International Journal of Medical Ophthalmology

E-ISSN: 2663-8274
P-ISSN: 2663-8266
www.ophthalmoljournal.com
IJMO 2019; 1(1): 39-42
Received: 11-11-2018
Accepted: 20-01-2019

Dr. Subodh Kumar Agarwal
Assistant Professor, Department of Ophthalmology, Varun Arjun Medical College and Rohilkhand Hospital, Banthara, Shahjahanpur, Uttar Pradesh, India

Dr. Rashmi Agarwal
MBBS, DOMS, Consultant, Ophthalmologist, Shahjahanpur, Uttar Pradesh, India

Corresponding Author:
Dr. Rashmi Agarwal
MBBS, DOMS, Consultant, Ophthalmologist, Shahjahanpur, Uttar Pradesh, India

A clinical study of diabetic patients who underwent the retinopathy while in the deficiency of calcitriol: Tertiary care teaching hospital based study

Dr. Subodh Kumar Agarwal and Dr. Rashmi Agarwal

DOI: https://doi.org/10.33545/26638266.2019.v1.i1a.72

Abstract
Background: Diabetes mellitus continues to be a tremendous health burden in America. In 2007, the prevalence of diabetes was estimated to be 23.6 million people, or 7.8% of the population. Diabetes mellitus (DM) is a large public health disorder which affects more than 300 million individuals worldwide, with significant morbidity and mortality. The prevalence of Diabetic Retinopathy varies from 20% to 80% in different studies according to previous literature. The increased physical activity is highly associated with less severe levels of Diabetic Retinopathy. Serum 25-hydroxyvitamin D (25(OH) D) levels were almost decreased in type 2 diabetic patients with retinopathy when compared with type 2 patients who had no microangiopathy. Objectives the purpose of this study was to evaluate the evidence for an association between diabetic retinopathy (DR) and vitamin D deficiency.
Materials and Methods: As we have taken, 104 subjects of both the sexes, after obtaining informed consent; 52 being cases with Diabetic Retinopathy and 52 without Diabetic Retinopathy, using convenient sampling. Exclusion criteria included patients having known risk factors of diabetic retinopathy mainly people who were hypertensive or pregnant and lactating women. The serum of the patients' samples were assessed by Chemiluminescence immunoassay [CLIA] of serum 25 hydroxy Vitamin D determination.
Results: Our study included 52 patients with Diabetic Retinopathy and 52 without Diabetic Retinopathy. Mean age of the DR cases was 51.0 ±10.4 years and those without DR were 52.0 ±8.2 years. There were 25 (50%) males in patients with DR while 33 (66%) in patients without DR. The P-value was highly significant between both the groups (p=0.001).
Conclusion: There is a statistically significant association between vitamin D (Calcitriol) deficiency and Diabetic Retinopathy (DR).

Keywords: non -proliferative DR, proliferative DR, diabetic retinopathy (DR), calcitriol, vitamin D deficiency (VDD), serum 25-hydroxyvitamin

Introduction

"Diabetes mellitus continues to be a tremendous health burden in America. In 2007, the prevalence of diabetes was estimated to be 23.6 million people, or 7.8% of the population[1]The number of people diagnosed with diabetes is expected to increase to 48.3 million people by the year 2050 [2]. Diabetes is also the leading cause of new blindness in patients 20 to 74 years of age[1]While it has been well established that intensive blood glucose control can lower the risk of micro vascular complications from diabetes, the pathophysiology of retinopathy progression is not completely understood Vitamin D is essential for a vast number of physiologic processes and vitamin D insufficiency has reached pandemic proportions, with more than half the world's population at risk of Vitamin D insufficiency has been implicated in the development of diabetes and also correlated with an elevated risk of cardiovascular disease, cancer, and mortality. Additionally, vitamin D insufficiency has been associated with neurologic conditions, such as multiple sclerosis and Parkinson's disease. Diabetes mellitus (DM) is a large public health disorder which affects more than 300 million individuals worldwide, with significant morbidity and mortality [2]. The prevalence of Diabetic Retinopathy varies from 20% to 80% in different studies according to previous literature. Recent studies suggests that the number of people and its prevalence with diabetic retinopathy will increase to 191 million by 2030 [3]. Praidou *et al.* found that increased physical activity is highly associated with less severe levels of Diabetic Retinopathy [4].

