ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 07 | July - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EVALUATION OF VITAMIN D IN DIABETICS WITH HYPERLIPIDEMIA

Diabetology

Khatija Begum Senior Resident
Ahmed Khan Siraj Additional Professor
Madiha Amatullah Senior Resident
Tahsina Begum Assistant Professor
Nabila Rahman* Assistant Professor *Corresponding Author

ABSTRACT

Background: Diabetes and Hyperlipidemia are major health concern worldwide with complications such as stroke and heart attack. Vitamin D is involved in the metabolic regulation of sugar and fat. Vitamin D regulate glucose homeostasis by stimulating insulin release from pancreatic B-cells and serum lipids levels by lowering total cholesterol, triglycerides, and LDL-cholesterol and increasing HDL-cholesterol. **Objectives:** To assess Vitamin D status in diabetic and Hyperlipidemic patients.**Materials and methods:** In this cross sectional study 200 cases were recruited and divided based on Vitamin D levels. Vitamin D, HbA1C, Total cholesterol/HDL ratio were estimated. Appropriate statistical analysis was done. P value of <0.05 was taken as significant.**Results:** The median HbA1c (%) for total population was 6.6(7.6-6.0) and median Vitamin D (IU/ml) was 24.61(33.54-17.88). There was significant negative correlation between vitamin D and LDL in both groups (ρ sufficient =0.0699, ρ insufficient =0.7476, p=<0.0001). Positive correlation between vitamin D and HbA1C (ρ=-0.0257, p<0.0001).**Conclusion:** Our study has shown that Vitamin D deficiency leads to atherogenic blood lipid profiles and impaired glucose control. Therefore, the correction of vitamin D deficiency may result in improved glucose control and managing lipid profile levels.

KEYWORDS

INTRODUCTION:

Vitamin D is well known to be involved in the calcium and bone metabolism, and most observational and randomized placebo-controlled trials concerning this vitamin have focused on the skeletal effects and have linked low vitamin D levels to fractures [1]. However, interest is growing in the non skeletal effects of vitamin D [2] and in the relationship between vitamin D deficiency and diseases such as obesity, diabetes mellitus, and metabolic syndrome. Various studies have shown that vitamin D can be stored in adipose tissues. [3]Adipose tissue has the potential to accumulate a significant amount of vitamin D, particularly when fat mass expands(such as in overweight and obesity)[4]. It has been demonstrated that obese individuals have lower circulating concentrations of (OH)D25 compared to non-obese individuals. However, it can be said that body fat mass and percentage of body fat are strong predictors of vitamin D status in different individuals. Recent studies have confirmed that vitamin D is also involved in the metabolic regulation of nutrients in the body, such as sugar and fat.

REVIEW OF LITERATURE:-

Amir Gholamzad et al in recent studies said that current evidence supports an increase in serum vitamin D levels was associated with a decrease in LDL.[5] This finding is inconsistent with the study by Ponda et al., which demonstrated that an increase in vitamin D levels leads to an increase in HDL.

Kaili Yang et al results showed that vitamin D was negatively correlated with FPG, TG and TC, and after adjusting for gender, age and BMI, vitamin D was negatively correlated with FPG and TG.[6]

On the contrary, the study by Kim et al. indicated that there was no significant relationship between vitamin D levels and cholesterol, LDL, and HDL, and triglyceride levels were significantly higher in individuals with vitamin D deficiency, which is not consistent with the findings of the present study Guo-Tao Pan et al findings suggested that serum 25(OH)D concentrations were inversely associated with the risk of MetS among the middle-aged and elderly with type 2 diabetes, indicating that vitamin D deficiency may increase the risk of MetS in diabetes. [7] This is correlating with our study.

AIMS AND OBJECTIVES:

A. To evaluate correlation between Vitamin D and Lipid profile of diabetic patients.
B. To determine correlation between Vitamin D with glycemic status of an individual.

PARTICIPANT RECRUITMENT PROCEDURES:

Inclusion criteria: 200 cases between 18- 70 years of age had been recruited in this retrospective study and divided into two groups based on vitamin D levels which came in NIMS OPD from September 2022 to December 2023.

Exclusion Criteria:

- History of other diseases like malignancy, inflammatory diseases, kidney diseases will be excluded from the study.
- Patients who have previously attended OPD in Nizam's Institute of Medical Sciences and had their blood tested for vitamin D levels.

MATERIALS AND METHODS:

Sample size:200 subjects were taken and divided into two groups based on vitamin D levels. vitamin D insufficient group has 131 cases and vitamin D sufficient group has 69 cases and 200 healthy controls were included of approximate age.

Sample size is collected based on the previous study of Guo-Tau Pan et al [7] with a Multivariable odds ratio (ORs) 0.95 and 0.94, 95% confidence interval (CI) 0.81 to 0.96; heterogeneity $p < 0.001$.

