ORIGINAL ARTICLE

Vitamin D Deficiency in Patients of Type 2 Diabetes

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ABSTRACT

Aim: To determine the prevalence of vitamin D deficiency in patients of type 2 diabetes mellitus and to compare this with vitamin D deficiency in health adults.

Methods: This case control study was conducted in DHQ hospital Gujranwala within a period of 8 months from 1-Jan-2017 to 31-Aug-2017. We included 100 patients of type of diabetes and 100 health individuals in this study. Both male and female patients having age 30-70 years with diagnosis of type 2 diabetes were selected. Patients were labelled as vit. D levels if vitamin d levels were <20 ng/ml.Chi-square test we used for comparing the frequency of vit. D deficiency between the cases and controls.

Results: Mean age of patients was 48.55 ± 14.62 in diabetes groups and 46.15 ± 12.43 in comparator group. Regarding gender, in diabetes group percentage of males was 53.0% and in comparator group was 51.0% (p-value 0.77). Vitamin d levels were significantly less 13.45 ± 6.61 ng/ml in diabetic patients and 17.90 ± 8.15 ng/ml in comparator group (p-value <0.001). Vitamin D deficiency was diagnosed in 69% patients in diabetes group and in 23% patients in comparator group (p-value <0.001).

Conclusion: Prevalence of vitamin D (25-OH vitamin D levels) is high in type 2 diabetes mellitus patients as compared to the normal healthy adults. Diabetic patients should be evaluated for vitamin D deficiency.

Keywords: Type 2 diabetes mellitus, vitamin D deficiency.

INTRODUCTION

Type 2 Diabetes mellitus is a chronic metabolic disease characterized by the presence of abnormal blood glucose levels.[1] About 170 million people are affected with type 2 diabetes globally and the figures will increase to 370 million in 2030 and 642 million in 2040.[2] It results from decreased sensitivity of body cells to insulin or due to decreased production of insulin by the pancreas. Diabetic neuropathy, diabetic nephropathy and diabetic retinopathy are major complications of type 2 diabetes.[3, 4]There were about 5 million deaths due to diabetes in 2015.[5] About 1/3rd of diabetic patients are living in middle class countries. Pakistan is 6th largest country by population.[6] Prevalence of diabetes has been reported to be 11.11% to 11.77% in Pakistan and this rate is increasing due to rapid changes in the life styles of Pakistani population.[5,7]There are about 12000 deaths every year in Pakistan due to diabetes mellitus[8].

Vitamin D is responsible for mineral and bone homeostasis in the body. Vitamin D deficiency is also highly prevalent in Pakistan. Even Pakistani population living outside the Pakistan is deficient in vitamin D. Some studies have concluded higher risk of development of diabetes in vitamin D deficiency patients and some have found that vitamin D

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deficiency is responsible for poor control of diabetes in these patients. So from these scenarios it can be hypothesized that may be the low vit. D levels are responsible for this increasing prevalence of diabetes mellitus in Pakistan. Very few data has been published from Pakistan regarding estimation of the vitamin D deficiency in diabetic patients. Shahzad et al. found vitamin d deficiency in 92.0% patients of diabetes but these authors did not compared their results with normal healthy adults. Iqbal et al. found higher incidence of vit. D deficiency in patients with poor control of diabetes as compared to the patients with good control and these authors concluded that vit. D may also be responsible for higher prevalence of diabetes in vit. D deficient patients. In this study we determined the prevalence of vitamin D deficiency in patients of type 2 diabetes mellitus and compared this with vitamin D deficiency in health adults.

METHODS

This case control study was conducted in DHQ hospital Gujranwala within a period of 8 months from 1-Jan-2017 to 31-Aug-2017. We included 100 patients of type of diabetes and 100 health individuals in this study. Both male and female patients having age 30-70 years with diagnosis of type 2 diabetes were selected. Approval from hospital Administration and written consent from every patient was taken. Health individuals were age and gender matched with the diabetic patients to remove biasedness in the results. Patients having two

abnormal fasting blood sugar levels (FBS >120 mg/dl) were labelled as newly diabetic patients. Patients taking anti-diabetic medications were labelled as known cases. Digital glucometer was used to measure FBS levels. Patients of type I diabetes and those suffering from complications of diabetes such as diabetic retinopathy, neuropathy or nephropathy were excluded.

Blood sample for each patient was taken by phlebotomist and send to one private laboratory for estimation of vitamin d levels. Patients were labelled as vit. D levels if vitamin d levels were <20 ng/ml.

For data analysis we used SPSS v19. Chi-square test we used for comparing the frequency of vit. D deficiency between the cases and controls.

RESULTS

On comparison of demographic variables mean age of patients was 48.55 ± 14.62 in diabetes groups and 46.15 ± 12.43 in comparator group. Regarding gender, in diabetes group percentage of males was 53.0% and in comparator group was 51.0% (p-value 0.77). Mean creatinine levels were comparable between the groups. Mean fasting blood sugar (FBS) levels were 168.45 ± 53.23 mg/dl in diabetic patients and 92.82 ± 8.95 mg/dl in normal patients. Similarly HBA1c levels were also high in diabetic patients. Vitamin d levels were significantly less 13.45 ± 6.61 ng/ml in diabetic patients and 17.90 ± 8.15 ng/ml in comparator group (p-value <0.001) [Table 1]. Vitamin D deficiency was diagnosed in 69% patients in diabetes group and in 23% patients in comparator group (p-value <0.001) [Fig. 1].