The detailed pathophysiological mechanisms and other Diabetic Retinopathy risk factors are not fully clarified yet. Inukai *et al.* reported that serum 25-hydroxyvitamin D (25 (OH) D) levels were almost decreased in type 2 diabetic patients with retinopathy when compared with type 2 patients who had no microangiopathy [5]. However, others researchers suggested that no significant differences in calciferol status were found between type 2 diabetes with or without diabetic retinopathy. Alam *et al.* found there was no association at al between serum 25(OH) D levels and the presence and the severity of diabetic retinopathy in his study population [6]. Presently, there is insufficient evidence depicted whether serum vitamin D deficiency is related to diabetic retinopathy, and the determination of this relationship has rarely been conducted and observed. To address this issue, we carried out this analysis by pooling the results from observation studies to examine the highest potential association between vitamin D and diabetic retinopathy.

Materials and Methods

This study was conducted in the Department of Ophthalmology, Varun Arjun Medical College & Rohilkhand Hospital, Banthara, Shahjahanpur Uttar Pradesh. 104 subjects of both the sexes were included in our study after obtaining informed consent; 52 being cases with Diabetic Retinopathy and 52 without Diabetic Retinopathy, using convenient sampling.

Exclusion criteria: included patients having known risk factors of diabetic retinopathy mainly people who were hypertensive or pregnant and lactating women. Rest all type 2 diabetics from general OPD are admitted in the Hospital, were included Written and informed consent was obtained from all the subjects and ethical approval was taken from the ethical committee of the institution. Data was collected from subjects on a pre-designed proforma filled by the principal investigator with the help of other investigators. Detailed information on their diabetic status was obtained which included family history and current clinical status, medication etc. Vitamin D concentrations were estimated in all 104 patients who were included in the study. The qualified nurse of the department collected the blood samples. The serum of the patients' samples were assessed by Chemiluminescence immunoassay [CLIA] of serum 25 hydroxy Vit–D determination at Varun Arjun Medical College Shahjahanpur. Retinopathy was assessed using ZEISS VISUCAM 500 fundus camera at Varun Arjun Medical College Shahjahanpur. For this, a trained technician deputed in the unit for this purpose took the pictures from the department of Ophthalmology. DR was graded by the consultant Ophthalmologist as none, non-proliferative and proliferative retinopathy from the department. SPSS version 17 was used to analyze the data. Calcitriol levels were categorized as low levels and normal to high levels. The range taken was from 8.6ng/ml to 37.2ng/ml for normal to high levels. P value was determined using chi square tests for the comparison of both the groups.

Results

Table 1: Pattern of Calcitriol deficiency on Diabetic retinopathy patients.

Level of calcitriol	Normal Retinopathy	Diabetic Retinopathy	Total	P-value
Low (<8.6ng/ml)	3(6%)	18(34%)	21(20%)	<0.001
Normal to high (8.2-37.2 ng/ml)	49(94%)	34(66%)	83(80%)	<0.001
Total	52(100%)	52(100%)	104(100%)	<0.001

*Significant value (p-value-<0.001)

Table 2: Subjects segregation of Diabetic Retinopathy.

Cases pattern	No. of cases
Non-poliferative DR	42(80%)
Poliferative DR	10(20%)
Total	52(100%)

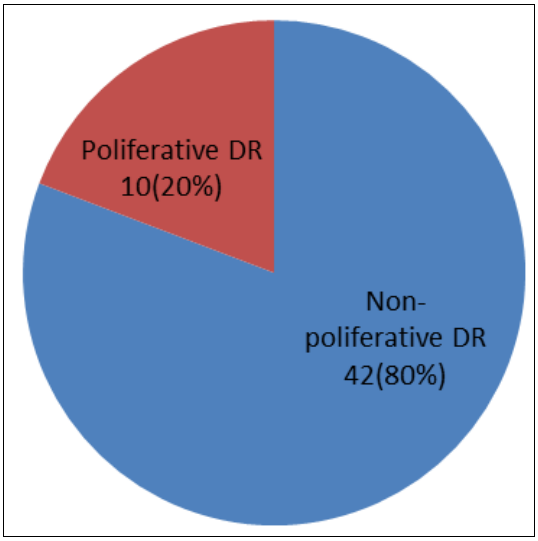

Fig 1: Diagrammatically presentation of Non -Proliferative DR and Proliferative DR with Total No of Cases attempted in the study

Table 3: Subjects segregation of non-poliferative DR.

