

# Frequency of Vitamin D Deficiency among Patients of Diabetes Mellitus Type II, Presented at Medicine OPD of a Tertiary Care Hospital

NASRULLAH AAMER<sup>1</sup>, RAJKUMAR<sup>2</sup>, MUHAMMAD KHALID NIZAMANI<sup>3</sup>, YAR MUHAMMAD TUNIO<sup>4</sup>, SHAHZAD MEMON<sup>5</sup>, RUQAYYA FARHAD<sup>6</sup>

<sup>1</sup>Associate Professor of Medicine, Peoples University of Medical and Health Sciences for women, Nawabshah (SBA)

<sup>2</sup>Assistant Professor of Medicine, Bhattai Dental & Medical College MirpurKhas

<sup>3</sup>Senior Registrar of Medicine, Indus Medical College Tando Muhammad Khan

<sup>4,6</sup>Assistant Professor of Medicine, GIMS Gumbat

<sup>5</sup>Assistant Professor of Medicine, Peoples University of Medical and Health Sciences for women Nawabshah (SBA)

Corresponding author: Nasrullah Aamer, Email: [aamer.nasrullah@gmail.com](mailto:aamer.nasrullah@gmail.com)

## ABSTRACT

**Objective:** To determine the frequency of vitamin d deficiency and insufficiency among patients of diabetes mellitus type II presented at medicine OPD of tertiary care Hospital

**Methodology:** This cross-sectional study was done at Medicine department of Peoples University of Medical and Health Sciences for women Nawabshah (SBA). Study was done during six months from April 2020 to September 2020. All patients of diabetes mellitus type II, age >40 years and of either were included. A 5ml sample was taken from each patient and was sent to the diagnostic laboratory to assess the HbA1c level and vitamin D status. The normal range for vitamin D (25-OHD) was 30–40 ng/ml. The value <20 ng/ml was defined as deficiency while insufficiency was ranged between 20.1- 29.9 ng/ml. All the data was collected by the self-made study proforma. Data analysis was done by using the SPSS version 26.

**Results:** A total of 62 patients of diabetes mellitus were studied for vitamin D level; their average age was 49.51+12.65 years and average duration of diabetes was 10.25+5.22 years. Average HbA1c was 7.33+3.5 and the average vitamin D level was 27.21+21.98. 36(58.1%) were males and 26(41.9%) were females. Average BMI was 28.41+3.63 kg/m<sup>2</sup>. Out of all study participants 48.40% of the cases were observed with vitamin D deficiency. Vitamin D deficiency was statistically insignificant according to gender and socioeconomic status ( $p > 0.05$ ).

**Conclusion:** As per study conclusion the vitamin D deficiency and insufficiency was observed to be higher among patients of diabetes mellitus type II and vitamin D deficiency was insignificantly linked to gender, socioeconomic status and severity of diabetes.

**Keywords:** Vitamin D, Type II diabetes mellitus

## INTRODUCTION

Diabetes mellitus Type II is one of the most frequent public health issues throughout the world, and its prevalence is increasing, especially in middle- and low-income nations.<sup>1</sup> It's one of the fastest-growing public health problems, and it is generating a slew of major health problems. There are approximately 415 million people suffering with diabetes globally, with 90-95 percent having T2DM.<sup>2</sup> By 2040, this population is predicted to rise to 642 million.<sup>2</sup> Pakistan is a developing country with a rapidly increasing diabetes prevalence.<sup>3</sup> Diabetes mellitus is caused by a combination of environmental and genetic factors.<sup>4</sup> In the vast majority of instances, diabetes mellitus type 2 is linked to some form of poor living. Such variables are frequently modifiable. Obesity is one of the most major modifiable variables. Deficiency of vitamin D is another controllable factor that is linked to the development and management of diabetes.<sup>4,5</sup> Deficiency of vitamin D is a new link with diabetes mellitus that has gotten a lot of attention recently.<sup>2</sup> Lower intake of dietary vitamin D and decreased cutaneous vitamin D production are the most common causes of vitamin D deficiency, with the latter being linked to lower sunshine exposure due to different locations geographically, genetic background impacting skin colour, age, and cultural or religious behaviors.<sup>2</sup> Vitamin D is linked in the several non-skeletal processes as well as mineral homeostasis management and increasing insulin secretion and insulin

