Correlation between proliferative diabetic retinopathy in type 2 diabetes and hypertension, dyslipidemia, and diabetic nephropathy

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Abstract
Diabetics develop chronic, sight-threatening retinopathy. Retinal blood vessel injuries blind. To determine its clinical profile and link to hypertension, dyslipidemia, and nephropathy, all type 2 diabetics have their fundus tested for proliferative diabetic retinopathy. Cross-sectional. Karad's Krishna Hospital offers ophthalmology. 2019–2021. Our OPD requires pre-registration. Proliferative diabetic retinopathy patients also had hypertension, dyslipidemia, and nephropathy examined. Assessed. Proliferative diabetic retinopathy data evaluated hypertension, dyslipidemia, and diabetic nephropathy. 44 people were studied from December 2019–May 2021. Excel data Qualitative percentages were mean +/- SD. (min-max). Matches. Chi-square tests compared qualitative variables. An independent student t test evaluated quantitative data between groups when appropriate. Significant. Analyzed open epi 2.3.1 data. Non-compliant 56-year-olds 9.98. Noncompliance. 70% had abnormal cholesterol. PDR was 98% triglycerides. 66% HDL. Benefit less. HDL/LDL. 62% had hypertension. HTN lasted 5–6 years; PDR began sooner. Surveys should detect diabetes and lower risk factors. Diabetics need early retinopathy screening. Counseling non-adherents minimizes sickness.

Keywords: Fundus Diabetic Retinopathy, Hypertension, Dyslipidemia, Diabetic Nephropathy

Introduction
Diabetic retinopathy is a well-defined, sight-threatening, chronic ocular disease that eventually develops, to some degree, in almost all persons who have diabetes. This condition is characterized by a tendency to damage blood vessels in the retina, which can lead to vision loss. This issue stands out from others affecting the eyes since it is a persistent form of ocular disease. Areas of retinal nonperfusion, increased Vaso permeability, and the pathologic intraocular proliferation of retinal arteries are brought on by the gradual and progressive alterations in the retinal microvasculature that are characteristic of diabetic retinopathy. These changes are what cause Diabetic Retinopathy (Gardner TW et al.,2002)[1]. Epidemiological research conducted on patients with type 1 and type 2 diabetes mellitus (DM) as part of the Diabetes Control and Complications Trial (DCCT) and the Action to Control Cardiovascular Risk in Diabetes (ACCORD) Eye Study has revealed the importance of glycemic control in delaying or preventing the development of diabetic retinopathy (DR). These findings are relevant to the risk factors that have been identified for DR (Jeng CJ et al 2016)[2].It manifests itself as subtle

alterations in the capillaries of the retina. Microaneurysms, which are local disruptions of the retinal capillaries, are the first abnormalities that may be differentiated from one another. The microaneurysms that have been stretched out result in bleeding that occurs within the region. This results in the first stage of DR, which is usually known as mild non-proliferative diabetic retinopathy. This stage is characterized by the presence of small blood vessels in the retina. As a result of the eye fundus' susceptibility to certain vascular illnesses, fundus imaging is a technology that lends itself particularly well to noninvasive forms of screening. The outcome of the screening method is proportional to the quality and precision of the fundus image extraction method in conjunction with effective image processing methodologies, which are used to recognize abnormalities (Sisodia DS et al.,2017)[3]. The first case of diabetic retinopathy was discovered by (Kamarainen TK et al., 2007)[4] who used an ophthalmoscope as a screening tool to examine the retinas of both normal and diabetic patients. The results showed that the specificity was 97 percent, but the sensitivity was just 73 percent. The optic disc, the fovea, and the blood vessels were all present in the fundus images as they would normally be. Exudates and blotchy hemorrhages were two of the most notable abnormalities that were associated with diabetic retinopathy (Sisodia DS et al.,2017)[3]. In light of this, we have made the decision to investigate the clinical profile of proliferative diabetic retinopathy and its connection to hypertension, dyslipidemia, and diabetic nephropathy in all of the type 2 diabetic patients who participated in our study.

