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A study on vitamin D levels in type 2 diabetic patients

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Abstract
Introduction: Vitamin D deficiency is linked to many diseases. Many studies have studied Vitamin D deficiency. We studied Vitamin D deficiency in Indian population.
Methods: We enrolled a total of 152 patients. 46 of these patients were on Insulin therapy and the rest were on oral hypoglycaemic agents. Patients with liver disease, renal disease or other co-existing conditions were excluded from the study. BMI, fasting blood sugars, Hba1c, S. creat, SGOT, SGPT, Alkaline phosphatise was measured in all the patients. Patients with raised lab values were excluded from the study. CRP and Vitamin D levels were measured in all the participants. Statistical analysis was done using the student's t test. P value of less than 0.05 was considered to be of significant statistical importance.
Results: Vitamin D (25(OH)D) deficiency is common in patients with Diabetes Mellitus –II. There was an inverse co-relation between 25(OH)D levels and Hba1c and CRP. Also, there was an inverse co-relation between fasting glucose levels in patients on Insulin.
Conclusion: Vitamin D deficiency is common in patients with Diabetes Mellitus-II. Vitamin D levels and metabolic control has an inverse co-relation.

Keywords: Vitamin D levels, diabetic patients, insulin therapy

Introduction
Vitamin D deficiency is highly prevalent in Asian countries like India. The status of Vitamin D can be determined by measuring serum 25-hydroxy Vit D [25(OH) D], with normal level higher than 30 ng/mL which contributes to the optimal calcium absorption and fracture prevention [1].
The clinical trials in non-calcium effect of Vitamin D are not sufficient. There has been an association of Vitamin D deficiency with extra-skeletal disorders like diabetes, insulin resistance, cancer, and cardiovascular disease [2, 3]. As we move away from equator, there's decrease in sunlight so higher incidence of Vitamin D deficiency. Also there is some epidemiological data that supports the higher prevalence of Diabetes Mellitus type 2 at higher latitudes [3]. Similarly people who live at higher altitude receive less UV radiation, necessary for production of Vitamin D, and they have higher prevalence of Cardiovascular (including macro- and micro-vascular) disorder, Diabetes, Insulin resistance and Metabolic Syndrome. So by linking these, we can say that there might be some association of Vitamin D deficiency with type 2 Diabetes Mellitus.
Inflammation has a key role in the pathophysiology of type 1 and 2 diabetes and its associated metabolic abnormalities and there has been studies showing relation of anti-inflammatory drugs in treatment of Diabetes [4]. As vitamin D have some anti-inflammatory effects [5], it has some beneficial effects on improving islet-cell functions, insulin release, and decreasing insulin resistance [6].
It has been observed in a study that Overweight children and adolescents have low 25 hydroxy Vitamin D levels [7]. Which can be correlated to low adiponectin levels, insulin resistance and obesity [8, 9]. Clinical studies by restoration of serum 25(OH)D levels showed that it improved insulin resistance [6, 10]. There has been studies showing Vitamin D deficiency in India and prevalence of DM is increasing. Finding a possible link between Vitamin D deficiency and DM can help to control complications from DM.

Methods

In this study, we studied a total of 164 patients who were diagnosed with type 2 Diabetes Mellitus. Out of these patients, 46 patients were on Insulin therapy. The rest patients were on oral hypoglycaemic agents. To reduce confounding, we included patients who were exclusively on regular Insulin. Patients on combination of regular Insulin and Insulin Glargine or on Insulin Mixtard regimes were excluded from the study. The compliance of the patients was properly checked before including them in the study. Patients with liver disease, renal disease or other co-existing conditions were excluded from the study. BMI, fasting blood sugars, Hba1c, S. creat, SGOT, SGPT, Alkaline phosphatise was measured in all the patients. Patients with raised lab values were excluded from the study. A total of 152 patients were included from the 164 patients. CRP and Vitamin D levels were measured in all the participants. Statistical analysis was done using the student's t test. P value of less than 0.05 was considered to be of significant statistical importance.

Results

The results of the study are shown in the 2 tables below. The characteristics of the study population is shown in the table below.

