



# Vitamin D Deficiency in Patients with Type 2 Diabetes Mellitus in Jammu Region

Rachna Sabharwal, Pallavi Mahajan, Animesh Mahajan

## Abstract

**Purpose:** The present study was undertaken to estimate the serum vitamin D levels in type 2 diabetic patients and compare it with normal healthy individuals. **Material and Methods:** The study was conducted in the department of Biochemistry, Government Medical College, Jammu. 50 patients with type 2 diabetes mellitus diagnosed on the basis of raised serum glucose levels and 50 healthy adults in the age group of 40 years and above were selected irrespective of their sex. Serum sample was taken for the estimation of serum glucose levels and the vitamin D levels in both the groups. **Results:** The mean levels of vitamin D in diabetic males were 24.27 ng/dl which was much less as compared to normal healthy males in whom the levels were 34.11 ng/dl, and the difference was statistically significant ( $P=0.0042$ ). Similarly, the levels of vitamin D in diabetic females were 19.56 ng/dl which was very low, as compared to the healthy females, and the p-value was also statistically significant (0.0041). **Conclusion:** It was observed, that the type 2 diabetic patients had significantly lower vitamin D levels irrespective of their gender.

## Keywords

Diabetes mellitus, Vitamin D deficiency, Sunlight exposure

## Introduction

Type 2 Diabetes mellitus is a metabolic disorder and is one of the main causes of morbidity and mortality in many countries of the world (1). Vitamin D has an important role in maintaining bone and mineral homeostasis but research in recent decades has shown its role in immune function regulation and also in multiple non-skeletal diseases (2). Some studies have shown inverse relationship between prevalence of type 2 diabetes mellitus and vitamin D levels in circulation (3), and vitamin D supplementation can help to decrease the incidence of DM (4). Vitamin D may also play a role on glucose tolerance through its effect on insulin sensitivity and secretion (5). The prevalence of vitamin D deficiency in old men and women with type 2 diabetes mellitus is more

common and they also secrete higher insulin after intake of glucose (6). A high prevalence of vitamin D deficiency is found in population of Jammu in different age groups according to some studies (7). The present study was conducted in urban population of Jammu with the aim to determine vitamin D status among type 2 diabetic patients and compare it with the healthy adults.

## Material and Methods

The study was conducted in the Department of Biochemistry, Super Specialty hospital, Government Medical College, Jammu. The study was carried out after

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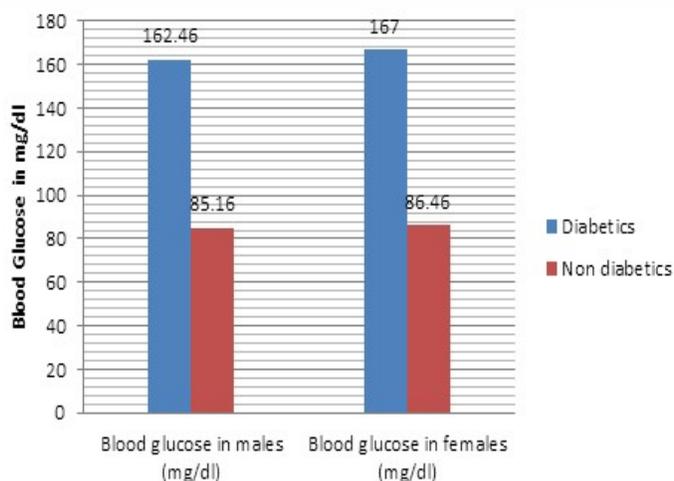
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obtaining due approval from the ‘Institutional Ethics Committee’ of the College over a period of 6 months from November, 2019 to April, 2020. 50 patients with type 2 diabetes mellitus diagnosed on the basis of raised serum glucose levels and 50 healthy adults in the age group of 40 years and above were selected irrespective of their sex. Patients were explained about the details of the study and an informed written consent was taken before including them into the study. Serum obtained from 3 ml of blood drawn from the ante-cubital vein under aseptic conditions from each individual with his/her consent, duly following the guidelines and norms of the hospital, was taken for the estimation of serum glucose levels and the vitamin D levels in both the groups. The vitamin D levels were estimated in abbot architect chemiluminescent microparticle immunoassay (8).

A 25(OH)D level <10ng/mL was considered as severe vitamin D deficiency, 10-19.9 ng/mL as moderate vitamin D deficiency, 20-29.9 ng/mL as mild vitamin D deficiency, and e” 30ng/mL as vitamin D sufficiency. Patients with previous history of liver disease, renal disease, thyroid disorders, metabolic bone disorders, malignancy, hyperparathyroidism, anti-osteoporotic therapy were excluded from the study.

The results were analyzed by using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp. Released 2017. Armonk, NY, USA). Comparison between the two groups for the continuous variables was made using unpaired sample *t*-test. Chi-square test was used to analyse nominal categorical variables. All statistical tests were



**Figure 1: Comparison of Blood Glucose Levels in Males and Females**

carried out at 5% level of significance and  $P < 0.05$  was considered to be statistically significant.

