

ASSOCIATION OF VITAMIN D STATUS WITH GLYCEMIC CONTROL IN TYPE II DIABETIC PATIENTS

Keenjher Rani, Urooj Bhatti,
Sindhu Laghari

ABSTRACT:

Objective: To determine the association of vitamin D levels with glycemic control in type II diabetic patients.

Study setting: Physiology department and diabetic clinic, LUMHS Jamshoro from March 2020 to August 2020

Methods: This study comprised all male and female type II diabetic patients (n=196), of age group ≥ 18 years. After taking all aseptic measures, 10cc blood taken intravenously in study population. Serum vitamin D3 levels determined by using 3L52 ARCHITECT 25 -OH Vitamin - D Reagent kit. Hemoglobin A1c determined on Cobas e411 Roche. Data entered in predesigned proforma and then to SPSS data sheet and analyzed on IBM, SPSS VERSION 22.0.

Results: Mean \pm SD of age (in years), vitamin D levels(ng/ml) and hemoglobin a1c in study population (n=196) were 43.57 \pm 9.59, 24.6 \pm 12.7 and 8.27 \pm 2.15 respectively. Deficient vitamin D levels found in 47.8 percent type II diabetic group having hemoglobin a1c > 8.0 gm%, (P-value < 0.01 , Pearson chi square value=27.74, df=4). Vitamin D levels were negatively related to glycemic control in diabetic type II patients, r- value=-0.18 and p value < 0.01 .

Conclusion: Deficient vitamin D levels are related with poor glycemic control in type II diabetes mellitus.

Key words: Vitamin D, Hemoglobin a1c, diabetes type II

How to cite this:

Rani K, Bhatti U, Laghari S, Association of vitamin D status with glycemic control in type II diabetic patients. JIMC 2021; 5.(1) : 212-214

Correspondence

Dr. Keenjher Rani
Assistant Professor of Physiology
Liaquat University of Medical and Health sciences, Jamshoro
Pakistan
Email:keenjherrani@yahoo.com

vitamin D status with glycemic status in type II diabetic patients and to determine the relationship between vitamin D levels and hemoglobin a1c.

METHODOLOGY

BACKGROUND

Vitamin D is one of the significant dietetic materials and their function is to control levels of calcium and the phosphorus in human body. They also play their part in immune system and also in the mineralization of bones. At present, vitamin D is the topic of debate that either it should be recommended to get better glycemic control in type II diabetes mellitus patients.¹ Prevalence of pre-diabetes and type II diabetes has been augmented in Pakistan. Comprehensive strategies are needed to incorporate prevention, screening and management of type II diabetes.² Diabetes mellitus is described by chronic increased blood glucose levels due to the impaired secretion of insulin, peripheral insulin resistance or both.³ A few research studies explored that blood sugar levels are connected to vitamin D levels.^{4,5} In Pakistan, deficient vitamin D is a big public health concern and its occurrence in various regions of Pakistan varies from 70 percent to 90 percent in healthy individuals, and up to 97 percent in ambulatory patients.⁶ It has been reported that in spite of abundant sun light in South Asia, insufficient vitamin D levels are pertinent in this area.^{6,7} Vitamin D supplementation might play role in decreasing the incidence of type II diabetes among the non-diabetic people at augmented risk.⁸ Presently, vitamin D supplementations are suggested as better option for better glycemic control in type II diabetic patients. So, this study has been designed to determine the association of

Present cross sectional comparative study carried in the Physiology department of LUMHS in collaboration with diabetic clinic, Liaquat university hospital, Jamshoro/Hyderabad, from march 2020 to august 2020. The sampling technique was non probability purposive sampling. This study comprised all male and female type II diabetic patients of age group ≥ 18 years who signed informed consent form. The patients who were non-diabetics, type I diabetics, migraineur, hypertensive, obese, taking vitamin D supplements, chronic kidney disease, liver dysfunction and pregnant women were excluded from this study. After taking all aseptic measures, 10 cc blood taken intravenously in study population and vitamin D levels, hemoglobin a1c and fasting blood sugar determined. Serum vitamin D3 levels determined by using 3L52 ARCHITECT 25 -OH Vitamin - D Reagent kit. Vitamin D levels, 30-40 ng/ml were considered normal. The value < 20 ng/ml were definite as deficient while insufficient was in range of 20.1 to 29.9ng/ml.⁹ Hemoglobin a1c is well thought-out as the gold standard measure of glycemic control in diabetic patients.¹⁰ The data entered in predesigned proforma and analyzed on SPSS 22.0. Quantitative data is expressed as mean \pm SD and qualitative data as frequency (%). Categorical data compared by applying chi square test. P value < 0.05 was taken statistically significant.

