

THE CORRELATION BETWEEN VITAMIN D AND HbA1C IN TYPE-2 DIABETES MELITUS PATIENTS



Medical Science

KEYWORDS : Hypovitaminosis D, HbA1C, Type-2 Diabetes melitus

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ABSTRACT

OBJECTIVE: The correlation between Hypovitaminosis D and HbA1C have not been well explained, the present study set to determine how vitamin D deficiency correlate with glycated haemoglobin in type-2 diabetics patients. **METHODS:** This retrospective cohort study used data from 395 known type-2 diabetic patients enrolled at Asian institute of Gastroenterology Hyderabad. The search criteria was used to include all patients who had their level of 25(OH)D level obtained by electrochemiluminescence (ECLIA) method and HbA1C levels obtained by Ion-exchange high performance liquid chromatography (HPLC). **CONCLUSION:** The most important finding of this study is that vitamin D negatively correlates with HbA1c which suggest the improvement of glycaemic control with improvement in vitamin D status.

INTRODUCTION

Diabetes mellitus is the most common chronic metabolic endocrine disorder nearly in all countries, the burden of continue to increase in numbers and significance, putting a significant strain on healthcare resources that will impact most on developing region of the world. {1} 95% of diabetic patients suffer from type-2 diabetes mellitus also called non-insulin dependent diabetes, characterize by insulin resistance and relatively inadequate compensatory insulin production and secretion by beta cells of the pancreatic islet of langerhans {2}. The extended activity of vitamin D from skeletal health benefits to preservation of insulin secretion and insulin sensitivity {3}. Early observation have suggested that Hypovitaminosis D selectively inhibited insulin secretion {4} also several reports have demonstrated the role of vitamin D in the regulation of the endocrine function of pancreas especially the beta cells. Despite the fact that insulin secretion and action being the cause of diabetes, in routine clinical care, insulin is rarely measured, even though it can be measured easily on automated equipment in laboratories. Blood glucose control in diabetic patients is usually monitored by determination of HbA1C (glycated haemoglobin) which is now the gold standard, and gives the amount of glucose in the blood over the previous two to three months. {5} Lowering the blood glucose levels will lead to lower HbA1C, and failure to control high blood glucose will lead to high HbA1C. As HbA1C is known to correlate positively with blood glucose the present study aim to determine the correlation of HbA1C and hypovitaminosis D in type-2 diabetes mellitus patients.

METHODS:

This retrospective cohort study used data from 395 known type-2 diabetic patients enrolled at Asian institute of Gastroenterology Hyderabad. The search criteria was used to include all patients who had their level of 25(OH)D level obtained by electrochemiluminescence (ECLIA) method and HbA1C levels obtained by Ion-exchange high performance liquid chromatography (HPLC).

STATISTICAL ANALYSIS:

The data obtained was statistically analyzed using SPSS version 16.0 to determine the mean and standard deviation. MS Excel 2007 to determine the Carl Pearson correlation co-efficient.

RESULTS:

Table 1: Shows the variation of HbA1C with improvement in vitamin D status

	Age		HbA1C	
Vitamin D	Mean	SD	Mean	SD
Deficiency	51	10.1	7.7	1.6
Insufficiency	51	9.8	7.4	1.4
Sufficiency	56	10.94	7.4	1.5

Table 2: Shows the Carl Pearson Correlation co-efficient between vitamin.543wqq'hjklp\780. D status and HbA1C

	r	N
Correlation between Vitamin D and HbA1C	-0.109	395

DISCUSSION

Vitamin D the sunshine hormone, has been associated with a role in insulin secretion and insulin action, even though the biological mechanism are poorly understood, the association between hypovitaminosis D and type 2 diabetes mellitus may be attributed to the effect of vitamin D on the glucose homeostasis and in particular the direct effect of vitamin D on the β -cells function and thus insulin secretion {6} the use of HbA1c for the monitoring of blood glucose which has also been extended to diagnose and screen for diabetes mellitus as endorsed by the world health organization (WHO). The advent of automation for accurate and precise measurement of blood glucose has shifted the criteria of monitoring blood glucose from primarily fasting plasma glucose to HbA1c which is now the gold standard. {7}

The most interesting part of the finding of this study is that there is decrease in the level of glycated haemoglobin (HbA1c) as the vitamin D status improves from deficiency through insufficiency to sufficiency, this shows that improvement in vitamin D status plays an important role in glucose homeostasis (Table 1; shows the variation of HbA1c with improvement in vitamin D status) This finding also supports the findings and suggestion of many investigators like Norman et al in 1980, who suggested that hypovitaminosis D inhibited insulin secretion and by extension improve vitamin D status leads to improved insulin secretion and insulin action and consequently affect the glucose homeostasis.

Another important finding of this result (Table 2: shows the Correlation between Vitamin D and HbA1c) is that vitamin D status is negatively correlated (-0.109) with HbA1c, meaning that as vitamin D level increases the level of HbA1C decreases, similarly the as the level of HbA1C increases the level of vitamin D decreases. To explain this, even though the glycation of haemoglobin is not catalyzed by the enzyme, rather it occurs through a chemical reaction that depends on the amount of glucose that is circulating in the blood and the length and duration of exposure. The main constituent of in the formation of glycated haemoglobin, HbA1c is formed by the attachment of glucose of glucose molecule to the N-terminal of the β -globin chain, valine. Initially the labile version of the HbA1c is produced which is later converted to a more stable form through rearrangement process known as Amadori rearrangement. {8} The relationship between HbA1c and vitamin D may be due to the role of vitamin D particularly on the β -cell of the pancreas islet of langerhans which result in improved insulin secretion and insulin action, and consequently, improved glucose homeostasis, or it may be that vitamin D plays a role in the alteration of haemoglobin affinity to glucose need further investigation and verification.

CONCLUSIONS

The most important finding of this study is that vitamin D negatively correlates with HbA1c which suggest the improvement of glycaemic control with improvement in vitamin D status.

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