

VITAMIN D DEFICIENCY IN PATIENTS WITH DIABETIC RETINOPATHY

Farzana Khan¹, Robina Usman², Shafaq Zafar³, Shamaila Wadud⁴

¹⁻⁴ Peshawar Medical College,
Peshawar - Pakistan.

Address for Correspondence:
Dr. Farzana Khan

House No. 355, Sector P/II,
Street 11, Phase 4 Hayatabad,
Peshawar - Pakistan.

Email: drfsalman@yahoo.com

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ABSTRACT

Objective: To determine the relationship of vitamin D deficiency with diabetic retinopathy (DR) in patients with type 2 diabetes mellitus.

Methodology: This comparative study recruited one hundred cases from January to April 2012 from the Department of Endocrinology, Hayatabad Medical Complex, Peshawar; 50 with DR and 50 without DR. Frequency of Vitamin D levels was assessed and compared between the groups. The data was analyzed using SPSS v.17 and to compare the groups, Chi square test was used.

Results: Mean age of the cases with DR was 53.0 ± 10.6 years and those without DR 54.0 ± 8.5 years. Significant vitamin D deficiency was demonstrated in diabetics with any stage of retinopathy as compared to those without retinopathy. Among cases with non-proliferative retinopathy (NPDR) 41 (82%) had normal to low levels of vitamin D. In cases with PDR 9(18%) had normal to low levels of vitamin D levels. P-value was highly significant ($p=0.001$).

Conclusion: Diabetics with retinopathy were found to have significant vitamin D deficiency as compared to those without retinopathy. As the DR increased, levels of vitamin D decreased.

Key Words: Vitamin D, Diabetic retinopathy, Diabetes mellitus

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INTRODUCTION

Vitamin D is a fat-soluble vitamin, well known for its enhancing effects on the immune system. It has anti-oxidant, anti-inflammatory and anti-proliferative functions in all areas of the body including the eyes¹. There is considerable data to suggest that vitamin D can inhibit angiogenesis either by a direct action on endothelial cells or indirect effect through angiogenic signaling or combination of both². According to a study, vitamin D plays an important role in prevention of diabetic retinopathy (DR) because on one hand it is essential for normal insulin release and glucose metabolism while on the other hand it decreases the level of inflammatory cytokines that are up-regulated in diabetes².

People without any eye disease were found to have highest serum vitamin D levels while those with proliferative retinopathy had the lowest levels³. A study has shown that levels of vitamin D were inversely correlated with a higher grade of retinopathy in type-2 diabetic patients with more advanced retinopathy, especially lower levels were associated with proliferative retinopathy⁴. According to a study, 33.3% of their diabetic population was suffering from diabetic retinopathy, a condition amenable to timely and cost effective treatment⁵.

Type-2 diabetic patients have significant association between the existence of proliferative retinopathy and a decrease in vitamin D levels⁶. The plasma concentration of vitamin D has been inversely correlated with development and severity of diabetic retinopathy⁷. Low levels of vitamin D might act as a risk marker for development or progression of diabetic retinopathy⁸.

Diabetic retinopathy is a leading cause of visual disability and blindness. Although the treatment of diabetic retinopathy has greatly improved but the management of progressive changes remains a challenge. Determining an association between vitamin D deficiency and severity of diabetic retinopathy can help establish a preventive measure that can have a beneficial effect on the prognosis of diabetic retinopathy and thus improve the quality of life of those suffering from this devastating disease. Therefore, this study was planned to determine the relationship of vitamin D deficiency with diabetic retinopathy (DR) in patients with type 2 diabetes mellitus.

