EFFECT OF DURATION OF DIABETES MELLITUS AS A SIGNIFICANT MARKER FOR DIABETIC RETINOPATHY.

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Abstract

Objective: To determine the association between duration of diabetes with diabetic retinopathy at a tertiary care hospital of Karachi, Pakistan. **Materials & Methods:** It was a case-control study conducted at the department of medicine of Jinnah Medical College Hospital Karachi for the duration of six months between Aug 2018 to Feb 2019. 45 cases of diabetes (both type 1 and 2) with retinopathy and 45 controls without retinopathy were included in the study. Duration of diabetes mellitus was divided into two categories such as ≤10 years and > 10 years. The data was entered and analyzed using SPSS version 23. **Results:** The majority of the patients diagnosed with diabetic retinopathy had DM from more than 10 years (77.8%) and only 8 had DM from ≤10 years (21.6%) & there was a statistically significant difference among them ($p<0.05$). The people with diabetes mellitus from less than & equal to 10 years have less risk to develop diabetic retinopathy as compared to patients with diabetes mellitus from more than 10 years (O.R=16.1875). **Conclusion:** The development of diabetic retinopathy is associated with the duration of diabetes

Keywords: Diabetes mellitus, Retinopathy, Duration of Diabetes mellitus, preventive medicine, complications.

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INTRODUCTION

Globally, diabetes mellitus (DM) is one of the quickly increasing & common chronic diseases. More than 371 million individuals have been diagnosed with diabetes in 2012 and it has been estimated about 552 million people by 2030 will be affected by DM [1] DM is a metabolic disorder occurs due to defects in insulin discharge or insulin action or both prompting hypoglycemia or hyperglycemia, neurovascular damage, and dyslipidemia [2-4]. The impairment can impact each body organ of the patients that negatively influence the survival and quality of life of patients [2,4].

One of the common visual complications of diabetes type 1 & 2 is diabetic retinopathy [5]. The risk of a person with diabetes losing vision is 25-fold that of people without diabetes [1]. In the 30-69 years of age, people with diabetes mellitus are the most frequent reason for visual impairment. The frequency of diabetic retinopathy is about 21-60% in diabetic patients for less than 5 years and 15 or more years, respectively [6]. After 10 years of duration of diabetes, the severity of retinopathy is associated with longer duration, presence of proteinuria, raised levels of glycosylated hemoglobin, raised diastolic BP, and male sex [7].

The aim of our study was to evaluate the relationship of diabetic retinopathy and duration of diabetes mellitus in our local population so this notorious complication can be dealt with right on time to keep away from visual impairment.

MATERIALS & METHODS

It was a case-control study conducted at the department of medicine of Jinnah Medical College Hospital Karachi for the duration of six months between Aug 2018 to Feb 2019. The ERC gave ethical review approval dated 25th Jun 2018 by committe.

The sample size was calculated using Open Epi online sample size calculator by taking the level of significance as 5%, power of test as 90%, the prevalence of diabetic retinopathy as 21.38% among diabetic patients with duration of ≤10years and 64.49% among diabetic patients with duration of more than 10 years [8]. The calculated sample size came out as 28 cases and 28 controls, but we have included 45 cases and 45 controls in this study for adequacy of results.

A total of 90 patients were included using a non-probability consecutive sampling technique. Patients of more than 18 years of age of either gender were included in the study. Cases were the known case of diabetes (both type 1 and 2) with retinopathy and controls were patients without retinopathy. Patients whose funduscopic examination was difficult due to cataract, retinal detachment, or corneal opacity or patients who did not give consent were excluded from the study.

The purpose, procedure, merits, and demerits of the study were explained by the study physician to all eligible patients and written consent was obtained. History and examination carried out and fundoscopy was done. Each enrolled patient sent to an ophthalmologist for examination. In order to avoid subject variation single qualified and experienced ophthalmologist was involved in the study. All the findings were recorded on the pre-designed Performa along with demographic data. Duration of diabetes mellitus was divided into two categories such as ≤10 years and > 10 years.

