

## ORIGINAL RESEARCH

# Assessment of serum vitamin D level in diabetic patients: An observational study

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Received: 22 December, 2021

Accepted: 24 January, 2022

### ABSTRACT

**Background:** The present study was conducted for assessing serum vitamin D level in diabetic patients. **Materials & methods:** A total of 100 patients with type 2 diabetes and 100 healthy controls were enrolled. Complete demographic and clinical details of all the patients was obtained. Inclusion criteria for the study group included whose diabetes was confirmed and were between 30-60 years old and agreed to participate in this study. Blood samples were obtained from all the patients and was sent to laboratory where Vitamin D levels were evaluated using an auto-analyzer. 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. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis. **Results:** Mean vitamin D levels among the patients of the study group and control group was 16.3 ng/ml and 23.1 ng/ml respectively. While comparing the results, significant results were obtained. **Conclusion:** Vitamin D levels are significantly affected in diabetes patients.

**Key words:** Diabetes, Vitamin D

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### INTRODUCTION

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels.<sup>1-4</sup>

Diabetes with its ever-increasing global prevalence has emerged as one of the most important and challenging health issues confronting the human population of the present world. The increase in the prevalence of diabetes in most regions across the globe has been parallel to the rapid economic development, leading to urbanization and adoption of modern lifestyle habits. In the year 2019, the number of adult people aged 20–79 years with diabetes has been estimated to be about 463 million, which represents 9.3% of the total world adult population. By the year 2030, this number has been estimated to increase to 578 million, representing 10.2% of the total world adult population and further increase to 700 million by the year 2045, which represents 10.9% of the total world adult population. In the year 2019, the prevalence of diabetes among men and women has been estimated to be 9.6% and 9.0%, respectively, of the total respective gender world population.<sup>5-7</sup>

Vitamin D has several non-endocrine actions. Several studies have reported the immunomodulatory, endocrine, and metabolic effects of vitamin D. Around one billion of the world population have either vitamin D deficiency or insufficiency. Vitamin D deficiency is very common in India, with a prevalence rate of 70% to 100% in many parts of the country. Vitamin D deficiency has been linked to the complications of diabetes, both microvascular and macrovascular. Considering the immunomodulatory action of vitamin D and its association with diabetic vascular complications, vitamin D may have a role in the development of foot infections and their prognosis.<sup>8-10</sup> Hence; the present study was conducted for assessing serum vitamin D level in diabetic patients.

### MATERIALS & METHODS

The present study was conducted for assessing serum vitamin D level in diabetic patients. A total of 100 patients with type 2 diabetes and 100 healthy controls were enrolled. Complete demographic and clinical details of all the patients was obtained. Inclusion criteria for the study group included whose diabetes was confirmed and were between 30-60 years old and agreed to participate in this study. Blood samples were obtained from all the patients and was sent to

laboratory where Vitamin D levels were evaluated using an auto-analyzer. 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. all the results were recorded in Microsoft excel sheet and was subjected to statistical analysis.

## RESULTS

Mean age of the patients of diabetic group and control group was 43.2 years and 41.8 years respectively.

Majority proportion of patients of both the study groups were males. Both the study groups were comparable in terms of age and gender-wise distribution of patients. Mean vitamin D levels among the patients of the study group and control group was 16.3 ng/ml and 23.1 ng/ml respectively. While comparing the results, significant results were obtained. In the control group and study group, 32 percent and 51 percent of the patients had vitamin D insufficiency.

**Table 1: Comparison of vitamin D levels**

Vitamin D levels	Diabetic group	Control group
Mean	16.3	23.1
SD	2.3	4.8
p-value	0.001 (Significant)	

**Table 2: Comparison of vitamin D sufficiency**

Vitamin D insufficiency	Diabetic group	Control group
Number	51	32
Percentage	51	32
p-value	0.000 (Significant)	

## DISCUSSION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia. It is associated with a significant increase in morbidity (e.g., blindness, kidney failure, stroke, cardiovascular diseases, limb amputations), premature mortality, high healthcare costs, and is rapidly becoming an epidemic disorder of global proportions. Various epidemiological studies show that the prevalence of diabetes mellitus is increasing every year, paralleling the increase in life expectancy, as the elderly population is at a higher risk of developing T2DM. Also, multiple studies show that more than 90% of T2DM cases are strongly associated with poor lifestyle, obesity (BMI >30 kg/m<sup>2</sup>), and reduced physical activity. Vitamin D is an essential nutrient for humans, which can be obtained both exogenously and endogenously. The primary source of vitamin D is endogenous synthesis by the skin with the help of ultraviolet light.<sup>7-10</sup> Hence; the present study was conducted for assessing serum vitamin D level in diabetic patients.

Mean age of the patients of diabetic group and control group was 43.2 years and 41.8 years respectively. Majority proportion of patients of both the study groups were males. Both the study groups were comparable in terms of age and gender-wise distribution of patients. Mean vitamin D levels among the patients of the study group and control group was 16.3 ng/ml and 23.1 ng/ml respectively. While comparing the results, significant results were obtained. In the control group and study group, 32 percent and 51 percent of the patients had vitamin D insufficiency. Al-Timimi DJ et al investigated the level of 25-hydroxyvitamin D(25(OH)D) in diabetic

patients. The mean  $\pm$  SD values for serum 25hydroxy (OH) D levels of diabetic patients was 25.6 $\pm$  12.6 ng/ml and those for the controls was 34.1 $\pm$ 14.7 ng/ml (p<0.01). The prevalence of vitamin D insufficiency was significantly higher among diabetic patients than among the controls (53.7% vs. 29.4%, p<0.001). This finding was still true even after the means of serum 25 (OH) D levels were adjusted to those of severe vitamin D deficiency (4.4% vs. 0.68%). Patients with poor glycaemic control had a higher prevalence of low vitamin D status (90%) than those with sufficient vitamin D levels (76%). As compared to diabetics with a good and fair glycaemic control, diabetics with a poor glycaemic control exhibited lower 25(OH)D levels (p<0.01) and a higher prevalence of low vitamin D status (89% vs. 4% and 7%) respectively. Patients with a diabetes duration of more than 5 years also had a higher prevalence of low vitamin D status as compared to vitamin D sufficient group (51% vs. 40%). A statistically negative significant correlation between serum 25 (OH) D levels and HbA1c % was found in diabetic patients ( $r=0.238$ , p<0.01). A low vitamin D status is present in two thirds of patients with DM type 2, particularly among diabetics with poor glycaemic control and among those with longer diabetes durations.<sup>11</sup> Haidari F et al investigated the association between serum 25(OH)D and glycaemic and inflammatory markers in non-obese patients with T2DM. The mean serum concentration of 25(OH)D was 11.01 $\pm$ 5.55 ng/mL. Severe deficiency, deficiency, and insufficiency of vitamin D were detected in 60.71%, 35.72%, and 3.57% of the participants, respectively. The results showed that those in the lowest group of serum 25(OH)D had significantly higher TNF- $\alpha$  than did those in the highest group

( $P=0.026$ ). Although the association between serum 25(OH)D and fasting blood sugar and TNF- $\alpha$  was statistically significant ( $P=0.049$  and  $P=0.044$ , respectively), the other glycemic markers and hs-CRP did not have any significant relationships with 25(OH)D. According to the high prevalence of vitamin D deficiency in the diabetic patients and the inverse relationship between serum 25(OH)D and fasting blood sugar and TNF- $\alpha$  in this study, vitamin D status may be a determining factor of systemic inflammation in patients with T2DM.<sup>12</sup>

## CONCLUSION

Vitamin D levels are significantly affected in diabetes patients.

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