Table 1: Characteristics of patient population

	All patients	Patients on insulin therapy	Patients not on insulin therapy
Age (yrs.)	54.76±18.65	58.33±12.28	49.66±89
Female sex	68(44.73%)		
BMI	31.67±4.27	33.47±3.27	28.89±4.75
BMI >30	72(47.36%)	29(63.04%)	43(40.56%)
Hypertension	28(18.42%)	5(10.86%)	23(21.69%)

The average age of the study population was 54.76±18.65 years. The mean age in the patients on insulin therapy was 58.33±12.28 years and in the group not on insulin therapy were 49.66±89 years. There were 68 females in the study population (44.73%). The mean BMI in the study population was 31.67±4.27 kg/m2. In the patients on insulin therapy, the mean BMI was 33.47±3.27 while the mean BMI was 28.89±4.75 in the group of patients not on insulin therapy. 72(47.36%) had BMI >30 in overall study group. While in the patients on insulin therapy, 29(63.04%) had BMI greater than 30. 43(40.56%) patients not on insulin therapy had BMI>30. Hypertension was present in 28(18.42%) out of 152 patients. 5(10.86%) had hypertension in the patients taking insulin and 23(21.69%) patients not on insulin had hypertension.

The comparison of the variables as per high and low levels of Vitmain D is shown in the table below. 20ng/dl was used as a cut-off to divide the patients into low Vitamin D levels and high Vitamin D levels. The average age in the patients with low Vitamin D was 58.36±9.67 and in the patients with adequate Vitamin D levels was 56.47±6.66.

74(70.47%) patients in low Vitamin D levels group had age above 60 while 28(5.57%) in the patients with adequate vitamin D levels had age >60. There was no significant difference in the levels of Vitamin D based on age. There were 42(61.76%) and 26(38.23%) females in low and adequate Vitamin D levels group respectively. P value for this was 0.001 and hence this difference is statistical significant. 24(52.17%) patients on insulin had low and 22(47.82%) patients on Insulin had adequate levels of vitamin D respectively with a p value of 0.13 which is not significant. Mean BMI in patients with low levels of Vitamin D was 29.54±4.54 and in patients with adequate levels of Vitamin D was 30.47±3.89. 33(45.83%) patients in the low Vitamin D group had BMI>30 and 39(54.16%) in the adequate Vitamin D levels had BMI>30. There was no significant statistical difference in the patients based on BMI. Hba1c eves were 8.5±1.7 in patients with low levels of Vitamin D and 7.2±1.4 in patients on adequate eves of Vitamin D. 14±4.7 was the mean CRP is patients with low levels of Vitamin D and mean CRP in the patients with adequate levels of Vitamin D was 8±6.4. The p value for Hba1c and CRP was less than 0.05.

Table 2: Comparison of patients with and without vitamin D deficiency

	25(OH)D < 20ng/m(105)	25(OH)D > 20ng/m(47)	P value
Age	58.36±9.67	56.47±6.66	0.15
Age>60	74(70.47%)	28(5.57%)	0.47
Female	42(61.76%)	26(38.23%)	0.001
Insulin therapy	24(52.17%)	22(47.82%)	0.13
BMI	29.54±4.54	30.47±3.89	0.65
BMI>30	33(45.83%)	39(54.16%)	0.47
Hba1c	8.5±1.7	7.2±1.4	0.04
CRP	14±4.7	8±6.4	0.01

Discussion

The increment in serum Vitamin D level helps to improve the sensitivity of body against insulin and to reduce the risk of insulin resistance, which can lead to type 2 DM [1]. Our study was conducted on total 152 diabetic patients in a single institute. It was found that 25-hydroxy Vitamin D deficiency (<20ng/ml) is significantly associated with elevated HbA1C level (8.5±1.7%) and elevated CRP values (14±4.7 mg/L). This significance was obtained after neutralizing other factors like age, BMI and patients taking insulin therapy. So we can deduce that Vitamin D deficiency is independently a risk factor for type 2 DM. Timely intervention and supplements of Vitamin D can reduce its prevalence in early age and can help in delay of elevation of HbA1C.

There are evidences that supports Vitamin D might be useful in preventing type 2 DM [11, 12]. This association may be linked with the effects of 25-hydroxy Vitamin D on the regulation of glucose that is associated with increased HbA1c levels. 25-hydroxy Vitamin D has key role in both the synthesis and release of insulin as both 1 alpha hydroxylase and vitamin D receptor are found in pancreatic beta cells. In addition, 25-hydroxy Vitamin D via control of calcium flux through the membrane in both beta cells of pancreas and peripheral tissues regulate insulin sensitivity [13].

