



ASSOCIATION OF HbA1C WITH GRADES OF RETINOPATHY.

Ophthalmology

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ABSTRACT

Chronic hyperglycemia is associated with long-term microvascular complications manifested as retinopathy, nephropathy and neuropathy. Disease duration and level of glycemic control are amongst the important causative factors which donated to the development of diabetic retinopathy in type 2 DM patients which is the most common major microvascular complications and results in blindness mostly. The present observational study was conducted in District Hospital Reasi (JKUT) over a period of 01 year with the aim to determine the association of HbA1C with grades of retinopathy. A total of 100 patients were screened. The data was collected and recorded in Microsoft Excel sheet. The data was analysed with SPSS version 22.0. In our study it was reported that the mean age of the study patients was 49.21 ± 8.67 years and the mean duration of diabetes mellitus was 10.51 ± 6.98 years. There was significant association between HbA1C and grades of retinopathy ($P < 0.05$). The present study concluded that the HbA1C is directly associated with the progression of diabetic retinopathy. Thus, the continuous monitoring of HbA1C is the best preventive and diagnostic measures to rule out the complications of diabetes mellitus.

KEYWORDS

Diabetes, Retinopathy, Disability, HbA1C and Blood glucose.

INTRODUCTION

Type 2 diabetes mellitus is a common metabolic disorder globally. It is estimated that about 1.5 million people are affected with diabetes.^{1,2} It is caused by abnormal insulin secretion, or due to insulin action there is an abnormal hyperglycaemic index.³

Diabetes is known as silent killer, which can start from early stages of life and can be asymptomatic.⁴ It was reported that the severity of manifestations of diabetes are significantly related with the type and duration of diabetes.⁵

Chronic hyperglycemia is associated with long-term micro vascular complications manifested as retinopathy, nephropathy and neuropathy. Disease duration and level of glycemic control are amongst the important causative factors which donated to the development of diabetic retinopathy in type 2 DM patients which is the most common major microvascular complications and results in blindness mostly. The literature is stating that the retinal complications are increasing nowadays. There was a rapid increase in retinopathy up to 97% after 15-20 years of the disease.^{6,7}

Various studies showing that the continuous monitoring is helpful in preventing the complications related to diabetes mellitus. HbA_{1c} is a potential single test that can be done in a non-fasting state which can measure the blood glucose levels over 3 months. It has been used for diagnosing the pre-diabetics and diabetic patients. A high level of HbA_{1c} has been seen to be closely associated with adverse outcomes of diabetes.⁸

Thus, the present study was undertaken to determine the association of HbA_{1c} with grades of retinopathy.

MATERIAL AND METHODS

The present observational study was conducted in District Hospital Reasi over a period of one year from June, 2022 to May, 2023 after taking the institutional permission. A total of 100 patients were involved in the study after obtaining the informed consent.

Inclusion Criteria

1. Patients aged between 40 to 60 years.
2. Patients willing to participate.
3. Patients with diabetic retinopathy.
4. Both genders.

Exclusion Criteria

1. The patients with other co-morbid illnesses (type 1 DM, cardiovascular diseases, etc.) were excluded.

A detailed history was collected. Complete ocular examination was done and Diabetic retinopathy was classified from grade 0 to grade 5 as

mild, moderate, Severe, Very severe NPDR and PDR. HbA_{1c} levels were classified in 3 grades as follow:

- Grade I: 5–8
- Grade II: 8–12
- Grade III: 12–15

The data was collected and recorded in Microsoft Excel sheet. The data was analysed with SPSS version 22.0.

OBSERVATION AND RESULTS

In our study it was reported that the mean age of the study patients was 49.21 ± 8.67 years and the mean duration of diabetes mellitus was 10.51 ± 6.98 years.

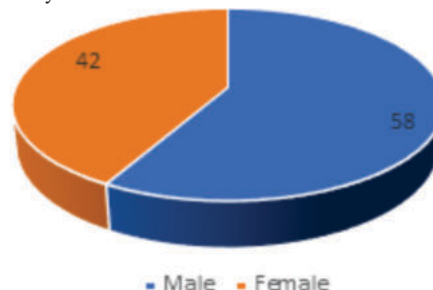


Figure 1. Gender distribution

It was reported that the majority of the subjects were males (58%) and 42% females as shown in figure 1.

Table 1: Grades of Diabetic retinopathy

Grades of DR	No.	%age
Mild NPDR	15	15
Moderate NPDR	17	17
Severe NPDR	20	20
Very severe NPDR	22	22
PDR	26	26

Table 1, depicted that the majority of the study subjects had PDR (26%) followed by very severe NPDR (22%), severe NPDR (20%), moderate NPDR (17%) and mild NPDR (15%).

Table 2: HbA_{1c} distribution

HbA _{1c} %	Number	Percentage
4	0	0
5	1	1
6	5	5
7	13	13
8	8	8
9	23	23

10	15	15
11	7	7
12	12	12
13	11	11
14	5	5

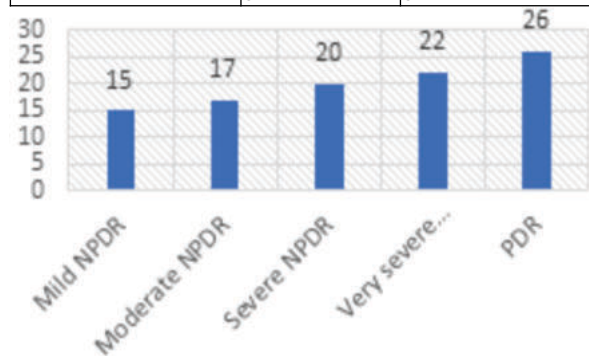


Fig.2 Grades of Diabetic Retinopathy

Table 2, presented that the HbA_{1c} %, majority of the patients had 9% score (23% patients), followed by 10% (15% patients), 7% (13% patients), 12% (12% patients), 13% (11% patients), 8% (8% patients), 11% (7% patients), 6%, 14% (5% patients each) and 5% (1% patient).