METHODOLOGY

This comparative study was conducted from January to April 2012 in Endocrinology Unit of Hayatabad Medical Complex, Peshawar. During this period, 100 subjects,

Table 1: Relationship of vitamin D deficiency and diabetic retinopathy

	Normal	Diabetic Retinopathy	Total	P-Value
Vitamin D Low Levels (<8.2ng/ml)	(1) 2%	(18) 36%	(19) 19.0%	0.001
Vitamin D Normal to High Levels (8.2-37.4 ng/ml)	(49) 98%	(32) 64%	(81) 81%	
Total	(50) 100%	(50) 100%	(100) 100%	

admitted in the unit, were included in the study after obtaining informed consent; 50 being cases with DR and 50 without DR, using convenient sampling. Exclusion criteria included patients having known risk factors related to diabetic retinopathy especially people who were hypertensive or pregnant and lactating women. Rest all type 2 diabetics admitted in Endocrinology Unit of Hayatabad Medical Complex, Peshawar were included.

Written consent was obtained from all the subjects and ethical approval was taken from the ethical board of the institution. Data was collected from subjects on a pre-designed proforma filled by the principal investigator. Detailed information on their diabetic status was obtained which included family history and current clinical status.

25-hydroxy vitamin D concentrations were assessed in all 100 patients. The qualified nurse of the unit took the blood. The serum of the patients' was assessed by ELISA technique using commercially available kit Euro-immun 25-hydroxy Vitamin D ELISA (Germany)⁹. The principal investigator did the payment of the tests. Retinopathy was assessed using Canon CR-1 Mark II Digital Retinal Camera¹⁰. For this, a trained technician deputed in the unit for this purpose took the pictures. Diabetic retinopathy was graded by the consultant endocrinologist as none, non-proliferative (NPDR) and proliferative retinopathy (PDR).

SPSS version 17 was used to analyze the data. Vitamin D levels were categorized as low levels and normal to high levels. The range taken was from 8.2ng/ml to 37.4ng/ml for normal to high levels. P value was determined using chi square tests for the comparison of both the groups.

RESULTS

The sample included 50 patients with DR and 50 without DR. Mean age of the DR cases was 53.0 ±10.6 years and those without DR was 54.0 ±8.5 years. There were 25 (50%) males in patients with DR while 32 (64%) in patients without DR. The P-value was highly significant between both the groups (p=0.001). (Table 1)

An increased frequency of vitamin D deficiency was demonstrated in diabetics with progressively increasing

retinopathy. Among 50 cases with DR, non-proliferative DR was in 41 (82%) cases, out of which 12 were with low vitamin D levels and 29 with normal to high vitamin D levels. Out of 9 (18%) cases of proliferative DR, 6 were with low Vitamin D levels and 3 with Normal to high vitamin D levels.

DISCUSSION

This study showed that as progression of DR increases the levels of vitamin D decreases. To our knowledge, this is the first study done in Peshawar-Pakistan, which showed the frequency of low levels of vitamin D and progression of diabetic retinopathy in type 2 diabetics.

There was no effect of age, gender or duration of diabetes in this study. The study also demonstrated the severity of vitamin D deficiency with progression of DR amongst type 2 diabetic patients. Similar finding have been reported in another study¹¹. A clinical based cross sectional study suggested that patients with diabetes especially those with PDR have low levels of vitamin D as compared to those without diabetes¹². Study done by Suzuki et al⁸ suggested that subjects with PDR have low serum 25-OH vitamin D concentration than those without retinopathy and those with early diabetic retinopathy. Another study done by Patricia et al¹³ suggested an association between severity of diabetic retinopathy and prevalence of vitamin D deficiency.

CONCLUSION

Diabetics with retinopathy were found to have significant vitamin D deficiency as compared to those without retinopathy. As the DR increased, levels of vitamin D decreased. Low levels of vitamin D are important not only for the development of retinopathy but also for its progression.

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CONTRIBUTORS

FK Conceived the idea, collected data and drafted the manuscript and final revision of the manuscript. RU helped compilation and interpretation of data and statistical analysis. SZ did literature survey and statistical analysis. SW did Proof reading and references management. All authors contributed significantly to the submitted manuscript.