The proved actions of Vitamin D like anti-proliferative, angiogenic, immune-modulatory, inhibition of the renin-angiotensin-aldosterone system can be associated with pathogenesis of micro- and macro-vascular complication of Diabetes when there is Vitamin D deficiency [14]. The negative correlation between Vitamin D and HbA1C levels, found in our study signifies the association of hypovitaminosis D with type 2 DM. So measures for correcting Vitamin D levels should be conducted. Correcting Vitamin D deficiency is cost effective and beneficial on long term. It can be achieved by population-

based supplementation via food fortification and lifestyle changes which includes increasing physical activities, consumption of less calorie-dense food, and increasing exposure to sunlight.

Conclusion

Our study shows that Vitamin D deficiency is common in patients with Diabetes mellitus type 2. Also, there is an inverse relation between CRP levels and Vitamin D eves and Hba1c and Vitamin D levels. This shows that the diabetic control on these patients also affects Vitamin D eves with a poor control over sugars related to low levels of Vitamin D.

References

1. Laird E, Ward M, McSorley E, Strain JJ, Wallace J. Vitamin D and Bone health: Potential mechanisms Nutrients 2010;2(7):693-724.
2. Manousopoulou A, Al-Daghri NM, Garbis SD, Chrousos GP. Vitamin D and cardiovascular risk among adults with obesity: A systematic review and meta-analysis. Eur J Clin Invest 2015;45(10):1113-26.
3. Parker J HO, Dutton D, Mavrodaris A, Stranges S, Kandala NB, Clarke A *et al*. Levels of vitamin D and cardiometabolic disorders: Systematic review and meta analysis. Maturitas 2010;65:225-36.
4. Sotirios Tsalamandris, Alexios Antonopoulos S, Evangelos Oikonomou, George-Aggelos Papamikroulis, Georgia Vogiatzi, Spyridon Papaioannou, Spyros Deftereos, Dimitris Tousoulis. The Role of Inflammation in Diabetes: Current Concepts and Future Perspectives. Eur Cardiol 2019; 14(1):50-59.
5. Krishnan AV, Feldman D. Mechanisms of the anti-cancer and anti-inflammatory actions of vitamin D. Annu Rev Pharmacol Toxicol 2011;51:311-36.
6. Sung CC, Liao MT, Lu KC, Wu CC. Role of vitamin D in insulin resistance. J Biomed Biotechnol 2012;2012:634195.
7. Lagunova Z, Porojnicu AC, Lindberg FA, Aksnes L, Moan J. Vitamin D status in Norwegian children and adolescents with excess body weight. Pediatr Diabetes. 2011;12(2):120-6.
8. Nunlee-Bland G, Gambhir K, Abrams C, Abdul M, Vahedi M, Odonkor W. Vitamin D deficiency and insulin resistance in obese African-American adolescents. J Pediatr Endocrinol Metab 2011;24(1-2):29-33.
9. Rajakumar K, De Las Heras J, Chen TC, Lee S, Holick MF, Arslanian SA. Vitamin D status, adiposity, and lipids in black American and Caucasian children. J Clin Endocrinol Metab 2011;96(5):1560-7.
10. Pilz S, Kienreich K, Rutters F, De Jongh R, Van Ballegooijen AJ, Grubler M *et al*. Role of vitamin D in the development of insulin resistance and type 2 diabetes. Curr Diab Rep 2013;13(2):261-70.
11. Al-Shoumer KA, Al-Essa TM. Is there a relationship between vitamin D with insulin resistance and diabetes mellitus? World J Diabetes 2015;6:1057-64.
12. 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.
13. Wolden-Kirk H, Overbergh L, Christesen HT, Brusgaard K, Mathieu C. Vitamin D and diabetes: Its importance for beta cell and immune function. Mol Cell Endocrinol 2011;347:106-20.
14. Alam U, Arul-Devah V, Javed S, Malik RA. Vitamin D and diabetic complications: true or false prophet? Diabetes Ther 2016;7:11-26.