The data was entered and analyzed using SPSS version 23. Quantitative variables were presented by mean & standard deviation. Frequency and percentage were computed for categorical variables. A Chi-square test applied to compare the different variables. P-value of <0.05 was considered significant. The odds ratio was calculated to check the association between diabetic retinopathy and the duration of diabetes mellitus.

RESULTS

A total of 90 patients were enrolled in the study. The mean age of patients was 45.3±12.1 years. The majority of the study subjects were males 51 (56.7%) and 39 females (43.3). A total of 55 subjects (61.1%) had a positive family history of diabetes mellitus. As shown in table 1, the comparison between two population groups.

About 45 patients had diabetes mellitus from ≤10 years and 45 had diabetes mellitus from more than 10 years in our study.

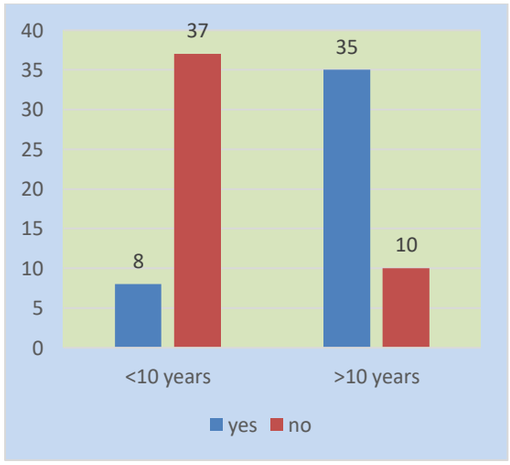
The majority of the patients diagnosed with diabetic retinopathy had DM from more than 10 years were35(77.8%) and only 8 had DM from ≤10 years (21.6%) & there was a statistically significant difference among them (p<0.05). The people with diabetes mellitus from less than & equal to 10 years have less risk to develop diabetic retinopathy as compared to patients with diabetes mellitus from more than 10 years (O.R=16.1875) with 95% Confidence interval of 5.7316 to 45.7175 and level of significance P < 0.0001. (Fig *1*)

TABLE 1: Demographics

Variable	Less than 10 years	More than 10 years
Age	45.1	45.5
Males	25	26
Females	19	20
Positive family history of diabetes	26	29
Retinopathy	8	35

	Cases	Control	OR (95% CI)	p-value
Age (in years)	45.5	45.1		
Gender				
Male	26	25	0.9880	P = 0.9774
Female	20	19	0.9880	
Types of Diabetes				
Type 1 diabetes	5	2	2.6875	P = 0.2531
Type 2 diabetes	40	43	2.6875	
Outcome				
Retinopathy present	35	8	16.1875	P < 0.0001
Retinopathy Absent	10	37	16.1875	P < 0.0001

FIGURE 1: Comparision of Diabetic Retinopathy with duration of diabetes



DISCUSSION

Diabetes retinopathy is a major cause of blindness among persons of working age group. In our study there was a male preponderance whereas in another case-control study conducted in India also showed a higher frequency of females as compared to males with diabetic retinopathy [6]. In another recent study, a significant difference was observed in the mean duration of diabetes (12 ± 5 vs. 8 ± 5 years) between patients without diabetic retinopathy and diabetic retinopathy (p<0.05) [6]. Bansal P et al. in his study concluded that increasing prevalence of DR with an increase in the duration of DM that is all patients having diabetes from more than 25 years was found to have diabetic retinopathy, we on the other hand took 10 years duration as a

benchmark [8]. Population-based studies of diabetic patients show great variation in the prevalence of diabetic retinopathy. The difference in age at diagnosis, duration of diabetes, and glycemic control could all influence the prevalence [9,10].

A yearly eye exam to ensure the health of eyes and to protect their vision should be conducted in diabetics. Diabetes can affect the eyes in numerous ways. It is very frequent the effects are temporary and controlled with good sugar control. However, long-term diabetes can cause vision-threatening changes [11,12]. In the current study majority of the males were dominant in diabetic retinopathy as compared to females. A similar study conducted by Nisar Set al. found 43% of males had diabetic retinopathy and 57% of females had diabetic retinopathy [13].

