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Study of Correlation of Hba1c And Blood Pressure In Sight Threatening Diabetic Retinopathy

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***Abstract**: Diabetic retinopathy is the most common cause of vision loss among people with diabetes and the leading cause of vision impairment and blindness among working age adults.Maintenance of HbA1c levels as close as possible to the near normal range results in considerable reduction in long-term complications of diabetes. Elevated Blood pressure was also found to be a risk factor for worsening diabetic retinopathy. So this study is conducted to correlate Hba1c levels and blood pressure with sight threatening diabetic retinopathy.*
***Materials And Methods:** A total of 300 type 2 diabetes mellitus patients aged more than 40 years with evidence of diabetic retinopathy were selected for the study. The diabetic changes observed through fundus examination were classified based on ETDRS classification and later categorized into Sight threatening diabetic retinopathy (STDR) and Non -STDR.It was then correlated with their Hba1c levels and blood pressure. Statistical analysis was done using Chisquare test, Karl Pearsons correlation and Logistic regression analysis.*
***Results:** On statistical analysis ,there was significant difference in the values of HbA1c and other risk factors like RBS and duration of diabetes among STDR and non-STDR group with a p value<0.05.And out of these three,Hba1c was found to be most significant variable. Other variables studied like age, blood pressure were found to be less significant in this study.*
***Conclusion:** Hba1c along with other risk factors like duration and RBS levels were showing statistically significant difference among STDR and NON-STDR group of patients out of which Hba1c was most significant.*
***Keywords**: HbA1c , NPDR, PDR,RBS, STDR*

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I. Introduction

The onset of uncontrolled hyperglycemia causes various microvascular complications such as damage of retina, nephron, neuron and cardiovascular tissues due to complex and multifunctional metabolic changes.[1] Diabetic retinopathy (DR) is the leading cause of blindness among working aged adults around the world[2]. It has been reported that improved glycemic control can reduce the development and progression of diseases and its complications. Hence screening for an early diagnosis of type 2 diabetes is of paramount importance.[3,4] The measurement of glycosylated hemoglobin (GHb) is one of the well established means of monitoring glycemic control in patients with diabetes mellitus. HbA1c reflects average plasma glucose over the previous eight to 12 weeks.[5] It was studied that HbA1c>8% would give maximum yield of sight-threatening retinopathies.[6] It was also studied that high systolic or diastolic BP increased the risk of DR, whereas antihypertensive treatment halved the risk of DR versus no treatment .[7] The present study is done for correlating Hba1c levels and blood pressure with sight threatening diabetic retinopathy.

II. Materials And Methods

A total of 300 type 2 diabetes mellitus patients aged more than 40 years with evidence of diabetic retinopathy were selected for the study from January 1st 2016 to December 30th 2016. Detailed diabetic history was taken and ocular examination including fundus examination was done. The diabetic changes observed were classified based on ETDRS classification and later categorized into Sight threatening diabetic retinopathy (STDR) and Non sight threatening diabetic retinopathy .These patients were then evaluated for their HbA1C levels, random blood sugar levels and blood pressure and it was then correlated with their diabetic retinopathy changes . Statistical analysis was done using Chisquare test, Karl Pearsons correlation and Logistic regression analysis

III. Results

Table Number 1 - Stratification of study population into STDR and Non-STDR groups

Groups	Retinopathy	Patient no:	Total patients
	Mild NPDR	105(35%)	183 (61%)
Non STDR	Moderate NPDR	78(26%)	
	Maculopathy/Macular edema	63(21%)	
	Severe	48(16%)	
STDR	Proliferative	6 (2%)	117 (39%)

As per this table, out of the total 300 patients studied,61% belongs to Non-STDR group out of which 35% were having mild NPDR and 26% were having moderate NPDR. 39% belongs to STDR group out of which 21% had moderate NPDR with either maculopathy or macular edema, 16% had severe NPDR and 2% had PDR.

table number 2- Difference between STDR and Non-STDR Groups

PARAMETERS	NON STDR GROUP (183)	STDR GROUP (117	t VALUE	p VALUI
DEMOGRAPHIC DATA				
Age (Years)	61.97 ± 10.41	58.31 ± 8.88	1.8133	0.0729
Duration of Diabetes mellitus (Years)	11.28 ± 4.99	13.36 ± 4.46	2.1174	0.0368*
CLINICAL DATA				
Systolic Blood Pressure	134.03 ± 18.53	133.69 ± 17.55	0.0913	0.9274
Diastolic Blood Pressure	83.15 ± 12.55	86.10 ± 12.44	1.1504	0.2528
BIOCHEMICAL DATA				
HbA1C	7.87 ± 1.81	10.66 ± 2.03	7.1685	<0.0001*
	181.65 ± 86.83	238.87 ± 86.24	3.2227	0.0017*