Aim

All type 2 diabetic patients were examined for fundus findings of proliferative diabetic retinopathy to study its clinical profile and connection with hypertension, dyslipidemia, and diabetic nephropathy.

Inclusion criteria

Excel processed the data. Quantitative data was mean +/- SD, whereas qualitative data was percentages and proportions (%). (min-max). Chi-square compared qualitative elements. The independent student t test examined quantitative variables between groups when applicable. 0.05 had statistical significance. Openepi 2.3.1 examined data.

Exclusion criteria

1. Patients with type 1 diabetes mellitus.
2. Patients with central corneal opacities and anyone else whose fundus exam is more difficult.
3. Those who have suffered previous eye trauma.
4. People who are completely out of it and in a coma.
5. People who aren't interested in taking part in the study.
6. People who have symptoms of retinal problems such as glaucoma in addition to dry eye or ARMD.

Material & method

This research used a cross-sectional design. This is Krishna Hospital in Karad, India, a tertiary care facility with an ophthalmology unit. Between December 2019 and May 2021, patients were registered. When patients visited the Ophthalmology Outpatient Clinic (OPD) at our institute for treatment, they were required to fill out a registration form. Ineligible participants were not included in the study when they were flagged during the registration process to investigate the

clinical importance of risk variables such as hypertension, dyslipidemia, and nephropathy in patients with proliferative diabetic retinopathy. Clinical findings, socioeconomic characteristics, and the results of any other examinations were all included in the data entered during registration. The obtained data was used to investigate the relationship between hypertension, dyslipidemia, and diabetic nephropathy in patients with proliferative diabetic retinopathy. Timeframe: December 2019–May 2021 The study has 44 participants.

Data collection

After explaining the research, participants gave written permission. Ophthalmologists studied patients who satisfied the inclusion criteria. Interviews using a standard questionnaire included clinical state, socioeconomic status, a family history of addiction, and more. Research examined how individuals reacted to medical history questions and sought medical care. A complete clinical assessment included a diagnosis and earlier investigations and surgeries.

Statistical analysis

Data gathering and compilation utilized Excel. Categorical (qualitative) data were given in percentages and proportions (%), whereas continuous (quantitative) outcomes were provided as Mean +/- SD (min-max). Results were presented similarly. The chi-square test compared qualitative variables. An independent student t test was used to compare quantitative factors between groups. For statistical significance, a p value of 0.05 was used. Data analysis was done using open epi 2.3.1.

Result

Age in years	Frequency	Percentage
≤30	16	3.82%
30-60	218	52.16%
>60	184	44.02%
Total	418	100%

Table 1: Age distribution in the study population is analyzed.

This cross-sectional study evaluated a total of 418 people with diabetes mellitus for diabetic retinopathy. There were 16 patients (3.82%) in the research population who were younger than 30 years old. The majority of patients, 218 (52.16%), were between the ages of 30 and 60. The majority of patients, 184 (44.02%), were in the 60+ age bracket. The average age was 56.56 $\pm$ 11.7 years old, with a range of 25 to 75 years old.

Age in years	Frequency	Percentage
≤30	16	3.82%
30-60	218	52.16%
>60	184	44.02%
Total	418	100%

Table 2: Examining the gender ratio of the sample population

This cross-sectional study evaluated a total of 418 people with diabetes mellitus for diabetic retinopathy. Out of the 418 patients, 200 were men, or 52.15 percent of the total, and the other 200 were women, or 47.84 percent.

vision	Frequency	Percentage
RE 6/36 LE 6/18	14	28%
RE 6/60 LE 6/36	11	22%
RE 6/6 LE 6/18	9	18%
RE 6/36 LE fc 1/2 m	8	16%
RE 6/24 LE 6/12	6	12%
BE 6/60	1	2%
BE FC 1 meters- NI	1	2%
Total	50	100%

Table 3: Evaluation of participants' levels of vision in the population under study.

