

ROLE OF GLYCEMIC CONTROL IN DEVELOPMENT OF DIABETIC RETINOPATHY

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ABSTRACT

Background; Diabetic retinopathy (DR) is a common microvascular complication of diabetes mellitus (DM) and is considered the leading cause of visual impairment in working-aged adults worldwide. The duration of DM and hyperglycemia have been associated with DR, so this study was done to ascertain role of glycemic control in the development of diabetic retinopathy. **Objective;** To compare the frequency of DR in in type II diabetes having controlled and un-controlled diabetes. **Subjects and Methods;** A total of 175 type 2 diabetic patients presenting in Diabetes OPD aged 35 – 65 years were selected in this cross-sectional study from Diabetes outdoor clinic of Nishtar Hospital Multan. Patients underwent any form of retinal surgery / laser therapy, on ACE-inhibitors or ARBs, having cataract were excluded from our study. All patients had undergone retinal imaging using Non Mydriatic Fundus Camera (NIDEK® Model # AFC-330) and collected data was analyzed by SPSS version 22. **Results;** Of these 178 study cases, 73 (41.0 %) were male patients while 105 (59.0 %) were female patients. Mean age of our study cases was 50.39 ± 8.25 years. Mean age of the male patients was noted to be 57.36 ± 5.25 years while that female patients was 45.54 ± 6.24 years ($p=0.000$). Mean body mass index of our study cases was 26.12 ± 1.85 kg/m² and obesity was present in 45 (25.3 %) of our study cases. Mean disease duration was 6.23 ± 3.28 years and 92 (51.7%) had duration of illness more than 5 years. Of these 178 study cases, 112 (62.9%) were illiterate and 66 (37.1%) were literate. Diabetes was controlled in 79 (44.4%) while it was un-controlled in 99 (55.6%) of our study cases. Diabetic Retinopathy was noted in 69 (38.8%) of our study cases. Diabetic retinopathy was 22.8% patients with controlled diabetes and 51.5% in patients with un – controlled diabetes. **Conclusion;** Very high frequency of diabetic retinopathy was noted in our study among diabetic patients having un-controlled diabetes as compared with those having controlled diabetes. Diabetic retinopathy was significantly associated with control of diabetes, residential status and prolonged disease duration. National health authorities must launch a mega awareness campaign at national level for awareness of diabetic patients leading to good glycemic control which will protect them from future hardships.

Keywords; Diabetic retinopathy, controlled diabetes, frequency.

INTRODUCTION;

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both¹. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially eyes; kidneys, nerves, heart, and blood vessels.² There are three main types of diabetes mellitus (DM): Type I, Type II and gestational diabetes.²⁻⁴ The multisystem complications of diabetes such as retinopathy, nephropathy, neuropathy and cardiovascular diseases are considered important, impinging on public health.³ Diabetic nephropathy (DN) and diabetic retinopathy (DR) are arguably the two most dreaded complications of diabetes. Together they contribute to serious morbidity and mortality. As they progress to end-stage renal disease (ESRD) and blindness, they impose enormous medical, economic, and social costs on both the patient and the health care system. Because nephropathy and retinopathy are frequently linked in patients.^{3,4} Diabetic retinopathy, which is a common complication in diabetes, is characterized by retinal vascular leakage, inflammation and abnormal neovascularization^{5,6}.

DR is recognized as a leading cause of blindness and visual impairment in working-age adults in developed and developing countries. The World Health Organization (WHO) lists DR as a priority disease in their “VISION 2020” program initiative for the global elimination of avoidable blindness. Potential risk factors of DR include age, duration of diabetes, glycemic level, blood pressure, pregnancy and nephropathy.⁷⁻⁹ Based on the levels of Glycosylated Haemoglobin (HbA1c) in the blood, American Diabetic Association has classified Type-2 Diabetes Mellitus patients as uncontrolled group of diabetic patients whose HbA1c level is maintained more than 7% and as controlled group of diabetic patients whose HbA1c level is maintained less than or equal to 7%^{10,11}.

The risk of retinopathy is directly related to the control and duration of diabetes as shown by the Wisconsin Epidemiology Study of Diabetic Retinopathy (WESDR)^{12,13}. Similarly a study conducted by Al – Amer et al¹⁴ demonstrated 12.9 % diabetic retinopathy in patients with controlled diabetes and 40.3 % patients with uncontrolled diabetes had DR. Although other risk factors are also known, their objective influence on the development of diabetic retinopathy are not well studied. The identification of risk factors associated with diabetic retinopathy is essential if preventive measures are to be adopted and it is important for the development of better management strategies for diabetic retinopathy¹⁵.

Diabetic retinopathy has a significant impact on productivity and efficiency as it affects functional status of the main work force of the society. So this study was done to ascertain role of glycemic control in our population regarding diabetic retinopathy.

MATERIALS AND METHODS:

A total of 175 type 2 diabetic patients presenting in Diabetes OPD aged 35 – 65 years were selected in this cross-sectional study from Diabetes outdoor clinic of Nishtar Hospital Multan. **Controlled Diabetes;** Patients with HbA1c less than 7 % while **Un – controlled Diabetes;** Patients with HbA1c more than 7 %. Patients underwent any form of retinal surgery / laser therapy, on ACE-inhibitors or ARBs, having cataract were excluded from our study.

All patients had undergone retinal imaging using Non Mydriatic Fundus Camera (NIDEK® Model # AFC-330). All retinal images were interpreted and reported by consultant ophthalmologist (with at least experience of 5 years). Collected Data was entered into SPSS version 22 and was analyzed through its statistical package. Descriptive statistics was used to analyze the data. Mean \pm S.D. was calculated for age of the patients and HbA1c values. Frequencies and percentages were calculated for qualitative variables like gender, DR, grades of diabetic retinopathy, obesity, control of diabetes (Controlled/Uncontrolled). Frequency of DR will be compared in patients having controlled and uncontrolled diabetes by applying chi-square test at level of significance of 0.05.

