

To Find Out the Association of Diabetic Retinopathy and Vitamin D Deficiency in Type 2 Diabetic Patients

Association of Diabetic Retinopathy and Vitamin D Deficiency

Huma Rehman¹, Aslam Khan Mohmand¹, Syed Salman Shah¹, Syed Shahmeer Raza², Syed Arsalan Ali Shah¹ and Arfaa Hoor¹

ABSTRACT

Objective: To find out the association of Diabetic Retinopathy and vitamin D deficiency.

Study Design: Descriptive/Cross sectional study

Place and Duration of Study: This study was conducted at the Dept. of Physiology at Khyber Medical College Peshawar from January, 2021 to April, 2021.

Materials and Methods: After the recruitment of subjects according to the inclusion criteria. Subjects were divided into two cohorts; Patients with Diabetic Retinopathy (Group I N=40) and a Non-Diabetic Retinopathy group (Control group N=40). Blood for Vitamin D Levels was taken and analysed at the Hospital Lab via Cobas 6000 E 501 analyzer. Data was analysed using SPSS version 26.0 for MacBook Pro.

Results: Vitamin D low levels were found in patients of the DR group. They were vitamin D deficient in comparison to the non-DR group.

Conclusion: Our study found an inverse relation between vitamin D levels and diabetic retinopathy.

Key Words: Ophthalmology; Fat Soluble Vitamins; Retinopathy

Citation of article: Rehman H, Mohmand AK, Shah SS, Raza SS, Shah SAA, Hoor A. To Find Out the Association of Diabetic Retinopathy and Vitamin D Deficiency in Type 2 Diabetic Patients. Med Forum 2022;33(4):67-69.

INTRODUCTION

Diabetes Mellitus (DM) is a public health concern of serious and growing nature. It also carries a substantial economic burden all over the world. Figures from the year 2019 show that an estimated 463 million people are living with DM. If efforts are not taken, this number could go beyond 700 million by the year 2045⁽¹⁾. The situation has taken the form of a pandemic. This rise in the DM cases can be linked to lifestyle changes, aging and rise in the obese population⁽²⁻³⁾. This is noteworthy that DM can cause severe complications of micro/macro vascular nature. This may include; diabetic retinopathy (DR)

Globally, DR is the primary reason behind blindness that could be prevented. Having a prevalence of roughly 35%⁽⁵⁾. The Serum vitamin D levels of the relatively inactive 25 hydroxy form are a better indicator of vitamin D level than its more active 1,25 dihydroxy form of the vitamin⁽⁶⁾.

During recent years, an increasing attention has been drawn towards establishing a link or possible association of vitamin D deficiency (VDD) and non skeletal system related medical conditions. This includes diabetes and its related complications (7-9). An inverse relation exists between vitamin D levels and the risk of developing DR was demonstrated among diverse ranges of population⁽¹⁰⁾

A study carried out by shimo et al. found an association between VDD and risk for developing diabetic retinopathy. However, this study was carried out on a small sample size and the population consisted of young type 1 diabetic adult patients⁽¹¹⁾.

In the current cross-sectional study, our aim was to explore and establish a link between VDD and the risk of developing the vascular diabetic complications (i.e., DR) in type 2 DM patients of Peshawar.

MATERIALS AND METHODS

Our cross sectional (descriptive) study was carried out in the Dept. of Physiology at Khyber Medical College in Peshawar from January 2021 to April 2021. Inclusion criteria included patients of both sexes with diagnosed diabetes mellitus (diagnosis made by consultant keeping both clinical and haematological values of the variables in account). Exclusion criteria included patients with kidney disease, secondary hypertension, thyroid, liver or parathyroid related medical conditions.

After the recruitment of subjects according to the inclusion criteria. Subjects were divided into two

¹. Department of Physiology, Khyber Medical College, Peshawar.

². Department of Physiology, Kabir Medical College, Peshawar.

Correspondence: Syed Shahmeer Raza, Assistant Professor of Physiology, Kabir Medical College, Peshawar
Contact No: 0305- 9006082
Email: shamir.raza@gmail.com

Received: October, 2021

Accepted: January, 2022

Printed: April, 2022

cohorts; Patients with Diabetic Retinopathy (Group I N=40) and a Non-Diabetic Retinopathy group (Control group N=40). Blood for Vitamin D Levels was taken and analysed at the Hospital Lab via Cobas 6000 E 501 analyzer. The cut off value for VDD was kept at 8.2 ng/ml.

RESULTS

Of the 40 patients in the No DR Group-30 were male and 10 were females. In the DR Group, out of the 40 patients, 24 were males and the rest 16 were females.

Table No.1: Shows results of serum Vitamin D Level and subjects with vitamin D deficiency.

Vitamin D	Non Diabetic Retinopathy Group (N=40)	Diabetic Retinopathy Group (N=40)	p Value
Vit D Level (ng/mL)	20.9 +/- 3.7	15.2 +/- 7.3	0.05
VDD Status (N)	8 (20%)	32 (80%)	0.03

Data shows mean \pm standard deviation (SD) or (%)

DISCUSSION

Our study confirms that a relation exists between VDD and increased risk of developing DR in type 2 diabetic patients. However, due to the cross-sectional nature of our study, the results of our study do have limitation. Another limitation of our study was the inability to determine the sun exposure time of the subjects.

It is noteworthy that only 8 (20%) out of the 40 in the No DR Group showed low levels of Vitamin D in contrast to 32 (80%) out of the 40 in the DR Group. Hence, making 80% of the patients in the DR group showing VDD. Patients with kidney disease were excluded from the study as diabetic patients with kidney disease could be a contributing confounder of vitamin D status^[12].