In this study, an increasing frequency of retinopathy was observed with increasing duration of diabetes. The retinopathy was present in 77.8% of patients who had diabetes of more than ten years of duration. This finding is consistent with the observations made by other studies [11,14-15] which showed a prevalence of 100% with twenty years duration. In the study by Kayani H et al. found 33.3% of diabetic individuals were suffering from retinopathy concluded that a condition responsive to timely and cost-effective management, every diabetic patient should be made attentive to the significance of regular ophthalmologic examination [12]. Patients with diabetes develop many complications out of which diabetic retinopathy is the gravest one [16]. Another study highlighted the association of Nicotine use and progression of diabetic retinopathy has a positive relationship and known to cause worsening [17]. Romero-Aroca stated a meta-analysis on the use of Anti VGEF and stated its use should be personalized with outcome in 70% individuals [18]. Another study showed a relation between duration of diabetes and retinopathy and they also stated that patients with nephropathy have higher chances of retinopathy [19]. Tight metabolic control, control of risk factors, and close monitorization of progression of preexisting DR are indispensable measures to maximally prevent vision loss [20]. A few new studies are being done that define the use of drugs like Anti-VGEF, and molecules associated with plasma kallikrein pathway, lipoprotein-associated phospholipase A2, and Anti- TNF [21]. The International Diabetes Federation (IDF) reported in its Atlas 5th edition the prevalence for Pakistan to be 6.8%, aged 20–79 years [22], but healthcare professionals with local insight always believed this to be an underestimate. Subsequently, there were conflicting findings with prevalence ranging from7.2% to 19.21% in different regions of the country [23].

This study was from a developing country with a high burden of diabetes and complications. If we educate the masses for early recognition we can prevent organ loss complications. However there were certain limitations i.e. our sample size was small, it was a single-center study and we only worked on a few aspects of diabetic retinopathy. Future studies taking into account multicenter trials, larger sample size, and treatment, and follow up can increase the generalization of data on our population.

CONCLUSIONS

The development of diabetic retinopathy is associated with the duration of diabetes. Early recognition and management can help our patients recover from organ loss complications and can enhance the quality of life.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE: The ERC gave ethical review approval dated 25th Jun 2018 by committe.

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REFERENCES

1. Zheng Y, He M, Congdon N: The worldwide epidemic of diabetic retinopathy. Indian J Ophthalmol. 2012, 60:428-31. doi: 10.4103/0301-4738.100542.
2. Jenkins AJ, Joglekar MV, Hardikar AA, Keech AC, O'Neal DN, Januszewski AS: Biomarkers in Diabetic Retinopathy. The review of diabetic studies : RDS. 2015, 12:159-95. doi: 10.1900/RDS.2015.12.159
3. Maiorino MI, Bellastella G, Esposito K: Diabetes and sexual dysfunction: current perspectives. Diabetes, metabolic syndrome and obesity : targets and therapy. 2014, 7:95-105. doi: 10.2147/DMSO.S36455
4. Zhou M, Wang W, Huang W, Zhang X: Diabetes mellitus as a risk factor for open-angle glaucoma: a systematic review and meta-analysis. PLoS One. 2014, 9:102972. doi: 10.1371/journal.pone.0102972.
5. Bourne RR, Jonas JB, Flaxman SR, et al.: Prevalence and causes of vision loss in high-income countries and in Eastern and Central Europe: 1990-2010. Br J Ophthalmol. 2014, 98:629-38. doi: 10.1136/bjophthalmol-2013-304033.