Type of study design: Retrospective, single centre study
Investigative site: Departments of Biochemistry, Nizam's Institute of Medical Sciences (NIMS), Punjagutta, Hyderabad

Subject selection:

Study subjects were selected who came in OPD in Nizam's Institute of Medical Sciences and had their blood tested for Lipid profile, HbA1C and vitamin D levels for the first time between September 2022 and December 2023.

- Data of the subjects was collected from electronic medical records.
- Electronic consent was sent out to respective patients and history of previous intake of Vitamin D supplements and comorbidities has been collected.

Laboratory testing

- Laboratory data on Vitamin D, HbA1C, LDL, HDL, Total Cholesterol and VLDL is collected.

Tests
Methodology

Vitamin D- CLIA on Siemens Advia Centaur XPT
Lipid profile- Colorimetry On Roche COBAS C501
HbA1C- HPLC on D10 analyzer Bio-Rad

STATISTICAL ANALYSIS

Data was collected from Hospital records. The statistical Analysis was

done using Med Calc Software, version21. Normality for all the variables in controls and cases was checked using Kolmogorov Smirnov test. The data is expressed as median with inter quartiles when non parametric. $p < 0.05$ is considered as significant. For not normally distributed parameters Spearmann correlation was measured.

RESULTS:

The median HbA1c (%) for total population was 6.6(7.6-6.0) and median Vitamin D (IU/ml) was 24.61(33.54-17.88)[Table 1].Mann-Whitney U test was done comparing HbA1c and lipid profile parameters in vitamin D sufficient and insufficient groups and there was significant difference found between LDL, cholesterol and Total cholesterol/HDL ratio ($p<0.0001$) between the groups.[Figure 5] Spearman rho correlation was done in total population. There was significant negative correlation between vitamin D and LDL in both groups (ρ sufficient $=0.0699$, ρ insufficient $=0.7476$, $p=<0.0001$) [Figure2 and 4]; and between Vitamin D sufficient and HbA1C ($\rho=-0.7962$, $p<0.0001$) [Figure3]. Positive correlation between vitamin D and HbA1C ($\rho=-0.0257$, $p<0.0001$) [Figure1].

DISCUSSION:

Vitamin D, as the main regulator of calcium and phosphorus metabolism, plays an important role in maintaining intracellular and extracellular calcium homeostasis. In addition to its association with bone health, vitamin D is also associated with obesity, insulin resistance, diabetes, hypertension, atherosclerosis and other diseases.[8]

Some potential mechanisms have been suggested to explain the role of vitamin D deficiency in insulin resistance,[9] because the vitamin D by the pancreas and nerve tissue of the VDR directly stimulates the production of insulin, and vitamin D secretion, signal transduction and the activity of glucose transporter. In addition, insulin secretion is a calcium dependent process, and vitamin D indirectly regulates the function of cells by regulating extracellular calcium and calcium fluxes. So a lack of vitamin D or calcium intake may alter the stability of the intracellular and extracellular calcium pools, which in turn may affect the normal secretion of insulin. Vitamin D deficiency may indirectly affect the variations of calcium level during insulin. Vitamin D supplementation may reduce the rate of conversion from pre-diabetes to diabetes, and the incidence of obesity.[10]

CONCLUSION:

Based on our study it can be concluded that vitamin D deficiency leads to atherogenic blood lipid profiles and impaired glucose control. Therefore, the correction of vitamin D deficiency may result in improved glucose control and managing lipid profile levels, further preventing complications.

TABLES AND CHARTS:

Table-1 Variables in Cases and Controls

Variable	Cases (n=200)	Controls(n=200)	p-Value
Vitamin D(ng/ml)	24.6 (8.48,101.6)	60±20	<0.0001
HbA1C	6.6(3.1,7.4)	5.1±0.2	<0.0001
Total cholesterol	157 (2.2,1088)	140±50	0.2343
HDL	41(4,120)	30±10	0.2550
LDL	91(12,500)	72±12	0.7476
TGs	116(9,77.2)	100±20	<0.0001

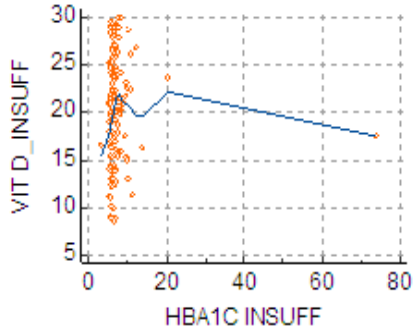

Figure 1 Correlation of Vit D Insufficient group with HbA1C

Sample size	131
Spearman's coefficient of rank correlation (rho)	0.196
Significance level	P=0.0257
95% Confidence Interval for rho	0.0243 to 0.356

