Barha Rafiq Chaudhry
Bahawal Victoria Hospital Bahawalpur
Ex house officer
barha123@hotmail.com

Ali Raza Balouch
Bahawal Victoria Hospital Bahawalpur
Ex house officer
alibalouch1995@gmail.com

Muhammad Jawad Hassan
Bahawal Victoria Hospital Bahawalpur
House officer
jawadhassan857@gmail.com

ASSOCIATION OF DIABETIC RETINOPATHY WITH INCREASED BLOOD LEVEL OF HbA$_{1c}$

Abstract: *Objective:* *To determine frequency of diabetic retinopathy associated with high level of glycosylated hemoglobin HbA$_{1c}$ in blood.*

Design & duration: *This is a cross sectional study of observational type completed in eight months duration.*

Setting: *Study was conducted at ophthalmology department of Bahawal Victoria Hospital Bahawalpur.*

Patients & methods: *Diabetic patients presenting to out-patient door of ophthalmology department of study hospital were selected via non probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator. Retinal examination was done in all patients. Those having retinopathy in study group were put into separate group. Blood level of HbA$_{1c}$ was tested in all cases of study group. Frequency of proliferative and non-proliferative diabetic retinopathy was determined. Consent was taken from all cases in study group and from ethical committee of the study institution as well. Chi square test was applied. P-value less than 0.05 was taken significant.*

Results: *Total 180 diabetic patients were studied out of them 58.3% were male and 41.7% were female. Mean age of patients was 51±11.3 years. Mean HbA$_{1c}$ level was 8.3±1.6. Proliferative retinopathy was observed in 36.2% and non-proliferative retinopathy was seen in 63.8% out of total 47 cases with retinopathy.*

Conclusion: *Diabetic retinopathy is associated with high blood level of glycosylated hemoglobin and non-proliferative retinopathy is more common than proliferative retinopathy.*

Key words: *Diabetes, Retinopathy, Glycosylated hemoglobin.*

Language: *English*

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Introduction

Diabetes mellitus is a most common metabolic disease affecting every organ system of the body and having high prevalence in our population putting huge burden on healthcare system.[1] It is a hidden chronic disease which becomes obvious via polyurea, polydipsia and peripheral numbness.[2,3] In type-2 diabetes cells become unresponsive to insulin hence creating resistance against insulin and in the result blood glycemic level is increased. This leads to long

term complications like neuropathy, retinopathy and microvascular disease etc. Out of them diabetic retinopathy is a common complication leading to blindness ultimately.[4,5] According to a report 30% of diabetics develop retinopathy and 2% of them develop blindness if not treated well. There are two types of retinopathy, proliferative and non-proliferative retinopathy. In proliferative retinopathy microaneurysms are formed.[6,7] While in non-proliferative type there is tendency to develop intra retinal hemorrhages with advancing disease. According to American diabetic association glycosylated hemoglobin is a gold standard investigation to diagnose patients with diabetes mellitus.[8]

PATIENTS AND METHODS

It is a cross sectional study of observational type. Study was started in October 2019 and completed after eight months in May 2020. It was conducted in ophthalmology department of Bahawal Victoria Hospital Bahawalpur. Inclusion and exclusion criteria were defined for selection of cases. Patients having co-morbid conditions, already having any other disease of eye or HbA_{1c} level less than 6.5% were excl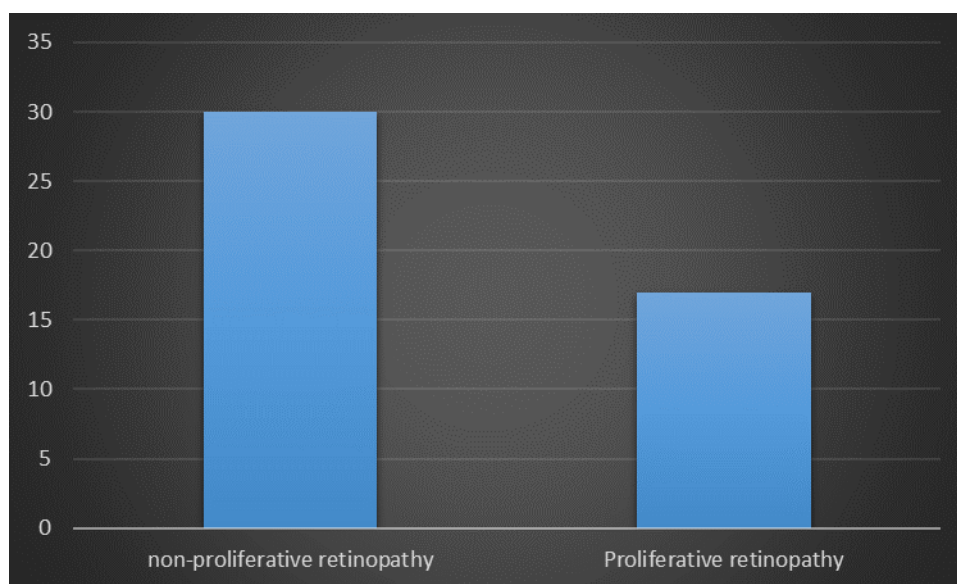uded from the study. Diabetic patients presenting to out-patient door of ophthalmology department of study hospital were selected via non probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator. Retinal examination was done in all patients. Those having retinopathy in study group were put into separate group. Blood level of HbA_{1c} was tested in all cases of study group. Frequency of proliferative and non-proliferative diabetic retinopathy was determined. Consent was taken from all cases in study group and from ethical committee of the study institution as well. Chi square test was applied. P-value less than 0.05 was taken significant. Data was analyzed using SPSS software version 21.