Cases pattern	No. of cases
Low vitamin Levels	12
Normal to high vitamin levels	30
Total	42

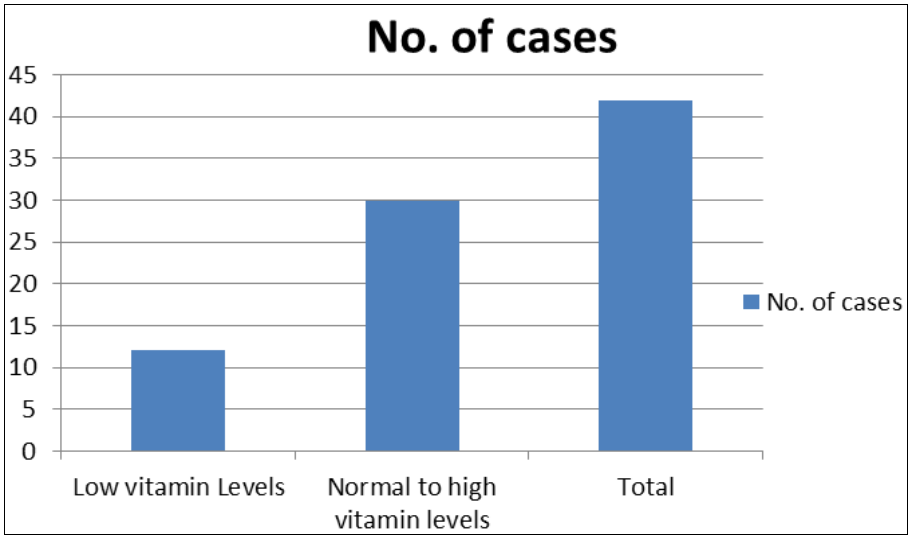

Fig 2: Diagrammatically presentation of Non -Poliferative DR with Total No of Cases attempted in the study

Table 4: Subjects segregation Of Poliferative DR.

Cases pattern	No. of cases
Low vitamin Levels	6
Normal to high vitamin levels	4
Total	10

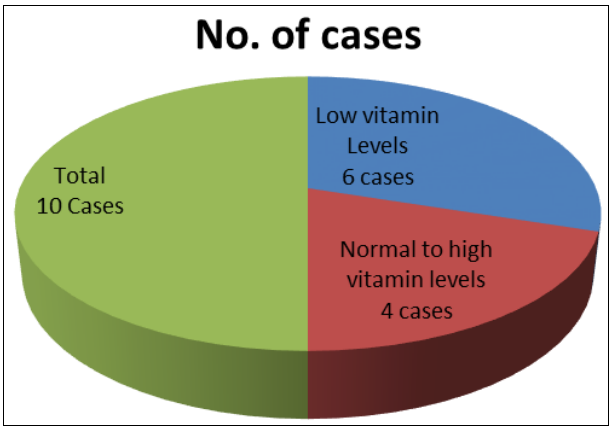

Fig 3: Diagrammatically presentation of Proliferative DR with Total No of Cases attempted in the study.

The sample included 52 patients with Diabetic Retinopathy and 52 without Diabetic Retinopathy. Mean age of the DR cases was 51.0 ±10.4 years and those without DR were 52.0 ±8.2 years. There were 26 (50%) males in patients with DR while 34 (66%) in patients without DR. The P-value was highly significant between both the groups (p=0.001).Table 1, an increased vitamin D deficiency was demonstrated in Diabetics with progressively increasing retinopathy. Among 52 cases with Diabetic Retinopathy, non-proliferative Diabetic Retinopathy was in 42 (80%) cases, Figure 1, out of which 12 were with low vitamin D levels and 30 with normal to high vitamin D levels. Out of 10 (20%) cases of proliferative DR, 6 were with low Vitamin D levels and 4 with Normal to high vitamin D levels, as shown in Table 1-4. and figure 2, 3.

Discussion

The first was to assess the relationship between vitamin D status and diabetic retinopathy and the second was to establish baseline data from which a larger prospective clinical study could be designed. It was found that patients with type 2 diabetes, particularly those with PDR, had lower vitamin D levels than those without diabetes. Moreover, there was a higher percentage of subjects with vitamin D insufficiency in the diabetic retinopathy groups. Multivitamin usage had a significant impact on the vitamin D levels of the study subjects. To the best of our knowledge, the role of vitamin D in cellular inflammation pathways, endothelial cell proliferation, and angiogenesis is well established, however, its role in DR has to date been obscured in clinical studies by disease pathogenesis (diabetes Type I vs Type II), varied DR classifications, and differing patient ethnic populations [7]. It was observed, 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 study [8]. He *et al.*, suggested that serum vitamin D levels may be used as a low cost Diabetic Retinopathy screening tool in Chinese patients, suggesting that such patients with diabetes and VDD should undergo more routine diabetic eye exams [9]. Aksoy *et al.* also suggested that there exists an inverse relationship between serum vitamin D levels and the severity of DR [10]. In a previous studies, conducted in Lebanon, Japan, Italy, and China found significantly increased odds of vitamin D deficiency and lower serum 25(OH) D in patients with DR [11]. Suzuki *et al.* suggested that subjects with PDR have low serum 25-OH vitamin D concentration than those without retinopathy and those with early diabetic retinopathy [12]. Another study done by Patricia *et al.* suggested an association between severity of diabetic retinopathy and prevalence of vitamin D deficiency [14]. There are several important limitations to the present study as per or knowledge goes. The small number of