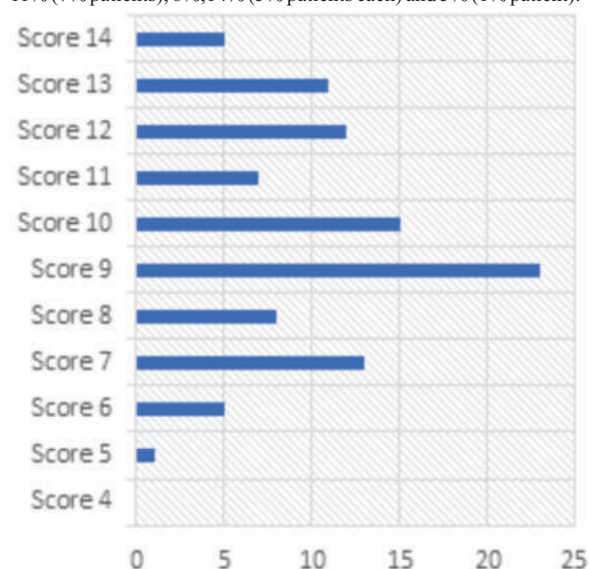


Fig.3: HbA_{1c} distribution

Table 3: Grades of DR vs HbA_{1c}

Grades of DR	No.	Mean±SD
Mild NPDR	15	6.801±1.171
Moderate NPDR	17	7.44±1.406
Severe NPDR	20	8.822±1.721
Very severe NPDR	22	10.243±1.245
PDR	26	12.356±2.198

Table 3, depicted the association of grades of diabetic retinopathy with HbA_{1c}. The most of the patients had PDR with mean HbA_{1c} 12.356±2.198%, followed by very severe NPDR with mean HbA_{1c} 10.243±1.245%, severe NPDR with mean HbA_{1c} 8.822±1.721%, moderate NPDR with mean HbA_{1c} 7.44±1.406% and mild NPDR with HbA_{1c} 6.801±1.171%. It shows that there was significant association between HbA_{1c} and grades of retinopathy (P<0.05).

DISCUSSION

The data was analysed and discussed with the previously available literature. In our study the mean age of the study patients was 49.21±8.67 years and the mean duration of diabetes mellitus was 10.51±6.98 years. The majority of the subjects were males (58%) and 42% females. The findings are correlated with the study conducted by Bukke SN et al., (2021) observed that the majority of patients were between 61-70 years of age, followed by 51 - 60 years of age and majority of the subjects were males (57%).⁹ In another study carried out by Uthman M et al., (2021) found that the mean age of the study

subjects was 50.55±5.17 years and the majority of the study subjects were males (56%) followed by 44% females.¹⁰

In our study the majority of the study subjects had PDR (26%) followed by very severe NPDR (22%), severe NPDR (20%), moderate NPDR (17%) and mild NPDR (15%). Majority of the patients had 9% score (23% patients), followed by 10% (15% patients), 7% (13% patients), 12% (12% patients), 13% (11% patients), 8% (8% patients), 11% (7% patients), 6%, 14% (5% patients each) and 5% (1% patient). These findings are consistent with the study performed by found that Uthman M et al., (2021) reported that mean HbA_{1c} was 7.1-11% (9.16±1.16), 37% had Non-Proliferative Diabetic Retinopathy (NPDR), 55% had Proliferative Retinopathy (PDR), mean HbA_{1c} was 7.2-9% (7.96±0.67); 7.1-11% (8.85±1.17); 7.6-11% (9.55±1.03), in all 3 groups i.e. No Retinopathy, Non-Proliferative Retinopathy & Proliferative Retinopathy respectively.¹⁰

It was observed that the most of the patients had PDR with mean HbA_{1c} 12.356±2.198%, followed by very severe NPDR with mean HbA_{1c} 10.243±1.245%, severe NPDR with mean HbA_{1c} 8.822±1.721%, moderate NPDR with mean HbA_{1c} 7.44±1.406% and mild NPDR with HbA_{1c} 6.801±1.171%. It shows that there was significant association between HbA_{1c} and grades of retinopathy (P<0.05). These outcomes are comparable with the study performed by Almutairi NM et al., (2021) found that 8.5% study subjects had mild non-proliferative diabetic retinopathy (NPDR), moderate (NPDR), and severe NPDR, and 1.5% had proliferative diabetic retinopathy (PDR). There was a significant association between the development of DR and HbA_{1c} levels (p = 0.040).¹¹ In another study performed by Uthman M et al., (2021) observed that there was significant association between grades of retinopathy with HbA_{1c}.¹⁰

CONCLUSION

It was concluded that the HbA_{1c} is directly associated with the progression of diabetic retinopathy. Thus, the continuous monitoring of HbA_{1c} is the best preventive and diagnostic measures to rule out the complications of diabetes mellitus.

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