RESULTS

Total 180 diabetic patients were studied out of them 105(58.3%) were male and 75(41.7%) were female. Mean age of patients was 51±11.3 years. Mean HbA_{1c} level was 8.3±1.6. Proliferative retinopathy was observed in 17(36.2%) and non-proliferative retinopathy was seen in 30(63.8%) out of total 47 cases with retinopathy. There were 13(72%) cases with age <20 years, 25(13.9%) cases between 21-30 years, 74(41.1%) between 31-40 years and 68(37.8%) between 41-50 years of age.

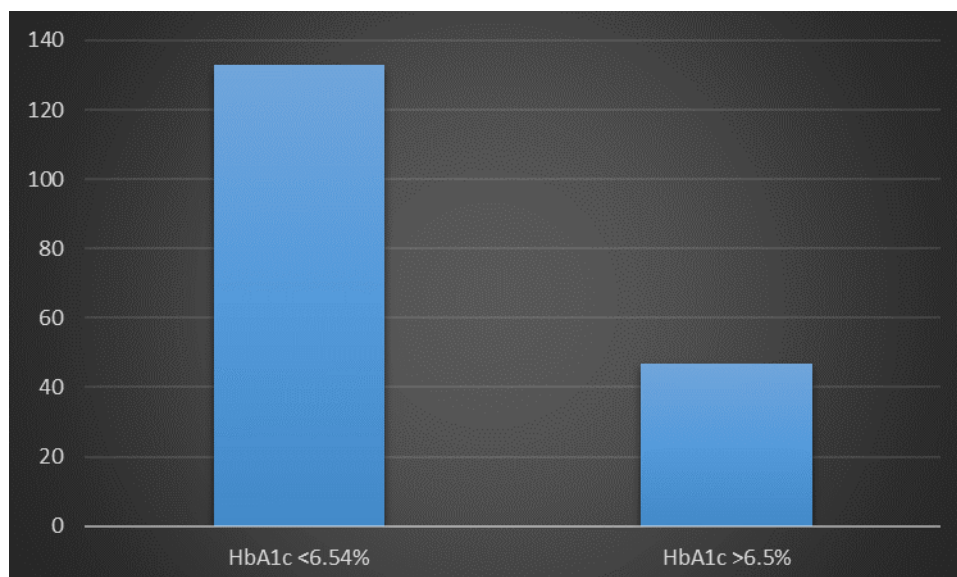**(Table-1) Frequency of diabetic retinopathy in various age groups**

Age (years)	Number of patients (N)	Diabetic retinopathy	
		Yes	NO
<20	13 (7.2%)	3 (23.1%)	10 (76.9%)
21-30	25 (13.9%)	6 (24%)	19 (76%)
31-40	74 (41.1%)	20 (27%)	54 (73%)
41-50	68 (37.8%)	18 (26.5%)	50 (73.5%)

(Figure-1) Frequency of proliferative and non-proliferative diabetic retinopathy

(Figure-2) Frequency of patients having serum level of HbA$_{1c}$ more or less than 6.5%

DISCUSSION

Diabetes mellitus is a most common metabolic disease which affects almost every system of the body and have many complications with high morbidity and mortality rate.[9-11] Type-2 diabetes is more common than type-1. In type-2 diabetes mellitus insulin resistance develops in the patient leading to high blood level of HbA$_{1c}$. Hyperglycemia leads to retinopathy, most common complication of diabetes.[12,13] Retinopathy if untreated can lead to permanent blindness. Previous literature reported that prevalence of diabetes mellitus among people older than 20 years were around 171 million all over the world, that is much high number. Diabetes mellitus is a most common metabolic disease affecting every organ system of the body and having high prevalence in our population putting huge burden on healthcare system.[14] It is a hidden chronic disease which becomes obvious via polyurea, polydipsia and peripheral numbness. In type-2 diabetes cells become unresponsive to insulin hence creating resistance against insulin and in the result blood glycemic level is increased.[15] It leads to long term complications like neuropathy, retinopathy and microvascular disease etc. Out of them diabetic retinopathy is a common complication leading to blindness ultimately.[16,17] Total 180 diabetic patients were studied out of them 105(58.3%) were male and 75(41.7%) were female. Mean age of patients was 51±11.3 years. Mean HbA$_{1c}$ level was 8.3±1.6. Proliferative retinopathy was observed in 17(36.2%) and non-proliferative retinopathy was seen in 30(63.8%) out of total 47 cases with retinopathy. It is a cross sectional study of observational type. Study was started in October 2019 and completed after eight months in May 2020. It was conducted in ophthalmology department of Bahawal Victoria Hospital Bahawalpur. Inclusion and exclusion criteria were defined for selection of cases. Patients having co-morbid conditions, already having any other disease of eye or HbA$_{1c}$ level less than 6.5% were excluded from the study. Diabetic patients presenting to out-patient door of ophthalmology department of study hospital were selected via non probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator. Retinal examination was done in all patients. Hasan et al didi similar study on 159 patients and concluded that those having HbA$_{1c}$ >8% were having more complications than those having HbA$_{1c}$ <8%.[18]

CONCLUSION

Retinopathy is a very common complication of diabetes mellitus leading to blindness. Diabetic retinopathy is associated with high blood level of glycosylated hemoglobin and non-proliferative retinopathy is more common than proliferative retinopathy. Early detection of retinopathy and good glycemic control can reduce this complication and blindness can be prevented.

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