The majority of patients in the study population, which consisted of 50 patients in total, had vision ranging from 6/18 to 6/36. This represented 28 percent of the total patient population. A visual acuity of 6/60 was reported by the majority of patients who were classified as having either a mild-to-moderate or high-risk form of PDR. Vision was significantly impaired in diabetic patients who had advanced stages of the disease in comparison to other PDR patients.

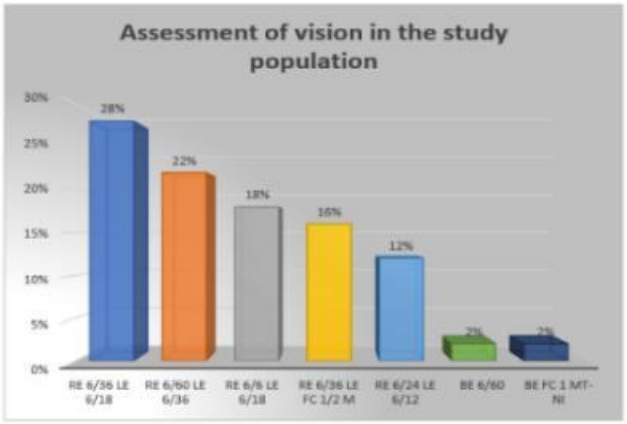

Fig 1: Evaluation of participants' levels of vision in the population under study

Duration of DM in years	Frequency	Percentage
≤10	33	66%
10-15	8	16%
>15	9	18%
Total	50	100%

Table 4: Research into how long people in the research population have had diabetes mellitus.

Out of a total of 50 patients, 66 percent of them had diabetes for less than 10 years. 9 individuals (18%) had diabetes for more than 15 years, whereas 8 patients (16%) had the disease for a duration of between 10 and 15 years. The duration of DM, measured in years, was 9.98 $\pm$ 6.17 on average, with a range of 5 to 30.

Duration of HTN in years	Frequency	Percentage
≤5	8	16%
5-10	11	22%
>10	12	24%
No HTN	19	38%
Total	50	100%

Table 5: Research studying the prevalence of hypertension over time in the community under study.

Out of the total of 50 patients, 16 percent had hypertension that had been present for less than five years. 11 patients (22%) had hypertension for a duration of between 5 and 10 years, whereas 12 patients (24%) had hypertension for a duration of more than 10 years. 19 out of the 28

patients, or 38%, did not have hypertension. Hypertension was present in 31 of the total individuals (or 62%). The duration of hypertension, measured in years, was found to be 12.16+5.86 on average, with a range of 4 to 20 years.

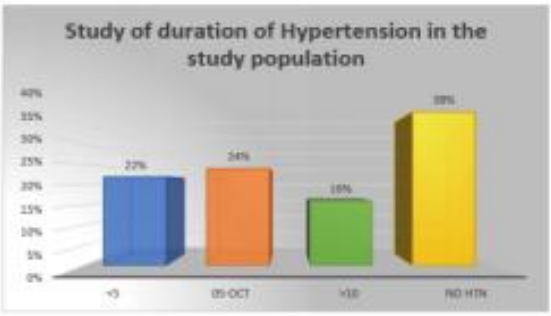

Fig 2: Research studying the prevalence of hypertension over time in the community under study.

BP in mmHg	Frequency	Percentage
120/80	12	24%
130/80	5	10%
130/90	2	4%
140/90	10	20%
150/90	9	18%
160/100	4	8%
160/90	7	14%
200/120	1	2%
Total	50	100%

Table 6: Study of distribution of blood pressure in the study population.

The average blood pressure was measured at 130 over 90 mmHg. However, it is important to keep in mind that we carried out a cross-sectional analysis, and the vast majority of patients were already receiving therapy for hypertension.