sensitivity are two of these functions.<sup>6</sup> Lower levels of vitamin D in the blood have been linked to an increased risk of diabetes, according to several studies.<sup>6,7</sup> Improvement in the sensitivity of insulin and survival of the  $\beta$  cells;<sup>8,9</sup> improved the secretion of insulin from cells of the pancreas cells and calcium flux' regulation for glucose tolerance stabilization and the beta cells protection against cytokine-induced apoptosis are some of the vitamin D's mechanisms of action on glucose metabolism among individuals of diabetes.<sup>8,9</sup> Deficiency of vitamin D is prevalent in Pakistan throughout all age groups, so there is an urgent need to identify the country's present high levels of Vitamin D deficiency.<sup>10</sup> Despite the fact that various research investigations have been conducted to evaluate the incidence of vitamin D insufficiency in diabetes mellitus and its related risk factors, estimates of the incidence of vitamin D deficiency vary greatly from study to study. However, this study has been conducted to assess the frequency of vitamin D deficiency in patients of diabetes mellitus type II.

## MATERIAL AND METHODS

This cross-sectional study was done at Medicine department of Peoples University of Medical and Health Sciences for women Nawabshah (SBA). Study was done during six months from April 2020 to September 2020. All patients of diabetes mellitus type II, age >40 years and of

either were included. All the patients having other chronic medical disorders, pre- and post-menopausal women, patients having liver cirrhosis and those who refused to participate in the study were excluded. After taking clinical examination and medical history patients were assessed for body mass index (BMI). A 5ml blood sample was taken from each study subject after obtaining the informed consent and was sent to the diagnostic laboratory to assess the HbA1c level and vitamin D status. Vitamin D (25-OHD) levels in the usual range of 30-40 ng/ml was considered as normal. Deficiency was considered as a less than 20 ng/ml, whereas insufficiency was defined as a value between 20.1 and 29.9 ng/ml. The self-made study proforma was used to collect all of the data and SPSS version 26 was used to analyse the data.

**RESULTS**

A total of 62 patients of diabetes mellitus were studied for vitamin D level; their average age was 49.51+12.65 years and average duration of diabetes was 10.25+5.22 years. Average HbA1c was 7.33+6.5 and the average vitamin D level was 27.21+21.98. Out of all study subjects, 36(58.1%) were males and 26(41.9%) were females. Most of the study subjects were overweight, their average BMI was 28.41+3.63 kg/m<sup>2</sup>. 32(51.6%) patients were socioeconomically poor and education level was also lower in most of the cases as shown in table.1

Out of all study participants 48.40% of the cases were observed with deficiency of vitamin D and 27.40% had insufficient vitamin D level. Fig.1

Table 1: Descriptive statistics of demographic variables n=62

Variables	Statistics	
Age (years)	49.51+12.65	
BMI (kg/m <sup>2</sup> )	28.41+3.63	
Duration of diabetes (years)	10.25+5.22	
Hba1c level	7.33+6.5	
Vitamin D3	27.21+21.98	
Gender	Males	36(58.1%)
	Females	26(41.9%)
Educational status	Illiterate	18 (29.0%)
	Primary	15 (24.2%)
	Secondary	22 (35.5%)
	Graduation	07(11.3%)
Socioeconomic status	Poor	32(51.6%)
	Middle	23(37.1%)
	Upper	07(11.3%)

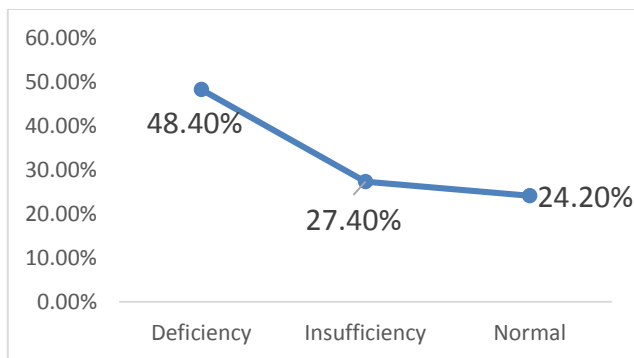


Fig 1: Vitamin D deficiency and insufficiency among patients of diabetes mellitus type II n=62

According to gender and socioeconomic class, vitamin D deficiency and insufficiency was statistically insignificant among diabetic patients, p-values were quite insignificant. Table.2

Table.2: Deficiency of vitamin D and insufficiency with respect to the gender and SES n=62

Variables		Vitamin D status			p-value
		Deficient	Insufficien t	Normal	
Gender	Males	19	7	10	0.248
	Females	11	10	5	
Socioe con- omic status	Poor	15	10	7	0.383
	Middle	10	5	8	
	Upper	5	2	0	