RESULTS;

Our study comprised of a total of 178 patients meeting inclusion criteria of our study. Of these 178 study cases, 73 (41.0 %) were male patients while 105 (59.0 %) were female patients. Mean age of our study cases was 50.39 ± 8.25 years (with minimum age of our study cases was 35 years while maximum age was 65 years). Mean age of the male patients was noted to be 57.36 ± 5.25 years while that female patients was 45.54 ± 6.24 years ($p=0.000$). Our study results have indicated that majority of our study cases i.e. 99 (55.6 %) were aged more than 50 years. Of these 178 study cases, 47 (26.4 %) belonged to rural areas and 131 (73.6 %) belonged to urban areas. Monthly family income up to Rs. 35000 was noted in 97 (54.4%) and 81 (45.5%) had monthly family income more than Rs. 35000. Mean body mass index of our study cases was 26.12 ± 1.85 kg/m² and obesity was present in 45 (25.3 %) of our study cases. Mean disease duration was 6.23 ± 3.28 years and 92 (51.7%) had duration of illness more than 5 years. Of these 178 study cases, 112 (62.9%) were illiterate and 66 (37.1%) were literate. Mean HbA1c level was 7.53 ± 1.61 %. Diabetes was controlled in 79 (44.4%) while it was un-controlled in 99 (55.6%) of our study cases. Diabetic Retinopathy was noted in 69 (38.8%) of our study cases. Grade III diabetic retinopathy was noted in 40 (58%) and grade IV diabetic retinopathy was noted in 29 (42%) of our study cases. Diabetic retinopathy was 22.8% patients with controlled diabetes and 51.5% in patients with un – controlled diabetes.

Table No. 1 Cross-tabulation of diabetic retinopathy with regards control of diabetes.

Control of diabetes	Diabetic Retinopathy		P – value
	Yes (n=69)	No (n=109)	
Controlled (n=79)	18 (22.8%)	61 (77.2%)	0.000
Un - controlled (n=99)	51 (51.5%)	48 (48.5%)	
Total	178		

DISCUSSION;

Diabetic retinopathy (DR) is a common microvascular complication of diabetes mellitus and is considered the leading cause of visual impairment in adult people of working age in developed countries. DR currently affects almost 100 million people worldwide and is becoming an ever-increasing health burden, with estimates between 1990 and 2010 showing that DR-related visual impairment and blindness increased by 64% and 27%, respectively¹⁶.

Our study comprised of a total of 178 patients meeting inclusion criteria of our study. Of these 178 study cases, 73 (41.0 %) were male patients while 105 (59.0 %) were female patients. A study conducted by Naheed et al¹⁷ has also reported 64 % female gender preponderance among diabetic patients which is in compliance with our study results. Nisar et al¹⁸ from Lahore also reported 57 % female gender preponderance which is in compliance with our study results. Khan et al¹⁹ from Peshawar also reported 61 % female gender predominance which is close to our study results. Jawed et al²⁰ from Karachi also documented 69.5% female gender predominance in female patients which is in compliance with our study results.

Mean age of our study cases was 50.39 ± 8.25 years (with minimum age of our study cases was 35 years while maximum age was 65 years). Mean age of the male patients was noted to be 57.36 ± 5.25 years while that female patients was 45.54 ± 6.24 years ($p=0.000$). Our study results have indicated that majority of our study cases i.e. 99 (55.6 %) were aged more than 50 years. A study conducted by Naheed et al¹⁷ has also reported 56.1 ± 9.38 years mean age which is close to that of our study results. Khan et al¹⁹ from Peshawar also reported 45 ± 7.45 years mean age of the diabetic patients which is similar to our study results. Jawed et al²⁰ from Karachi also documented similar findings.

Of these 178 study cases, 47 (26.4 %) belonged to rural areas and 131 (73.6 %) belonged to urban areas. Monthly family income up to Rs. 35000 was noted in 97 (54.4%) and 81 (45.5%) had monthly family income more than Rs. 35000. Mean body mass index of our study cases was 26.12 ± 1.85 kg/m² and obesity was present in 45 (25.3 %) of our study cases. A study conducted by Basit et al²¹ from Karachi documented 66% obesity in diabetic patients which is quite higher than that being reported in our study.

Mean disease duration was 6.23 ± 3.28 years and 92 (51.7%) had duration of illness more than 5 years. A study conducted by Naheed et al¹⁷ has also reported similar results.

Of these 178 study cases, 112 (62.9%) were illiterate and 66 (37.1%) were literate. Diabetes was controlled in 79 (44.4%) while it was un-controlled in 99 (55.6%) of our study cases. Diabetic Retinopathy was noted in 69 (38.8%) of our study cases. Grade III diabetic retinopathy was noted in 40 (58%) and grade IV diabetic retinopathy was noted in 29 (42%) of our study cases. Diabetic retinopathy was 22.8% patients with controlled diabetes and 51.5% in patients with un – controlled diabetes. A study conducted by Al – Amer et al¹⁴ demonstrated 12.9 % diabetic retinopathy in patients with controlled diabetes and 40.3 % patients with uncontrolled diabetes had DR. These results are close to our study results.

CONCLUSION;

Very high frequency of diabetic retinopathy was noted in our study among diabetic patients having un-controlled diabetes as compared with those having controlled diabetes. Diabetic retinopathy was significantly associated with control of diabetes, residential status and prolonged disease duration. National health authorities must launch a mega awareness campaign at national level for awareness of diabetic patients leading to good glycemic control which will protect them from future hardships.

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