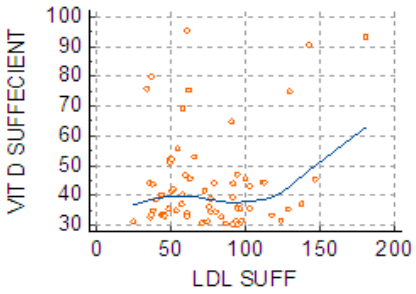

Figure 2 Correlation of Vit D Sufficient group with LDL

Sample size	69
Spearman's coefficient of rank correlation (rho)	0.0401
Significance level	P=0.7476
95% Confidence Interval for rho	-0.202 to 0.278

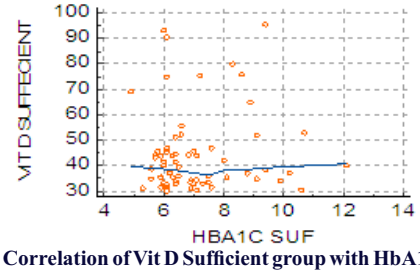

Figure 3 Correlation of Vit D Sufficient group with HbA1C

Sample size	69
Spearman's coefficient of rank correlation (rho)	0.0322
Significance level	P=0.7962
95% Confidence Interval for rho	-0.210 to 0.270

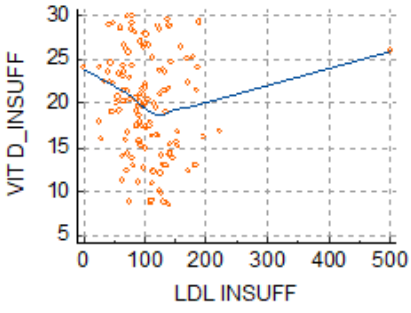

Figure- 4 Correlation of Vit D Insufficient group with LDL

Sample size	131
Spearman's coefficient of rank correlation (rho)	-0.161
Significance level	P=0.0699
95% Confidence Interval for rho	-0.325 to 0.0131

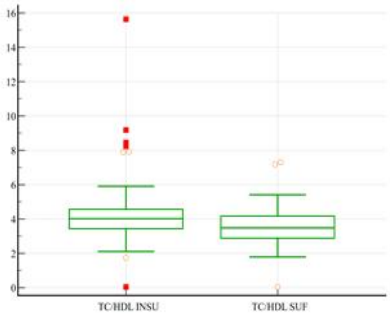

Figure 5 Comparison of TC/HDL in both groups of Vit D

REFERENCES

1. M. F. Holick, "Medical progress: vitamin D deciency," *The New England Journal of Medicine*, vol. 357, no. 3, pp. 266–281, 2007.
2. S. Nagpal, S. Na, and R. Rathnachalam, "Noncalcemic actions of vitamin D receptor ligands," *Endocrine Reviews*, vol. 26, no. 5, pp. 662–687, 2005.
3. Al-Oanzi, Z. H. *et al.* The role of vitamin D in reducing the risk of metabolic disturbances that cause cardiovascular diseases. *J. Cardiovasc. Dev. Dis.* **10**(5), 209 (2023).
4. Nikparvar, M. *et al.* Dyslipidemia and its associated factors in southern Iranian women, Bandare-Kong Cohort study, a crosssectional survey. *Sci. Rep.* **11**, 9125 (2021).

5. Amir Gholamzad, Niloofar Khakpour , et al. Association between serum vitamin D levels and lipid profiles: a cross-sectional analysis Sci Rep 13,21058 (2023).
6. Kaili Yang, Jingfang Liu et al. Vitamin D Status and Correlation with Glucose and Lipid Metabolism in Gansu Province, China; Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 2020:13.
7. Guo-Tao Pan, Jian-Feng Gu et al. Vitamin D Deficiency in Relation to the Risk of Metabolic Syndrome in Middle-Aged and Elderly Patients with Type 2 Diabetes Mellitus, *J Nutr Sci Vitaminol*, **62**,213-219, 2016.
8. Chinese Association Of Osteoporosis And Bone mineral Salt Disease. [Consensus on the clinical application of vitamin D and its analogs]. Chin J Osteoporosis Bone Miner Res. 2018;11:1–13. Chinese.
9. Kim MK, Il Kang M, wang Oh K, et al. The association of serumvitamin D level with presence of metabolic syndrome and hypertension in middle-aged Korean subjects. Clin Endocrinol (Oxf). 2010;73 (3):330–338. doi:10.1111/j.1365-2265.2010.03798.x
10. Viljakainen HT, Vaisanen M, Kemi V, et al. Wintertime vitamin Dsupplementation inhibits seasonal variation of calcitropic hormones and maintains bone turnover in healthy men. J Bone Miner Res. 2009;24(2):346–352. doi:10.1359/jbmr.081009.