RESULTS

General characteristics of study population (n=196) are shown in **table No.1**

Vitamin D status compared in three groups of type II diabetic (Hba1c<7.0%, =7.0-8.0% and >8.0

%) (P-value<0.01, Pearson chi square value=27.74, df=4) **Table No. 2**

Vitamin D levels are negatively related to glycemetic control in diabetic type II patients, r- value=-0.18 and p value <0.01 as revealed in **table No. 3**

	Mean	Frequency(%)
Age(in Years)	43.57±9.59	--
Fasting blood sugar	147.40±27.0	--
Hemoglobin A1c	8.27±2.15	--
Glycemic status(Hba1c)		
<7.0%	--	46(23.5%)
=7.0-8.0%	--	38(19.4%)
>8.0%	--	112(57.1%)
Fasting blood sugar (mg/dl)	147.4±27.0	--
Vitamin D levels	24.6±12.7	--
Normal vitamin D levels 30-40ng/ml	--	61(31.1%)
insufficient(20.1-29.9 ng/ml)	--	68(34.7%)
deficient(<20ng/ml)	--	67(34.2%)

		Glycemic status			Total	
		Hba1c<7.0 %	Hba1c =7.0-8.0%	Hbba1c>8.0 %		
vitamin D levels	Normal vitamin D levels 30-40ng/ml	Count	24	10	27	61
		% within Glycemic status	52.2 %	26.3%	24.1%	31.1 %
	insufficient(20.1-29.9 ng/ml)	Count	19	17	32	68
		% within Glycemic status	41.3 %	44.7%	28.6%	34.7 %
	deficient(<20ng/ml)	Count	3	11	53	67
		% within Glycemic status	6.5 %	28.9%	47.3%	34.2 %
Total		Count	46	38	112	196
		% within Glycemic status	100.0 %	100.0%	100.0%	100.0 %

Variable	r- value	p-value
Age	0.08	0.2
Hemoglobin a1c	-0.18	0.008

DISCUSSION

Diabetes mellitus is a big public health issue globally that inflict to note worthy comorbidities and mortalities attributed to micro vascular and also macrovascular complications. The deprived condition of vitamin D might participate a significant role in developing type II diabetes

mellitus.¹¹In present study, there was negative relationship (r= -0.18) between vitamin D and hemoglobin a1c in type II diabetic patients. Saif-

Elnasr M. et al.¹² revealed significantly declined levels of vitamin D in type II diabetic individuals when compared to controls, p-value=0.01. Similar

to this study, Buhary M et al.¹³ found inverse correlation between serum 25(OH) vitamin D and HbA1c (relationship coefficient) = -0.14, P < 0.01) before supplementation with vitamin D. Furthermore, Mirhosseini N, et al.¹⁴ concluded in their research that adding vitamin D supplements might help in declining the fasting blood sugar levels and hemoglobin a1c in diabetics and this also increases insulin sensitivity in type II diabetic individuals. High levels of blood glucose represent abnormality in glucose metabolism and increased hemoglobin a1c reflect poor glycemic control. Vitamin D act as modulator in homeostasis of glucose and its deficiency or insufficiency might play role in poor glycemic control in type II diabetics.¹⁵ Khan TU et al.¹⁶ also revealed that

hypovitaminosis D is linked with reduced glycemic control in type II diabetes as well as adding vitamin D, could probably play the part in improving glycemic control in patients with uncontrolled diabetes. It is suggested thereby that vitamin D levels are inversely related to HbA1c levels and glycemic control.

CONCLUSION

Deficient vitamin D levels are related with poor glycemic control in type II diabetes mellitus.

