VOLUME - 10, ISSUE - 02, FEBRUARY - 2021 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Biochemistry

STUDY OF SERUM VITAMIN-D IN TYPE-2 DIABETES MELLITUS PATIENTS.

Ajay Jain	Assistant Professor, Department Of Biochemistry, J.L.N. Medical College, Ajmer, Rajasthan.
Debina sarkar*	PG Resident Doctor, Department Of Biochemistry, J.L.N. Medical College, Ajmer, Rajasthan. *Corresponding Author
G.G. Kaushik	Senior Professor, Department Of Biochemistry, J.L.N. Medical College, Ajmer, Rajasthan.
Ankita Sharma	Assistant Professor, Department Of Biochemistry, J.L.N. Medical College, Ajmer, Rajasthan.

ABSTRACT **Background:** Type-2 diabetes mellitus (T2DM) is a progressive and chronic disease characterized by both β-cell dysfunction and increased insulin resistance. Diabetes mellitus is now considered a giant killer disease of the 21st century with its vicious prongs in the South-East Asian countries, specially India, which is rightly said to be the "Diabetes Capital" of the world. Vitamin D has important effects on insulin action, and may impact on a number of pathways which may be of importance in the development of type 2 diabetes mellitus. **Materials & Methods:** In this study 62 Type-2 diabetic patients, 62 healthy controls were enrolled. Biochemical analytes measured were Serum glucose (Fasting Blood Sugar & Post Prandial Blood Sugar), Glycosylated Haemoglobin, Serum Vitamin-D. **Results:** The mean Serum Vitamin-D in Type-2 diabetic subjects were (16.3 ±3.0) while in healthy subjects(controls) the values were (39.3±5.2) respectively. These values were found to be statistically highly significant($p<0.001$). **Conclusion:** Serum Vitamin-D levels were decreased in Type 2 diabetic subjects as compared to the values in healthy subjects(controls).

KEYWORDS : Vitamin-D, T2DM.

INTRODUCTION

Type II diabetes mellitus (T2DM) is a serious metabolic disorder that has become increasingly prevalent, not only in India but also throughout the world. The number of people with diabetes is expected to be more than double by 2030 from 171 million to astounding 366 million people worldwide, 90% will have T2DM. Vitamin D deficiency has been extensively studied in the pathogenesis of insulin resistance. It has been found to be associated with increased risk of type 2 diabetes by various mechanisms including insulin resistance (IR), pancreatic β-cell dysfunction and inflammation.[1]Vitamin D supplementation has been found to decrease the insulin resistance in normal healthy individuals and patients with type 2 diabetes. The aim of this study was to evaluate vitamin D levels in patients with Type-2 diabetic subjects and compare them with healthy controls.

MATERIALS & METHODS

Study participants

It is an observational descriptive, cross sectional, hospital based study conducted J.L.N. Hospital, Ajmer. Total 124 individuals were enrolled, 62 Type-2 diabetic patients (Group I) and 62 healthy individuals as controls(Group II). The subjects have been considered as Type-2 diabetic based on the American Diabetes Association guidelines (ADA) 2017. Individuals with any chronic disease, receiving any oral hypoglycemic medication or insulin, using bone active medications such as Vitamin-D, calcitonin, bisphosphonate, oestrogen, or lipid lowering drugs, pregnant and Post menopausal women, Type-1 diabetes patients were excluded. This study was reviewed by the ethical committee. Informed & written consent was taken from all the subjects at the beginning of study.

Anthropometric and laboratory measurements

Participants were weighed barefoot and in light clothing, height measured using measuring tape. Body mass index (BMI) was calculated as weight (kg) divided by height (m^2). Blood samples were collected after an overnight fast (at least 10 hour) to provide a fasting blood sample. After collecting fasting blood samples, the subjects were given 75g of glucose dissolved in 250ml of water. The blood was taken via venepuncture 2 hours after glucose load. After 30 minutes of collection, the blood sample will be centrifuged for 10-15 minutes at 3000 rpm to obtain the serum. Serum Glucose was measured by Glucose oxidase – peroxidase end point assay, Gycosylated Haemoglobin(HbA1c) evaluated by Ion exchange resin method & Serum Vitamin-D by ELISA Method.

Statistical analysis

Data was analysed by SPSS Software and p-value < 0.05 was considered significant. The vitamin D levels among the two groups were compared by unpaired student t test.

RESULTS

Basic anthropometric parameters of all subjects in Type-2 diabetic & healthy controls are summarized in Table-1. The anthropometric parameters viz, age in years was (47±6.2), (40 ± 2.5) in group-I , group-II respectively, BMI mean ± SD in kg/m2 in group-I , group-II was (23.7 ± 2.5), (19.6 ± 2.1) respectively (Table-1). There is also comparison of anthropometric parameters viz, age in years & BMI in Type-2 diabetic & healthy controls. The mean age level was found not significant in any of the groups($p=0.644$) and BMI was found significantly high in group-I , group-II ($p< 0.0001$).

Fasting blood sugar was found to be significantly higher in group-I(168.9 ± 23.6, $p<0.001$) as compared to group-II(82.45 ±7.38, $p<0.001$).

Post prandial blood sugar was found to be significantly higher in group-I(288.0 ± 37.6, $p<0.001$) as compared to group-II(127.27 ±7.31, $p<0.001$).

Glycosylated haemoglobin was found to be significantly higher in group-I(8.2 ± 1.2, $p<0.001$) as compared to group-II(4.99 ±.39, $p<0.001$)

Serum vitamin-D was found to be significantly low in group-I(16.29 ±3.01, $p<0.001$) as compared to group-III(39.33 ±5.27, $p<0.001$).