### Results

It was observed that the mean level of serum glucose in diabetic males was 162.46 mg/dl and that in diabetic

**Table 1: Gender-Wise Composition of Patients**

	Diabetic No (%)	Non-Diabetic No (%)	P- value
Males	31 (62)	26 (52)	0.3125
Females	19 (38)	24 (48)	
Total	50 (100)	50 (100)	

**Table 2: Gender-Wise Comparison of Vitamin D Levels in Diabetics and Non- Diabetics**

	Vitamin D levels in Diabetics (Mean ± SD)	Vitamin D levels in Non-Diabetics (Mean ± SD)	p-value
Males	24.27±10.72	34.11±12.06	0.0042*
Females	19.56±11.18	27.96±8.11	0.0041*

\*p-value <0.05, Statistically significant

**Table 3: Comparison of Vitamin D levels in both the genders in each group**

	Vitamin D levels in Diabetics (Mean ± SD)	Vitamin D levels in Non-Diabetics (Mean ± SD)
Males	24.27±10.72	34.11±12.06
Females	19.56±11.18	26.96±8.11
p-value	0.1109	0.0254*

\*p-value <0.05, Statistically significant

**Table 4: Comparison of Serum Glucose Levels and Serum Vitamin D Levels in Both Diabetics and Non-Diabetics**

	N	Glucose Levels (Mean ± SD)	Vitamin D Levels (Mean ±SD)
Diabetics	50	162.74±49.11	22.22±11.04
Non-Diabetics	50	85.84±9.62	31.16±10.71
p-value		0.0001*	0.0001*

\*p-value <0.05, Statistically significant; N= No. of Patients



females was 167 mg/dl whereas in non-diabetic males, serum glucose level was 85.16 mg/dl and that in non-diabetic females was 86.46 mg/dl as shown in *Figure 1*. *Table 1* shows gender wise composition of diabetic and non-diabetic patients. The mean level of vitamin D in diabetic males was 24.27ng/ml and in non-diabetic males was 34.11ng/ml and the p-value was 0.001, which is statistically significant as shown in *Table 2*. The mean level of vitamin D in diabetic females was 19.56ng/ml and in non-diabetic females was 27.96ng/ml and the p-value was 0.011, which is statistically significant as shown in *table 2*. On comparison of vitamin D levels in diabetic males and females, the difference was not statistically significant while in non-diabetic males and females, the difference was statistically significant shown in *Table 3*. *Table 4* shows comparison of serum glucose levels and serum vitamin D levels in both diabetics and non-diabetics.

### Discussion

In our study, we determined the levels of vitamin D in patients of type 2 diabetes and compared it with normal healthy adults. All the subjects included in the study were above 40 years of age. The mean levels of vitamin D in diabetic males were 24.27 ng/dl which was much less as compared to normal healthy males in whom the levels were 34.11 ng/dl, which was statistically significant. Similarly, the levels of vitamin D in diabetic females were 19.56 ng/dl which was very low, as compared to the healthy females, and the p-value was statistically significant also. Shahzad et al. (9) found vitamin D deficiency in 92% patients of diabetes. Gagnun et al (10) and Taheri (11) in their studies have found the mean serum concentration of vitamin D in diabetic patients to be lower than in non-diabetics. Some studies suggested that vitamin D directly activates pancreatic beta cells or may act indirectly through regulation at calcium homeostasis which causes positive effect on insulin secretion and sensitivity (12). On comparison of vitamin D levels in diabetic males and females, the difference was not statistically significant while in non-diabetic males and females, the difference was statistically significant in our study.

The receptors of Vitamin D have been found in beta cells of pancreas, which expresses the enzyme 1- $\alpha$ -hydroxylase. Vitamin D also facilitates the insulin secretion from pancreatic beta cells, thus regulating insulin secretion. Vitamin D decreases insulin resistance possibly through its effect on calcium and phosphorus metabolism and through up regulation of the insulin receptor gene (13).

Further, many studies have proven that there was poor control of DM in patients with vitamin D deficiency, which can be corrected with the supplementation of vitamin D (14,15). In our study, we found that Vitamin D deficiency was more among the uncontrolled diabetics than the diabetics with good glycemic control. Shruti bhattacharya et al (16) found that most of the non-diabetic controls in their study had Vitamin D deficiency. However, the prevalence of Vitamin D deficiency was more among the uncontrolled diabetics than the euglycemic controls. A study done in Nigeria showed that Vitamin D3 supplementation in persons with T2DM and Vitamin D deficiency resulted in a significant improvement in glycemic control (17).

### Conclusion

Our findings demonstrated that vitamin D levels in diabetics were significantly lower in comparison to non-diabetic individuals. There are certain limitations in our study, as the sample size was small and further studies could be performed in large sample of type 2 diabetes with different durations. Thus, keeping in view the high prevalence of vitamin D deficiency in Jammu region, we can do further study on these subjects by treating them with vitamin D supplementation and see if the supplementation of vitamin D helps in the control of serum glucose levels in diabetics.

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Nil.

### Conflicts of Interest

There are no conflicts of interest.

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