Conflict Of Interest: None

Funding Source: None

REFERENCES

- Martínez-Pizarro S. Vitamin D in type 2 diabetes mellitus. *Geriatrics, Gerontology and Aging*. 2020;14(3):220-1.
- Aamir AH, Ul-Haq Z, Mahar SA, Qureshi FM, Ahmad I, Jawa A, Sheikh A, Raza A, Fazid S, Jadoon Z, Ishtiaq O. 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;9(2):e025300.
- Ndisang JF, Vannacci A, Rastogi S. Insulin resistance, type 1 and type 2 diabetes, and related complications 2017.
- Lee CJ, Iyer G, Liu Y, Kalyani RR, Ligon CB, Varma S, Mathioudakis N. The effect of vitamin D supplementation on glucose metabolism in type 2 diabetes mellitus: A systematic review and meta-analysis of intervention studies. *Journal of Diabetes and its Complications*. 2017 Jul 1;31(7):1115-26.
- Wu C, Qiu S, Zhu X and Li L: Vitamin D supplementation and glycemic control in type 2 diabetes patients: A systematic review and meta-analysis. *Metabolism*. 73:67–76. 2017.
- Saqib MA, Rafique I, Hayder I, Irshad R, Bashir S, Ullah R, Awan NJ. Comparison of vitamin D levels with bone density, calcium, phosphate and alkaline phosphatase-An insight from major cities of Pakistan. *J Pak Med Assoc*. 2018 Apr 1;68(4):543-7.
- 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.
- Mirhosseini N, Vatanparast H, Mazidi M, Kimball SM. Vitamin D supplementation, glycemic control, and insulin resistance in prediabetics: a meta-analysis. *Journal of the Endocrine Society*. 2018 Jul;2(7):687-705
- Kandhro F, Dahot MU, Ahmed Naqvi SH, Ujjan IU. Study of Vitamin D deficiency and contributing factors in the population of Hyderabad, Pakistan. *Pakistan journal of pharmaceutical sciences*. 2019 May 1;32(3)
- Bansal M, Shah M, Reilly B, Willman S, Gill M, Kaufman FR. Impact of reducing glycosylated hemoglobin on healthcare costs among a population with uncontrolled diabetes. *Applied health economics and health policy*. 2018 Oct;16(5):675-84.
- Al Dossari KK, Ahmad G, Aljowair A, Alqahtani N, Shibrayn MB, Alshathri M, Alshehri D, Akhlaq S, Hejab FB, Alqahtani A, Razzak HA. Association of vitamin d with glycemic control in Saudi patients with type 2 diabetes: a retrospective chart review study in an emerging university hospital. *Journal of clinical laboratory analysis*. 2020 Feb;34(2):e23048. <https://doi.org/10.1002/jcla.23048>
- Saif-Elnasr M, Ibrahim IM, Alkady MM. Role of Vitamin D on glycemic control and oxidative stress in type 2 diabetes mellitus. *J Res Med Sci*. 2017;22:22. Published 2017 Feb 16. doi:10.4103/1735-1995.200278.
- Buhary BM, Almohareb O, Aljohani N, Alrajhi S, Elkaissi S, Sherbeeni S, Almaghamsi A, Khan SA and Almalki MH: Association of glycosylated hemoglobin levels with vitamin D status. *J Clin Med Res*. 2017; 9:1013–1018.
- Mirhosseini N, Vatanparast H, Mazidi M, Kimball SM. The effect of improved serum 25-hydroxyvitamin D status on glycemic control in diabetic patients: a meta-analysis. *The Journal of Clinical Endocrinology & Metabolism*. 2017 Sep 1;102(9):3097-110.
- Mahmood Y, Shahid S, Fawad A, Basit A, Azhar A. Association of vitamin D with type 2 diabetes mellitus in Karachi, Pakistan. *Int J BiolBiotechnol*. 2018;15(2):201-5.
- Khan TU, Arshad R, Khan ZA. Association of hypovitaminosis D with poor glycemic control and obesity in type II diabetes mellitus. *The Professional Medical Journal*. 2020 Jul 10;27(07):1386-90. <https://doi.org/10.29309/TPMJ/2020.27.07.3929>

Authors

- Dr. Keenjher Rani
MBBS, MPhil Physiology
Assistant Professor of Physiology
Liaquat University of Medical and Health sciences, Jamshoro
- Urooj Bhatti
MBBS, PhD Physiology
Senior lecturer Of Physiology
Liaquat University of Medical and Health sciences, Jamshoro
- Dr. Sindhu Laghari
Diploma in Diabetes
Diabetologist, Diabetic clinic,
LUH, Jamshoro/Hyderabad

Authors Contribution

Keenjhari Rani	Conception of study design, acquisition, analysis, and interpretation of data.
Urooj Bhatti	Drafting and methodology, data interpretation
Sindhu Laghari	Analysis and interpretation of data for work

Received Date: 20-Sept-2021

Revised Received: 12-Oct-2021

Accepted Date: 14-Nov-2021