The abovementioned table shows the difference in parameters(Age,Duration of Diabetes, Systolic and diastolic BP,HbA1c,RBS) between STDR and Non STDR groups. It is observed that duration of diabetes ,HbA1c levels and RBS were significantly higher in STDR group compared to Non STDR group.

table number 3- Logistic Regression of selected variables against diabetic retinopathy

VARIABLES	ODDS RATIO	95% CONFIDENCE INTERVAL		p VALUE
		LOWER LIMIT	UPPER LIMIT	
DURATION OF DIABETES	0.933	0.832	1.046	0.233
HbA1C	1.908	1.43	2.545	<0.0001*
RANDOM BLOOD SUGAR	1.001	0.995	1.007	0.764

As per the above mentioned table, the three parameters i.e Duration of diabetes , HbA1c,RBS, which were found to be significantly high in STDR group of patients were again compared based on logistic regression and it was observed that HbA1c was the most significant factor with a p value <0.0001

table number 4- Correlation between diabetic retinopathy and Hba1c

PEARSON CORRELATION BETWEEN STDR & NON STDR WITH HbA1C	CORRELATION COEFFICIENT	p VALUE
	0.585612	**<0.00001***

This table shows Pearson correlation between STDR and Non STDR with HbA1c which was again found to be significantly different with a p value <0.00001 and a correlation coefficient of 0.585612

IV. Discussion

This was a cross- sectional study comprising of 300 patients with type-2 diabetes mellitus detected to have atleast minimal changes of diabetic retinopathy. It was graded into mild NPDR, moderate NPDR, severe NPDR and PDR according to ETDRS classification. It was then broadly divided into Non-sight threatening diabetic retinopathy and sight threatening diabetic retinopathy and correlated with their HbA1c levels and other parameters like BP, age and duration of diabetes.35% of patients were found to have mild NPDR, 47% of

patients had moderate NPDR out of which 9% had associated diabetic maculopathy and 12% had clinically significant macular edema,16% of the patients had severe NPDR and 2% had proliferative DR. Overall 39% of the patients had sight threatening diabetic retinopathy. In a study conducted by Joanne et al[8] to examine the global prevalence and major risk factors for diabetic retinopathy (DR) and vision-threatening diabetic retinopathy (VTDR) among people with diabetes, the overall prevalence was 34.6% for any DR, 6.96% for proliferative DR, 6.81% for diabetic macular edema, and 10.2% for VTDR.

The patients included in our study were having atleast minimal changes of diabetic retinopathy. It suggests that there had been considerable time between the onset of disease and its clinical presentation. The patients with sight threatening diabetic retinopathy was found to have comparatively high HbA1c levels with a mean value of 10.66 ± 2.03 as compared to 7.87 ± 1.81 in non STDR group. These results were in agreement with the prospective study conducted by Stratton et al[9]in that the patients with progressive changes of retinopathy were found to have high Hba1c levels. This was also in accordance with a population based study conducted in Chennai by Rajiv Raman etal.,which concluded that subjects with diabetes with HbA1c>8% would give maximum yield of sight-threatening retinopathies.

Our study did not show significant difference in blood pressure between STDR group and Non-STDR group with an average of systolic BP 134.03 ± 18.53 in Non STDR group and 133.69 ± 17.55 in STDR group and a diastolic BP of 83.15 ± 12.55 in Non STDR group and 86.10 ± 12.44 in STDR group. This may be explained by the fact that 48% of the patients selected for the study were hypertensives also along with history of diabetes and out of them 47% were on regular medications for the same. In our study ,the mean duration of diabetes in Non-STDR group was 11.28 ± 4.99 and that in STDR group was 13.36 ± 4.46 . And the p value was found to be 0.0368 which was significant. It was consistent with the study conducted by Niaziet al[10] and Chaudhary[11] who reported that only the longer duration of diabetes mellitus was proved to be an independent risk factor for both type and progression of diabetic retinopathy.

V. Conclusion

HbA1c level was found to be the most significant factor in the correlation of severity of diabetic retinopathy in this study .So it has again proved that HbA1c is a good marker to monitor the glycemic control in diabetic patients and it was found to be significantly correlated with sight threatening diabetic retinopathy. Hence diabetic patients should be given awareness regarding this test as well as the need for having good control of HbA1c levels as it was observed that many patients were not willing initially to undergo this test due to lack of awareness among them. It should be recommended that all diabetic patients should be evaluated for their HbA1c levels on routine basis to assess their glycemic control and for modification of treatment if it is not under control for avoiding complications like sight threatening diabetic retinopathy.

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