studies eligible for this review and the different study designs prevented the extraction of more data regarding the highly association between vitamin D deficiency and DR. There are only 2 large population based studies from the United Kingdom and South Korea. Source of population in other studies are from clinics and subgroup of prospective study in diabetes, which may result in having different in population characteristics. However, the mechanism underlying ARMD (age related macular degeneration) also is thought to be ischemic in nature, with activation of angiogenic pathways responsible for the choroidal neovascularization and retinal edema seen in advanced ARMD. It seems to be there may be an important role for the supplementation of vitamin D and other antiangiogenic vitamins in the medical management of DR. The main strength of this study is giving strong evidence of the association of serum vitamin D and diabetic retinopathy. However, there were several limitations in this study. Future such eye screening studies will be more factual in terms of the information gleaned by the implementation of scientific sampling techniques, strict adherence to complete completion of standardized data entry forms along with better verification of the patients diabetic status and biochemistry.

Conclusion

Our study suggests that diabetic subjects, especially those with PDR, have lower 25(OH) D levels than those without diabetes. Therefore this demonstrated a highly significant association between VDD and DR and a statistically significant difference in mean serum vitamin D levels between DR and non-DR patients. The definite causative role of VDD and development of DR should be explored further. Vitamin D supplementation as a protective mechanism against the development and progression of DR warrants further investigation.

Source of Support: None Declared

Conflict of Interest: None Declare

References

1. Centers for Disease Control and Prevention National diabetes fact sheet: general information and national estimates on diabetes in the United States. 2007 http://www.cdc.gov/diabetes/pubs/factsheet07.htm. Accessed 2010.
2. Narayan KM, Boyle JP, Geiss LS *et al.* Impact of recent increase in incidence on future diabetes burden: U.S. Diabetes Care 2006;29:2114-2116, 2005-2050. [PubMed]
3. Sherwin R, Jastreboff AM. Year in diabetes 2012: the diabetes tsunami. J Clin. Endocrinol. Metab 2012;97:4293-4301. doi: 10.1210/jc.2012-3487.
4. Zheng Y, He M, Congdon N. The worldwide epidemic of diabetic retinopathy. Indian J Ophthalmol 2012;60:428-431.
5. Praidou A, Harris M, Niakas D, Labiris G. Physical activity and its correlation to diabetic retinopathy. J Diabetes Complicat 2017;31:456-461. doi: 10.1016/j.jdiacomp.2016.06.027.
6. Inukai T, Fujiwara Y, Tayama K, Aso Y, Takemura Y. Alterations in serum levels of 1 alpha, 25(OH)2 D3 and osteocalcin in patients with early diabetic nephropathy. Diabetes Res. Clin. Pract 1997;38:53-59. doi: 10.1016/S0168-8227(97)00090-9.
7. Alam U, Amjad Y, Chan AW, Asghar O, Petropoulos IN, Malik RA. Vitamin D Deficiency Is Not Associated with Diabetic Retinopathy or Maculopathy. J Diabetes Res 2016;2016:6156217. doi: 10.1155/2016/6156217.
8. Albert DM, Scheef EA, Wang S *et al.* Calcitriol is a potent inhibitor of retinal neovascularization. Invest Ophthalmol Vis Sci 2007;48:2327-2334.
9. Takashi H, Shibuya M. The vascular endothelial growth factor (VEGF) receptor system and its role under physiological and pathological conditions. Clin Sci (London) 2005;109:227-41.
10. He R, Shen J, Liu F *et al.* Vitamin D deficiency increases the risk of retinopathy in Chinese patients with type 2diabetes. Diabet Med 2014;31:1657-1664.
11. Aksoy H, Akcay F, Kurtul N, Baykal O, Avci B. Serum 1, 25 dihydroxy vitamin D (1, 25(OH) 2 D3), 25 hydroxy vitamin D (25(OH) D) and parathormone levels in diabetic retinopathy. Clin Biochem 2000;33:47-51.
12. Zittermann A. Vitamin D and disease prevention with special reference to cardiovascular disease. Prog Biophys Mol Biol 2006;92:39-48.
13. Suzuki A, Kotake M, Ono Y, Kato T, Oda N, Hayakawa N *et al.* Hypovitaminosis D in type 2 diabetes mellitus: association with microvascular complications and type of treatment. Endocr J 2006;53:503-10.
14. Patrick PA, Visintainer PF, Shi Q, Weiss IA, Brand DA. Vitamin D and retinopathy in adults with diabetes mellitus. Arch Ophthalmol 2012;130:756-60.