6. Hussain S, Qamar MR, Iqbal MA, Ahmad A, Ullah E.: Risk factors of retinopathy in type 2 diabetes mellitus at a tertiary care hospital, Bahawalpur Pakistan. 2013 Apr;29(2):536.. Pakistan journal of medical sciences.. 2013, 29:536. doi: 10.12669/pjms.292.3066
7. Kiire CA, Horak K, Lee KE, Klein BE, Klein R: The period effect in the prevalence of proliferative diabetic retinopathy, gross proteinuria, and peripheral neuropathy in type 1 diabetes: A longitudinal cohort study. PLoS One. 2017, 12:0174979. doi: 10.1371/journal.pone.0174979.
8. Bansal P, Gupta RP, Kotecha M: Frequency of diabetic retinopathy in patients with diabetes mellitus and its correlation with duration of diabetes mellitus. Medical Journal of Dr DY Patil University. 2013, 6:366. DOI: 10.4103/0975-2870.118267
9. Rodriguez-Poncelas A, Miravet-Jiménez S, Casellas A, Barrot-De La Puente JF, Franch-Nadal J, López-Simarro F.: Prevalence of diabetic retinopathy in individuals with type 2 diabetes who had recorded diabetic retinopathy from retinal photographs in Catalonia (Spain). Br J Ophthalmol. 2015, 99:1628-33. doi: 10.1136/bjophthalmol-2015-306683.
10. Thomas RL, Dunstan F, Luzio SD, et al.: Incidence of diabetic retinopathy in people with type 2 diabetes mellitus attending the Diabetic Retinopathy Screening Service for Wales: retrospective analysis. BMJ. 2012 344, doi: 10.1136/bmj.e874
11. Estacio RO, Jeffers BW, Gifford N, Schrier RW: Effect of blood pressure control on diabetic microvascular complications in patients with hypertension and type 2 diabetes. Diabetes Care. 2000, 23:54-64.
12. Kayani H, Rehan N, Ullah N: Frequency of retinopathy among diabetics admitted in a teaching hospital of Lahore. J Ayub Med Coll Abbottabad. 2003, 15:53-6.
13. Nisar S, Masud FN: Frequency of retinopathy in type II diabetic patients with or without microalbuminuria. Pakistan Journal of Medical and Health Sciences. 2010, 4:
14. Vijan S, Hofer TP, Hayward RA: Cost-utility analysis of screening intervals for diabetic retinopathy in patients with type 2 diabetes mellitus. JAMA. 2000, 283:889-96. DOI: 10.1001/jama.283.7.889
15. Din J-u, Qureshi MB, Khan AJ, Khan MD, Ahmed K: Prevalence of diabetic retinopathy among individuals screened positive for diabetes in five community based eye camps in northern Karachi Pakistan. J Ayub Med Coll Abbottabad. 2006, 18:40.
16. Cai X, McGinnis JF: Diabetic retinopathy: animal models, therapies, and perspectives. Journal of diabetes research. 2016 2016, https://doi.org/10.1155/2016/3789217
17. Boretsky A, Gupta P, Tirgan N, et al.: Nicotine accelerates diabetes-induced retinal changes. Current eye research. 2015 Apr, 3:368-77. doi: 10.3109/02713683.2014.924147.
18. Romero-Aroca P, Baget-Bernaldiz M, Pareja-Rios A, Lopez-Galvez M, Navarro-Gil R, Verges R: Diabetic macular edema pathophysiology: vasogenic versus inflammatory. Journal of diabetes research. 2016 2016, DOI: 10.1155/2016/2156273
19. Lima VC, Cavalieri GC, Lima MC, Nazario NO, Lima GC: Risk factors for diabetic retinopathy: a case-control study. International journal of retina and vitreous. 2016 Dec, 2:21.
20. Corcóstegui B, Durán S, González-Albarrán MO, et al.: Update on diagnosis and treatment of diabetic retinopathy: a consensus guideline of the Working Group of Ocular Health (Spanish Society of. Diabetes and Spanish Vitreous and Retina Society). Journal of ophthalmology. 2017 2017, doi: 10.1155/2017/8234186
21. Duh EJ, Sun JK, Stitt AW: Diabetic retinopathy: current understanding, mechanisms, and treatment strategies. JCI insight. 2017 Jul 20, 2:doi: 10.1172/jci.insight.93751.
22. Whiting DR , Guariguata L , Weil C , et al IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res Clin Pract 2011;94:311–21.doi:10.1016/j.diabres.2011.10.029.
23. Whiting DR , Guariguata L , Weil C , et al IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res Clin Pract 2011;94:311–21.doi:10.1016/j.diabres.2011.10.029