TCL	Frequency	Percentage
<200	15	30%
>200	35	70%
Total	50	100%

Table 7: Study of distribution of total cholesterol levels in the study population.
MeanTCLlevel was217.28±20.8ranging from183-250.

TRG	Frequency	Percentage
<150	1	2%
>150	49	98%
Total	50	100%

Table 8: Study of distribution of serum Triglyceride levels in the study population. Mean TRG level was 302.48±92.1 ranging from 152-459.

HDL	Frequency	Percentage
<40	17	34%
>40	33	66%
Total	50	100%

Table 9: Study of distribution of high-density lipoprotein levels in the study population. Mean HDL level was 44.67±9.63 ranging from 30-59.

LDL	Frequency	Percentage
<130	12	24%
>130	38	76%
Total	50	100%

Table 10: Study of distribution of very low-density lipoprotein levels in the study population. Mean VLDL level was 25.54±10.69 ranging from4 to 40.

Diabetic nephropathy	Frequency	Percentage
Present	10	20%
Absent	40	80%
Total	50	100%

Table 11: Study of distribution of low-density lipoprotein levels in the study population.

Diabetic nephropathy	Frequency	Percentage
Present	10	20%
Absent	40	80%
Total	50	100%

Table 12: Study of distribution of diabetic nephropathy in the study population. 10 patients (20%) having PDR had diabetic nephropathy.

Discussion

The majority, 52.16 percent, had an age range of 30 to 60 years old. The range of ages, in years, was from 15 to 75, with 56.56+11.7 being the mean age. According to a study carried out by (Baek, S.U et al.,2021)[5] the average age was 52.6 years, plus or minus 11.6 years. According to a study carried out by (Nittala MG et al.,2014)[6] the average age was 57.43+9.63 years. 52.15% of the participants were male, whereas just 47.84% were female. According to a study conducted by (Nittala MG et al.,2014)[6] the majority of participants were males.66% of patients had DM for less than 10 years. The average duration of DM, measured in years, was 9.98 + 6.17. ranging from five to thirty years in length. According to research carried out by (Nittala MG et al.,2014)[6] the typical length of diabetes mellitus is 9.76 years. 62% of the patients had hypertension. The overall mean duration of HTN, measured in years, was 5.16 $\pm$5.86, ranging from four to twenty years in length. According to the findings of a study carried out by (Nittala MG et al.,2014)[6] the average duration of hypertension is 25 years. Diabetic nephropathy was seen in 20% of the patients. According to the findings of the United Kingdom Prospective Diabetes Study (UKPDS), the incidence of microalbuminuria was 2% per year among individuals with type 2 diabetes, and its prevalence was 25% ten years following diagnosis (Adler AI et al.,2003)[7].

Conclusion

The average age of the people in the study was 56.56 years old, and the majority of them were men, which suggests that people in the middle to older age range may be affected but are resistant to treatment. In the population under examination, the researchers discovered that the average duration of diabetes was 9.98 years. In this group of patients, there was a low rate of treatment compliance. Seventy percent of patients diagnosed with dyslipidemia had abnormal levels of total cholesterol in their bodies. 98% of patients had abnormal levels of triglycerides, indicating the strongest possible connection with PDR. Sixty-six percent of patients had healthy levels of HDL. However, it did not turn out to be a component that protected against the disease. Having abnormal LDL is more specific than having abnormal HDL. 62% of the population was found to have hypertension. The average duration of hypertension was between five and six years, and the age at which prediabetic symptoms first appeared was significantly earlier, indicating a positive link as a risk factor. It is important to conduct comprehensive surveys in order to detect diabetes mellitus as well as identify and manage the risk factors. Screening for diabetic retinopathy should begin early on in the course of treatment for every diabetic patient.

Counseling to ensure treatment compliance and identifying and avoiding treatment-noncompliant patients are both key components in preventing the course of disease.

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