Table 1. Demographic Characteristics

Variable	Type 2 Diabetes Group	Comparator Group	P-value
Age (Years)	48.55 ± 14.62	46.15 ± 12.43	0.21
Female Gender (%)	47 (47.0%)	49 (49.0%)	0.77
Male Gender (%)	53 (53.0%)	51 (51.0%)	
Creatinine (mg/dl)	1.02 ± 0.19	0.98 ± 0.20	0.15
FBS (mg/dl)	168.45 ± 53.23	92.82 ± 8.95	<0.001
HbA1C	8.63 ± 1.40	6.11 ± 0.25	<0.001
Vitamin D levels (ng/ml)	13.45 ± 6.61	17.90 ± 8.15	<0.001

FBS=fasting blood sugar, $\pm$ = standard deviation

Fig. 1: Comparison of Vitamin D Deficiency between the Groups.
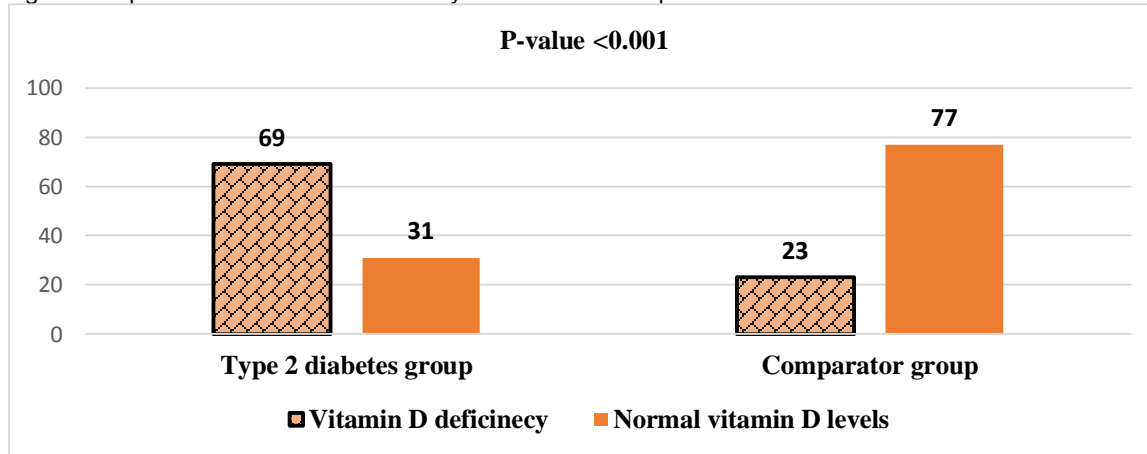
DISCUSSION

Type 2 diabetes mellitus has put a great burden on health care resources. It also has long term adverse effects on mental and physical health of affected patients. There is a higher prevalence of anxiety and depression in patients whose diabetes is not under-control.[9,10] Major adverse effects of diabetes on human health are; development of retinopathy, neuropathy, nephropathy, delayed wound healings and increased risk of heart disease there by increasing the risk of morbidity and mortality in effected patients.[11, 12] Diabetes mellitus and vitamin D deficiency both are highly prevalent in Pakistan and their prevalence is on rise in the coming years.[5,13] Prevalence of vitamin D deficiency is high among females. Prevalence of diabetes mellitus is high among males in Punjab, Sindh and Baluchistan province while it is among females in Khyber Pakhtunkhwa (KPK) province[14]. In this study we

determined the prevalence of vitamin D in patients of type 2 diabetes and compared it with normal health adults.

In our study there were 53% females. There were 66% males in the study of Shahzad et al. conducted in Sindh Province.Alcubierre et al.[15] also found higher number of males with diabetes mellitus.A study conducted in Saudi Arabia found higher number of female diabetic patients in that study.[16]

In our study, vitamin D deficiency was diagnosed in 69.0% patients with diabetes and in only 23.0% health patients. However, Shahzad et al.[17] found vitamin D deficiency in 92.0% patients of diabetes. Iqbal et al.[14] found vitamin D deficiency in 30.6% patients of diabetes with good control and in 58.7% patients with poor control. Alhumaidi et al.[16] found vitamin D deficiency in 76.6% diabetic patients and in 58.1% non-diabetic patients.

Marriot et al.[18] concluded that vitamin D deficiency is associated with development of depression in these patients. Vitamin D deficiency also increases the insulin resistance. This depression and insulin resistance may be responsible for the development of diabetes mellitus. Furthermore Iqbal et al.[14] concluded that vitamin D deficiency is associated with poor control of diabetes and supplementation of vitamin D may help to control the diabetes in a better way in these patients.

CONCLUSION

Prevalence of vitamin D (25-OH vitamin D levels) is high in type 2 diabetes mellitus patients as compared to the normal healthy adults. Diabetic patients should be evaluated for vitamin D deficiency.

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