**DISCUSSION**

Diabetes mellitus type II is a long-term metabolic disorder defined by elevated blood glucose levels.<sup>11</sup> Several studies have observed that the vitamin D insufficiency patients have a higher chance of developing diabetes, whereas others have determined that deficiency of the vitamin D deficiency is the root of poor diabetes management in these individuals.<sup>11</sup> In this study the average age of the cases was 49.51+12.65 years and average duration of diabetes was 10.25+5.22 years. Although the Bashir F et al<sup>4</sup> observed the mean age of the patients (46.7±12 years) and average diabetes duration (7±4.4 years). On other hand Saleem S et al<sup>11</sup> demonstrated that the average age of the study subjects was 48.55+14.62 years. In the study of Anyanwu AC et al<sup>2</sup> also found comparable findings regarding age as the average age of the individuals was 52±7.6 years. In the study of Khan Z et al<sup>13</sup> a total of 238 cases studied and their mean age was 51.24±7.7 years and among them, 103 (49.2%) were men and 121 (50.8%) were women, duration of disease was 6.34+3.0 and average BMI was 25.48+3.5 kg/m<sup>2</sup> and these findings were almost similar to this study, while this study was containing a small sample size.

In this study 36(58.1%) were males and 26(41.9%) were females. Consistently Saleem S et al<sup>11</sup> demonstrated that the comparable findings regarding gender as 53.0% were males and 47.0% were females in diabetes group. while inconsistently Bashir F et al<sup>4</sup> reported that the females were in majority as 54.8% and 45.2% were males among all of the study cases.

Deficiency and insufficiency of vitamin D was observed 75.80% in present study among all of the study subjects. Similarly, Saleem S et al<sup>11</sup> demonstrated that the vitamin D insufficiency was found in 69 percent of diabetic individuals. Although Bashir F et al<sup>4</sup> observed the vitamin D deficiency was highly prevalent 80.8% among diabetes population. On other hand Mahmood Y et al<sup>12</sup> demonstrated that vitamin D levels were less than 30 ng/mL in 64.6 percent of healthy participants. Anyanwu AC et al<sup>2</sup> also reported that the most of the study participants were vitamin D deficient, with a frequency of 72 (63.2%) in T2DM patients. Almetwazi MS et al<sup>6</sup> total of 929 non-pregnant and non-institutionalized diabetic adults were included in the study, with roughly 57 percent of diabetic patients having vitamin D deficiency. Diabetes mellitus is

one of the common health associated problems in our society. It was estimated that diabetes mellitus type 2 is 11.77% prevalent in Pakistani population; more common in males as compared to females and residents of cities as compared with rural population.<sup>12,14</sup> Hypovitaminosis D has been linked with DM (type 2) and its complications have been studied in different parts of this country.<sup>11,-13</sup> Diabetes and the deficiency of vitamin D are both common in Pakistan, and their incidence is expected to increase in the coming years.<sup>10</sup> Vitamin D' artificial supplementation, such as multivitamins, oral, and injectable vitamin D, has been linked to a decreased risk of vitamin D deficiency. The diet without fish and the milk has been linked to an increased risk of vitamin D deficiency.<sup>15</sup> Various studies have shown that insufficient nutrient supplementation, pollution and a lack of vitamin D fortification in milk and the products of milk are all indications of vitamin D deficiency in Asian developing nations, including Pakistan. Speedy urbanization, gender, age and numerous anthropometric variables, mainly the body mass index (BMI), are also key drivers of lower 25 (OH)D levels among Asian emerging countries' citizens.<sup>16,17</sup> Although a review of recent publications reveals that lifestyle changes, such as all of these factors, as well as the vitamin D-rich foods availability mandatory vitamin D fortification of foods, awareness and management programs regarding vitamin D supplementation, adequate sun exposure, pollution emissions, and services for economical and easily available vitamin D deficiency diagnostic investigation, could help to reduce the incidence of vitamin D deficiency and its severity in Pakistani population.<sup>17</sup> The current study had certain limitations, like as the smallest study sample size and the fact that it was a cross-sectional survey, which means it couldn't show a cause-and-effect relationship.

## CONCLUSION

As per study conclusion the vitamin D deficiency and insufficiency was observed to be highly prevalent in the cases of diabetes mellitus type II and vitamin D deficiency was insignificantly linked to gender, socioeconomic status and severity of diabetes. Because of the single-center and small sample size study, more large-scale population-based studies on this topic are required to the determination of exact sero-prevalence and correlation of vitamin D insufficiency with diabetes. A routine screening of vitamin D level and efforts for its sufficiency including vitamin D supplementation and life style modification must be understood to prevent the adverse outcome caused by uncontrolled diabetes mellitus type II.