TABLE-1

Comparison of Anthropometric parameters of Type-2 diabetic subjects and healthy subjects (controls).

Parameters	GROUP-I Type-2 diabetic subjects Mean ± SD	GROUP-II Healthy subjects (controls) Mean ± SD	'P' Value
AGE (yrs)	47± 6.2	40 ± 2.5	0.644
Weight(kg)	57 ± 2.6	52 ± 4.2	--
Height(m)	157 ± 6.0	159 ± 10	--
BMI (kg/m^2)	23.7 ± 2.5	19.6 ± 2.1	<0.0001

TABLE-2

Comparison of Laboratory parameters of Type-2 diabetic subjects and healthy subjects (controls).

Parameters	Group	Mean ±SD	'p' value
FBS	Type-2 diabetics	168.9 ± 23.6	<0.001
	Control	82.4 ± 7.3	
PPBS	Type-2 diabetics	288.0 ± 37.6	<0.001
	Control	127.2 ± 7.3	
HbA_{1C}	Type-2 diabetics	8.2 ± 1.2	<0.001
	Control	4.9 ± .39	
Serum vitamin-D	Type-2 diabetics	16.2 ± 3.0	<0.001
	Control	39.3 ± 5.27	

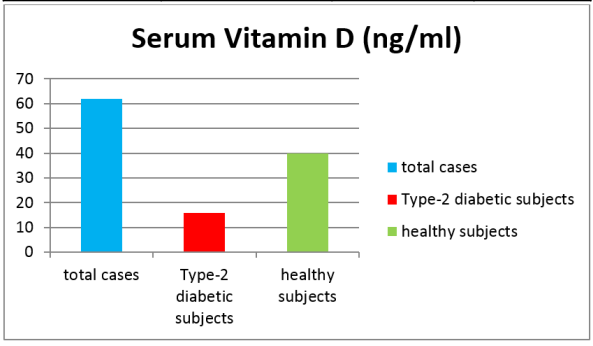

Fig No.1- Comparison of Serum-D in Type-2 diabetic subjects and healthy subjects(control).

DISCUSSION

Epidemiological studies indicate that vitamin D deficiency is widespread in those with diabetes. Recent studies have shown a relationship between vitaminD deficiency and development of tye 2 diabetes mellitus. Our study was an observational descriptive, cross sectional, hospital based study. This study found a greater level of severe vitamin D deficiency among T2DM subjects as compared to the healthy controls and this difference was statistically significant. Our findings are in agreement with Anita Subramanian et al.(2011) who also reported that levels of serum vitamin-D in T2DM patients were significantly lower than the healthy controls.[7] In this study the levels of fasting blood sugar, post prandial blood sugar, glycosylated haemoglobin values were higher in Type-2 diabetic subjects as compared to control group. These values were also found to be highly significant.

The mechanisms for increased insulin resistance in vitamin D insufficiency have not been fully elucidated. Many tissues and cells including the β-cells of the pancreas express 1-OHase and can produce 1,25-dihydroxy vitamin D. The β -cells have a vitamin D receptor, which may improve insulin secretion and production and an increase in serum 25(OH)D3 levels leads to reduction in β -cell glucose insensitivity and increases Phase 1 and 2 of insulin secretion after a glucose challenge [4,5]. Vitamin D can also affect insulin secretion by increasing the intracellular calcium concentration via the non selective voltage-dependent calcium channels.[6]

CONCLUSION

In general, the study found that Type-2 diabetic subjects were more likely to have a significant decrease level of Serum vitamin-D than the normal healthy subjects. The decrease in vitamin-D levels may occur through several mechanisms such as a decrease in the calcium concentration, an increase in PTH, or a direct effect of vitamin D on worsening insulin resistance and secretion, augmenting the risk of developing type 2 diabetes.

REFERENCES

1. Mitri J, Pittas AG. Vitamin D and diabetes. Endocrinol Metab Clin North Am. 2014;43(1):205–232.
2. George PS, Pearson ER, Witham MD. Effect of vitamin D supplementation on glycaemic control and insulin resistance: a systematic review and meta-analysis. Diabet Med.2012;29(8):e142–e150.
3. M. F. Holick, "Vitamin D deficiency," The New England Journal of Medicine, 2007;vol. 357(3), 266–281.
4. Holick MF. Diabetes and the vitamin D connection. Curr. Diab. Rep. 2008; 8(5): 393–398 .
5. Mathieu C, Gysemans C, Giulietti A, Bouillon R. Vitamin D and diabetes. Diabetologia 2005;48(7), 1247–1257.
6. Palomer X, González-Clemente JM, Blanco-Vaca F, Mauricio D. Role of vitamin D in the pathogenesis of Type 2 diabetes mellitus. Diabetes Obes. Metab. 2008;10(3):185–197.
7. Subramanian, Anita & Nigam, Priyanka & Misra, Anoop & Pandey, Ravinder & Mathur, Meeta & Gupta, Ritesh & Madhusudan, Shuchee. (2011). Severe vitamin D deficiency in patients with Type 2 diabetes in north India. Diabetes Management. 1. 477-483.
8. Executive summary: Standards of medical care in diabetes- 2010. Diabetes Care 2010;33 (Suppl 1): S4-10.
9. Ramachandran A, Snehalatha C, Mary S et al. Indian Diabetes Prevention Programme (IDPP). The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). Diabetologia 2006; 49: 289-97.