

Serum 25-Hydroxy Vitamin D levels and Risk of Type 2 Diabetes

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Abstract—Type 2 diabetes mellitus (DM) is a disease of impaired metabolism of carbohydrates. Vitamin D deficiency and diabetes mellitus are two common conditions and they are commonly prevalent across all ages, races, geographical regions, and socioeconomic conditions. The present study aimed to see the effect of 25 hydroxy (OH) vitamin D levels on glycaemic control and to show their role in pathogenesis. To evaluate the level of serum Vitamin-D in normal healthy individuals and diabetic type 2 patients. 5 ml of blood sample was taken after 12 hour of overnight fasting by complete aseptic means from the antecubital vein with sterilised disposable syringe for FPG, PPPG, and serum 25 hydroxy (OH) vitamin D. Out of 100 diabetic and 100 non-diabetic group there was a significant statistical difference between the diabetic and non-diabetic group for FPG ($p < 0.001$), PPPG ($p < 0.01$), 25-OH Vitamin D ($p < 0.05$). 25-OH Vitamin D levels were lower in type 2 DM patients as compared to control group. Early detection of vitamin D deficiency and its supplementation may help in improvement of glycaemic control and prevent its complications.

Keywords : 25OH Vitamin D, Type 2 diabetes.

Introduction- Vitamin D is a vital fat soluble vitamin, which is obtained both from food and cutaneous production. It has various forms. Vitamin D₂ (ergocalciferol) is acquired of non-animal products and vitamin D₃ (cholecalciferol) is created in the human skin and is distributed in animal tissues. Diet may supply either vitamin D₂ (ergocalciferol) or vitamin D₃. Vitamin D plays an important role in bone mineralization and body growth [1, 2]. Vitamin D deficiency is a common health problem throughout the world. High prevalence of vitamin D deficiency has shown in studies carried out in Middle East countries [3]. Vitamin D deficiency causes muscular-skeletal and extra skeletal defects. Low 25-hydroxyvitamin D (25(OH)D) is related to some extra-skeletal disorders such as autoimmune diseases, hypertension, endothelial dysfunction, dyslipidemia, infections, cardio-vascular disease (CVD), impaired glucose tolerance, diabetes and obesity [4]. Although several epidemiologic and cross-sectional studies have revealed that low circulating 25(OH)D concentrations are related to increased fasting plasma glucose, insulin and higher prevalence of diabetes, the recent findings are controversy [5,

6]. As a result, there is growing interest in vitamin D status as a potentially adjustable risk factor for diabetes mellitus [7, 8]

Objectives -The main question is whether diabetes state had an impact on vitamin D and is there any differences of serum vitamin D existed between normal individuals versus diabetic patients. Therefore, the main aim of this preliminary investigation is to assess, the possible differences of vitamin D serum value of diabetics versus normal persons and secondly we sought to assess the correlation of serum vitamin D with some biochemical parameters in two groups.

Patients and Methods

Study Group- The present study was done in the department of Biochemistry, Guru Gobind Singh Medical College and Hospital IBFUH Faridkot in collaboration with department of Medicine, Guru Gobind Singh Medical College and Hospital, Faridkot. 100 patients of detected and diagnosed Diabetes Mellitus type 2 (age group 30-60) were taken for the study and 100 healthy individuals with similar age and sex will be taken as a control group in the study.

Laboratory tests- Serum level of 25-Hydroxy vitamin D [25(OH) D] was assessed in all individuals. Additionally for all individuals, FPG, 2-hour postprandial plasma glucose 2-h PPPG were measured using standard kits. Serum 25(OH) D was estimated with ELISA method. Vitamin D status grouping were identified as sufficient (>75 nmol/l), insufficient (50–75 nmol/l) or deficient (<50 nmol/l). FPG and 2-h PPPG were measured by using enzymatic methods (GOD-POD).

Ethical issues- This study was approved by Ethical Committee of Guru Gobind Singh Medical College and Hospital of BFUHS Faridkot. Consent forms were obtained from all the patients.

Results- This was a comparative case control study conducted on 100 cases of type 2 DM (n=100) and 100 age and sex matched healthy controls (n=100). Serum 25-OH Vitamin D was estimated, analysed and correlated with FPG and PPPG. The results were expressed as mean \pm standard deviation.

Table 1 shows comparison of serum 25-OH Vitamin D, FPG, PPPG levels in both groups and was statistically significant ($p < 0.05$). The mean serum 25-OH Vitamin D levels (ng/ml) in cases was 21.07 ± 10.80 ng/ml and that in controls was 25.49 ± 14.47 ng/ml and was significant ($p < 0.05$). There was significant correlation of serum 25-OH Vitamin D levels with FPG and PPPG.

	Diabetics (n=100)	Non diabetics (n=100)	p Value	Significance
FPG mg%	175.14±63.87	77.64±12.37	0.000	Highly significant
PPPG mg%	256.66±84.0	107.92±11.28	0.000	Highly significant
Serum vitamin D ng/ml	21.07±10.80	25.49±14.47	0.015	Significant

Discussion- This study was set out with the aim of assessing serum 25-hydroxyvitamin D levels between diabetic patients and normal individuals. The results of this study show a significant difference between diabetic and normal individuals. Our results were same from the studies Raab et al [9], Al-Shoumer et al [10] and Bierschenk, et al [7] which revealed type 2 diabetes mellitus patients as compared to non-diabetic individuals have lower serum vitamin D concentrations. The findings of the current study are consistent with studies by Tahrani et al [11] and Holick et al [12], Also, our result is in similar with the study done by Svoren et al [13], which showed patients with type 1 diabetic had lower serum concentration of vitamin D than healthy subjects. Payne et al suggested that diabetic patients had lower 25(OH) D levels than those without diabetes [14]. In our study, the mean of vitamin D in the individual with and without diabetes showed the presence of vitamin D deficiency in both groups. However, differences in our results as compared to other studies may be related partly to the high prevalence of vitamin D deficiency in both groups. Several factors potentially influence on vitamin D status such as adiposity, genetic factors, and issues have an effect on the cutaneous synthesis of vitamin D such as season, skin pigmentation, melanin concentration, age, clothes and consume sunscreens [16]. It seems that these results are due to imperfect exposure to sunlight and little seafood ingestion possibly influenced vitamin D status in these groups. Another important finding was the significant negative association of vitamin D level with age in diabetic patients ($r = 0.38$, $P = 0.001$), which was consistent with the study by Hagenau et al [17]. They showed, serum 25(OH) D levels varied with age [17]. The change in vitamin D status with age probably might be the result of lack of sunlight exposure related to social factors, supplementation intake, and physical inactivity.

Statistical analysis- The independent t test was used to determine the significance of any baseline differences between groups and Pearson correlation test was used to assess correlations. The data was analysed with excel software version 12. P values of less than 0.05 was assumed to be significant ($P < 0.05$).

Conclusion

The study concluded that there was significant difference in serum 25-hydroxy vitamin D levels between diabetic patients and control group and serum Vitamin D level with age in diabetic patients had significant negative association.

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