twenty-nine patients (72.5%) percent were have 25-hydroxy vitamin D insufficiency (<30 ng/ml).

Conclusion: Type 2 Diabetes Mellitus patients typically have low vitamin D serum levels that perpetuate and worsen patient outcomes.

Keywords: *Diabetes Mellitus; BMI; Vitamin D deficiency.*

I. INTRODUCTION

Over recent decades, numerous non-skeletal diseases associated with vitamin D deficiency have been reported including T2DM (type2 diabetes melitus)¹. T2DM and vitamin D deficiency have risk factors in common such as American-African race, obesity, aging and low physical activity². Also there are associations of vitamin D deficiency with diseases such as osteoporosis, cardiovascular disease and metabolic syndrome disorders diseases³⁻⁵. Some studies have shown a relationship between vitamin D deficiency and T2DM⁶. Also some other studies have shown that vitamin D may play a functional role on glucose tolerance through its effects on insulin secretion and insulin sensitivity⁷. In comparison to healthy controls, subjects with T2DM have significantly lower circulating concentration of 25 (OH) D⁸. Also the prevalence of vitamin D deficiency in women with T2DM is more common and also, old men with vitamin D deficiency, secrete higher insulin after glucose intake⁹⁻¹¹. Animal studies have shown that vitamin D is a basic factor, necessary for normal insulin secretion¹¹⁻¹². Vitamin D reduces insulin resistance probably through its effect on calcium and phosphorus metabolism and through up regulation of the insulin receptor gene¹³. T2DM is considered to develop from a state of increased insulin resistance and β -cell dysfunction¹⁴. Studies on associations between insulin secretion and serum 25 (OH)D have been inconsistent. We have evaluated the level of vitamin D in subjects with T2DM.

II. Materials and Methods

Forty patients selected randomly from Medicine OPD of Kulai district hospital, Tripura, from July to November 2015.

Inclusion criteria:-All patients had been previously diagnosed with t2DM and were taking either oral medication for glucose control or by injecting insulin.

Exclusion criteria:-Subjects with chronic diseases of renal and liver, skin disorders, malabsorption, inflammatory bowel or Celiac disease (in history or nowadays), osteoporosis, osteomalacia and ones taking medications that may interfere serum levels of 25(OH)D were excluded from study.

Parameters Investigated:-Initial consultation and examination involved the routine assessment of serum 25-hydroxy vitamin D concentration. It has been previously proposed that vitamin D deficiency should be defined as a serum 25OHD level <50 nmol/L (<20 ng/mL), however most endocrinologists have a consensus that a serum 25OHD level of <75 nmol/L (<30 ng/mL)

should be taken as abnormal/insufficient¹⁵, and this is the reason why we considered serum 25OHD level of <30 ng/mL (<75nmol/L) to be as 25-hydroxy vitamin D insufficiency.

Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Science (SPSS). The categorical variables were shown as numbers of cases with percentage, and the continuous variables were shown as mean \pm standard deviation (SD). A *P* value of ≤ 0.05 was considered statistically significant

III. RESULTS

Demographic and clinical characteristics of the patients are shown in Table 1. Mean age was 58.38 ± 9.83 years and 10 (25%) of the patients were female.

Table No.1 Demographic and clinical characteristics of patients (n: 40).

Age (year)	58.38 ± 9.83
Male	30(75%)
Female	10 (25%)
BMI(kg/m ²)	27.3 ± 5.0

The average serum 25-hydroxy vitamin D concentration was 24.5 ng/ml (± 9.2). Twenty-nine patients (72,5%) percent were have 25-hydroxy vitamin D insufficiency (<30 ng/ml).

IV. DISCUSSION

We explored the relationship of serum 25-hydroxyvitamin D concentrations in a random sample of 40 t2DM patients who presented to medicine opd of kulai district hospital. All the patients had been diagnosed with adult onset, type 2 Diabetes Mellitus. A conservative recommendation for serum 25-hydroxyvitamin D concentration is 30 ng/ml. Our sample average was well below this level, in fact, only 11/40 (27.5%) had healthy levels. 72,5% (29/40) of our entire sample had clinically significantly low vitamin D levels. Therefore, the rationale for supplementation of vitamin D for t2DM patients is substantiated. Vitamin D supplementation has been proven to reduce the risk of developing the disease, as well as to reverse the disease state altogether¹⁶. Our sample did not demonstrate any significant age and vitamin D level association. Age, however would be expected to negatively correlate with vitamin D status since older individuals are less efficient at producing vitamin D in sunlight as opposed to younger individuals as well as the fact that older individuals kidneys are less able to convert vitamin D into its active form¹⁷. Ou *et al.* (2011)¹⁸ determined the optimal concentration of serum 25OHD to be 40 ng/ml in order to optimize insulin sensitivity. In our sample 35/40 (87.5%) had vitamin D levels at or below this optimal cut-off level. As this study demonstrates that the majority of people with t2DM suffer from inadequate amounts of vitamin D, vitamin D testing should be routine for all people at risk for t2DM, pre-diabetics and those currently suffering with t2DM in order to elevate levels sufficiently to improve insulin sensitivity and improve long-term outcomes. Large scale, well-controlled clinical trials assessing the effects of vitamin D treatment in this disorder are overdue and warranted.

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