



## EVALUATION OF VITAMIN D STATUS AND ITS CORRELATION WITH GLYCATED HAEMOGLOBIN IN TYPE 2 DIABETES MELLITUS

### General Medicine

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### ABSTRACT

The role of Vitamin D in various non-skeletal disorders including Diabetes Mellitus has been explored. The role of Vitamin D in peripheral utilization of glucose has been studied. This study evaluates the correlation between Vitamin D status and Glycated Haemoglobin in Type 2 Diabetes Mellitus. The present study was a retrospective case control study with 78 cases and 69 controls. Mann-Whitney Test was used to study difference in Vitamin D levels between cases and controls. Spearman correlation was used to study the correlation between Vitamin D levels and Glycated Haemoglobin in cases of Type 2 Diabetes Mellitus. The mean Vitamin D values in cases were 16.1 ng/ml and mean Vitamin D values in controls were 17.3 ng/ml. Though the mean values of Vitamin D in cases were lower than that of controls, the difference was not statistically significant ( $p=0.31$ ). Vitamin D insufficiency was observed in both cases and controls. Spearman correlation showed there was no statistically significant correlation between Vitamin D levels and Glycated haemoglobin ( $p$  value 0.741) in cases of Type 2 Diabetes Mellitus. Hypovitaminosis D and its correlation with Glycaemic control could not be established.

### KEYWORDS

Vitamin D, Diabetes mellitus, Glycated haemoglobin, Glycaemic control.

### INTRODUCTION

Vitamin D supplementation to prevent Diabetes Mellitus has been explored. The primary source of Vitamin D is exposure to sunlight which results in the formation of Cholecalciferol in the skin. The epidemiology of Diabetes Mellitus and Vitamin D deficiency is related. The incidence of Diabetes Mellitus is higher in ethnic groups who are more prone for Vitamin D deficiency and Diabetes Mellitus is more common in older age group where in the chances of Vitamin D deficiency increases. Diabetes Mellitus, psoriasis, cancer, multiple sclerosis, cardiovascular diseases and metabolic syndrome are some of the non-skeletal diseases where in Vitamin D deficiency has been implicated to play a role. Many studies indicate, calcium and Vitamin D homeostasis may play a role in development of Diabetes Mellitus. There are various mechanisms proposed to relate the role of Vitamin D with the development of Diabetes Mellitus. Some of these mechanisms include Expression of Vitamin D receptors in the beta cells of Pancreas, location of Vitamin D response element in human insulin gene, role of Vitamin D in maintenance of normal calcium homeostasis which plays a major role in insulin secretion, Presence of Vitamin D receptor in skeletal muscle, improvement of insulin mediated glucose utilization following Vitamin D therapy, role of cytokines like Interleukin 6 and Tumour Necrosis factor alpha (TNF alpha) in causing insulin resistance and down regulation of cytokine production by Vitamin D. The benefits of Vitamin D supplementation in Type 1 Diabetes Mellitus has been widely accepted.

### MATERIAL AND METHOD

The present study was a retrospective case control study with 78 cases and 69 controls. The study was approved by the institute ethics committee (Reference Number: IEC:RC/ 14/124). The clinical features and laboratory investigations (Vitamin D levels, Fasting Blood glucose (FBG), Post prandial blood glucose (PPBG), Glycated haemoglobin (HBA1C)) values were collected from the patient's records. **Cases-Inclusion criteria:** Age group: 30 to 70 years, Diagnosed cases of Type 2 Diabetes mellitus based on American Diabetes Association (ADA) criteria: HBA1C values  $\geq 6.5\%$  OR Fasting blood glucose  $\geq 126$  mg/dl or Two hour post glucose  $\geq 200$  mg/dl OR Patients with classical symptoms of diabetes (polyuria, polydipsia and polyphagia) with a random plasma glucose of  $\geq 200$  mg/dl. **Exclusion criteria:** Patients with Type 1 Diabetes Mellitus, Pancreatic disease, Hepatic disease, Renal disease, Bone diseases, Malignancy and any history of use of drugs such as insulin, calcium and vitamin D were excluded from the study. **Controls:** Individuals with blood sugar within normal limits were included as controls. Age and gender matched controls were selected for the study. Subjects with Pancreatic disease, Hepatic disease, renal disease, bone disease,

malignancy and any history of use of drugs such as calcium and vitamin D were excluded from the study. Blood glucose was estimated by Hexokinase method in cobas integra 400 plus from Roche diagnostics, Glycated haemoglobin was measured by immunoturbidimetric method in microlab 300 from merck, 25 hydroxy Vitamin D was measured in cobas e411 by electrochemiluminescence (ECLIA) method.

### RESULTS

Out of 78 cases, 33 were males and 45 were females. Out of 69 controls, 33 were males and 36 were females. The mean age of cases and controls were  $48.5 \pm 11.9$  and  $44.0 \pm 10.5$ , respectively. Vitamin D insufficiency was observed in both cases and controls. The mean Vitamin D values in cases were  $16.1 \pm 13.8$  ng/ml and mean Vitamin D values in controls were  $17.3 \pm 12.3$  ng/ml. Though the mean values of Vitamin D in cases were lower than that of controls, Mann-Whitney Test shows there is no statistical difference in Vitamin D levels between cases and controls. Spearman correlation showed a negative negligible correlation between Vitamin D levels and HBA1C, which was not statistically significant. Correlation coefficient was found to be 0.003 ( $p$  value 0.741).

### DISCUSSION

In our study, Vitamin D deficiency was observed in 32% of cases and 25% of controls. Sheth et al. observed Vitamin D deficiency in 91.4% of cases of Type 2 Diabetes Mellitus and 93% in the control group. Sheth et al. could not establish any association between Vitamin D deficiency and Glycated haemoglobin which is in agreement with the findings of the present study. In a study done by Athanassiou et al. Vitamin D values were found to be  $19.26 \pm 0.95$  ng/ml in type 2 Diabetes mellitus cases which were in the insufficiency range. The findings of Athanassiou et al. are in agreement with the findings of the present study since the Vitamin D levels of the present study were also in the insufficiency range. In their study, they observed an inverse relationship between Vitamin D levels and Glycated haemoglobin which could not be established in the present study. Three cohort studies observed lower incidence of Diabetes Mellitus in individuals with high Vitamin D levels. Alhumaidi et al. observed low Vitamin D levels in both cases of Type 2 Diabetes Mellitus and controls which were comparable to the findings of the present study. They observed low Vitamin D levels in 98.5% of the study population (including cases and controls).

### CONCLUSION

Hypovitaminosis D and its inverse association with Glycated Haemoglobin in type 2 Diabetes Mellitus have been established in many studies.

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