DR could prove to be detrimental due to the advancing nature of the disease. Low vitamin D levels could help us in finding DR patients early on in the disease process before progression to more serious and severe stages^[13]. Therefore, screening for vitamin D levels is an easy alternative of screening DR among diabetic patients in primary health care setup. This is also important from public health view point since there is a dearth of specialist ophthalmologist and specialized equipment. VDD has taken the form of an epidemic across the globe. The results of our study were consistent with the previously published literature from different populations across the world⁽¹⁴⁻¹⁶⁾. It is also worth noting that VDD is associated with risk for developing diabetes⁽¹⁷⁻¹⁸⁾.

Our study has various clinical implications. It was established for the first time in our population that diabetic patients show an explicit relationship between VDD and DR. We identified in our study that Vitamin D levels can be a modifiable risk factor in preventing of DR. This study does have some epidemiological strengths; including the fairly large sample size of the study, a well-established inclusion and exclusion criteria. Also, the strong quality controls add strength to the study.

CONCLUSION

Our study establishes that a relation exists between VDD and increased risk of developing DR in type 2 diabetic patients. However further studies including: systemic reviews, meta-analysis and level I evidence studies are required for not only understanding the medical condition but also to establish a possible link and to further help us understand the explicit effect governing this risk of developing DR with the variation in the vitamin D levels. Considering the role of preventive medicine, supplementation with vitamin D by any sort of intervention whether dietary or other intervention strategies for the correction of VDD in the diabetic population of Peshawar city.

Author's Contribution:

Concept & Design of Study: Huma Rehman
 Drafting: Aslam Khan Mohmand, Syed Salman Shah
 Data Analysis: Syed Shahmeer Raza, Syed Arsalan Ali Shah, Arfaa Hoor
 Revisiting Critically: Huma Rehman, Aslam Khan Mohmand
 Final Approval of version: Huma Rehman

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th ed. *Diabetes Res Clin Pract* 2019;157:107843.
2. Zheng Y, Ley SH, Hu FB. Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. *Nat Rev Endocrinol* 2018;14:88–98.
3. Chatterjee S, Khunti K, Davies MJ. Type 2 diabetes. *Lancet* 2017;389:2239–51.
4. Valencia WM, Florez H. How to prevent the microvascular complications of type 2 diabetes beyond glucose control. *BMJ* 2017;356:6505.
5. Yau JW, Rogers SL, Kawasaki R, Lamoureux EL, Kowalski JW, Bek T, et al. Global prevalence and

- major risk factors of diabetic retinopathy. *Diabetes Care* 2012;35:556–64.
6. Mauricio D, Mandrup-Poulsen T, Nerup J. Vitamin D analogues in insulin-dependent diabetes mellitus and other autoimmune diseases: a therapeutic perspective. *Diabetes/Metabolism Reviews* 1996; 12(1):57–68.
 7. Grammatiki M, Rapti E, Karras S, Ajjan RA, Kotsa K. Vitamin D and diabetes mellitus: Causal or casual association? *Rev Endocr Metab Disord* 2017;18:227–41.
 8. Zoppini G, Galletti A, Targher G, Brangani C, Pichiri I, Trombetta M, et al. Lower levels of 25-hydroxyvitamin D3 are associated with a higher prevalence of microvascular complications in patients with type 2 diabetes. *BMJ Open Diabetes Res Care* 2015; 3:e000058.
 9. Herrmann M, Sullivan DR, Veillard AS, McCorquodale T, Straub IR, Scott R, et al. Serum 25-hydroxyvitamin D: a predictor of macrovascular and microvascular complications in patients with type 2 diabetes. *Diabetes Care* 2015;38:521–8.
 10. Luo BA, Gao F, Qin LL. The association between vitamin D deficiency and diabetic retinopathy in type 2 diabetes: a meta-analysis of observational studies. *Nutrients* 2017;9:307.
 11. Shimo N, Yasuda T, Kaneto H, et al. Vitamin D deficiency is significantly associated with retinopathy in young Japanese type 1 diabetic patients. *Diabetes Res Clin Practice* 2014; 106(2):e41–e43.
 12. Kienreich K, Tomaschitz A, Verheyen N, et al. Vitamin D and cardiovascular disease. *Nutrients* 2013;5(8):3005–3021.
 13. Stitt AW, Curtis TM, Chen M, Medina RJ, McKay GJ, Jenkins A, et al. The progress in understanding and treatment of diabetic retinopathy. *Prog Retin Eye Res* 2016;51:156–18.
 14. Rhee SY, Hwang YC, Chung HY, Woo JT. Vitamin D and diabetes in Koreans: Analyses based on the Fourth Korea National Health and Nutrition Examination Survey (KNHANES), 2008–2009. *Diabet Med* 2012;29:1003–1010.
 15. Bonakdaran S, Shoeibi N. Is there any correlation between vitamin D insufficiency and diabetic retinopathy? *Int J Ophthalmol* 2015;8:326–331.
 16. Isaia G, Giorgino R, Adami S. High prevalence of hypovitaminosis D in female type diabetic population. *Diabetes Care* 2001;24:1496.
 17. Ahmadiéh H, Azar ST, Lakkis N, Arabi A. Hypovitaminosis D in Patients with Type 2 Diabetes Mellitus: A Relation to Disease Control and Complications. *ISRN Endocrinol* 2013; 641098.
 18. Reddy GB, Sivaprasad M, Shalini T, Satyanarayana A, Seshacharyulu M, Balakrishna N, et al. Plasma vitamin D status in patients with type 2 diabetes with and without retinopathy. *Nutr* 2015;31:959–963.