## REFERENCES

1 Aamir AH, Ul-Haq Z, Mahar SA, Qureshi FM, Ahmad I, Jawa A, et al. Diabetes Prevalence Survey of Pakistan (DPS-PAK): prevalence of type 2 diabetes mellitus and

prediabetes using HbA1c: a population-based survey from Pakistan. *BMJ open*. 2019;1;9(2):e025300.

2 Anyanwu AC, Olopade OB, Onung SI, Odeniyi IA, Coker HA, Fasanmade OA, et al. Serum vitamin D levels in persons with type 2 diabetes mellitus in Lagos, Nigeria. *Int J Diabetes Clin Res* 2020;7:133;1-7

3 Akhtar S, Nasir JA, Abbas T, Sarwar A. Diabetes in Pakistan: a systematic review and meta-analysis. *Pakistan journal of medical sciences*. 2019 Jul;35(4):1173.

4 Bashir F, Khan ZU, Qureshi S, Seetani NK, Sheikh Z. Prevalence of Hypovitaminosis D in Type 2 Diabetes Mellitus and its Relationship with Glycemic Control. *J Liaquat Uni Med Health Sci*. 2016;15(02):83-9.

5 Alhumaidi M, Agha A, Dewish M. Vitamin D Deficiency in Patients with Type-2 Diabetes Mellitus in Southern Region of Saudi Arabia. *Maedica*. 2013; 8(3): 231-6

6 Almetwazi MS, Noor AO, Almasri DM, Popovici I, Alhawassi T, Alburikan KA, Harrington CA. The association of vitamin D deficiency and glucose control among diabetic patients. *SPJ* 2017;1;25(8):1179-83.

7 Afzal S, Bojesen SE, Nordestgaard BG. Low 25-hydroxyvitamin D and risk of type 2 diabetes: a prospective cohort study and metaanalysis. *Clinical chemistry*. 2013 Feb 1;59(2):381-91.

8 Iqbal K, Islam N, Mehboobali N, Asghar A, Iqbal MP. Association of vitamin D deficiency with poor glycaemic control in diabetic patients. *J Pak Med Assoc*. 2016 Dec 1;66(12):1562-5.

9 Pittas AG, Lau J, Hu FB, Dawson-Hughes B. The role of vitamin D and calcium in type 2 diabetes. A systematic review and metaanalysis. *J Clin Endocrinol Metab*. 2007; 92: 2017-29

10 Riaz H, Finlayson AE, Bashir S, Hussain S, Mahmood S, Malik F, Godman B. Prevalence of Vitamin D deficiency in Pakistan and implications for the future. *Expert review of clinical pharmacology*. 2016 Feb 1;9(2):329-38.

11 Saleem S, Siddiqui A, Iqbal Z. Vitamin D deficiency in patients of type 2 diabetes. *Pakistan journal of medical & health sciences*. 2017 Oct 1;11(4):1324-6.

12 Mahmood Y, Waris N, Fawwad A, Basit A. Vitamin D deficiency and diseases: a review from Pakistan. *Authorea Preprints*. 2020;28;1-18

13 Khan Z, Khan M, Bahadur S, Khan Z, Khan Y, Umair H, Jan SS. Vitamin-D Level in Patients with Type-2 Diabetes Mellitus of different Age and Sex: its Effects on BMI, Calcium Level. *J Saidu Med Coll Swat* 2020;10(1):70-7

14 Meo SA, Zia I, Bukhari IA, Arain SA. Type 2 diabetes mellitus in Pakistan: Current prevalence and future forecast. *JPMA. The Journal of the Pakistan Medical Association*. 2016 Dec 1;66(12):1637-42.

15 Khan M, Parveen F, Aijaz S, Memon SA. Risk factors and presenting complaints of ectopic pregnancy at tertiary care Hospital. *PJMHS*. 2021;15(3):1226-8.

16 Babu US, Calvo MS. Modern India and the vitamin D dilemma: evidence for the need of a national food fortification program. *Molecular nutrition & food research*. 2010 Aug;54(8):1134-47.

17 Akhtar S. Prevalence and correlates of vitamin D deficiency-perspectives from Pakistan. *Pakistan journal of pharmaceutical sciences*. 2016 Jul 1;29(4).