Risk Factors for Diabetic Retinopathy

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Abstract:
Introduction : *Diabetes mellitus is a metabolic disease due to deficiency of insulin leading to elevated blood sugars which affects end organs by affecting micro and macro vasculature. About 7% of newly registered blind are due to DR and there is 15 times more chance of diabetics to become blind than non-diabetics.*
Aim: *To evaluate the risk factors associated with diabetic retinopathy (DR).*
Methodology: *Total 1000 eyes of 500 patients with history of diabetes were studied within a span of 2years.*
Results :*Duration of Diabeties, Glycemic Control, Smoking, Hyperlipidemia, Hypertension were associated with onset and progression of DR.*
Conclusion : *Concomitant avoidance of risk factors lead to better visual outcome.*

Date of Submission: 28-02-2019   Date of acceptance: 18-03-2019

I.   Introduction

Diabetes is a group of metabolic diseases characterized by hyperglycemiaresulting from defects in insulin secretion, insulin action, or both. The chronichyperglycemia of diabetes is associated with long-term damage, dysfunction, andfailure of different organs, especially the eyes, kidneys, nerves, heart, and bloodvessels[1]. Diabetic retinopathy (DR) is one of the most common complications of type2 diabetes mellitus and a major cause of unavoidable blindness in both developing anddeveloped countries. Up until now, although advances in treatment have greatlyreduced the risk of blindness from this disease, DR remains an important end organdamage of DM[2]. Diabetic retinopathy occurs due to microvascular alterations in theretinal circulation diabetics. It is responsible for around 10,000 new cases of blindnessevery year. The risk of developing diabetic retinopathy or other microvascular complications of diabetes depends on both the duration and the severity ofhyperglycemia[3], presence of hypertension in the U.K. Prospective Diabetes Study(UKPDS) and most patients with type 1 diabetes develop evidence of retinopathy within20 years of diagnosis[4,5]. Retinopathy may begin to develop as early as 7 years beforethe diagnosis of diabetes in patients with type 2 diabetes.

II.   Material And Methods

Type of Study: Patients with known history of diabetes or newly diagnosed cases attending outpatient department of ophthalmology, NRI Medical college and hospital, Chinakakani between 2016 to 2018. Duration of study is 2 years and sample size are 500 patients.

Criteria for selection:

Inclusion criteria of the study:
1.   Age: Between 30-60 years
2.   Gender: No consideration
3.   Patient already diagnosed as diabetes (Type 1 or 2) attending routine ophthalmic check-up or admitted with various complaints.
4.   Diabetic with history of hypertension & hyperlipidemia
5.   Diabetic with history of smoking

Exclusion criteria of the study:
1.   All patients below 30 & above 60 years.
2.   Patients with acute complications of diabetes like hyper osmolar, non ketotic coma, ketoacidosis or acute infections

Study design:
1.   It is a totally hospital-based study.
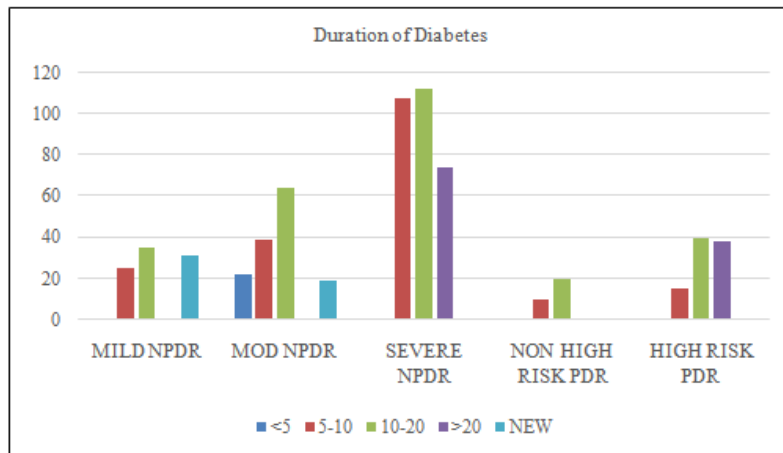2.   There is no potential risk in this study.

Statistical analysis: Data is expressed as percentage based on outcome of this study.

III.   Results

1.Duration of Diabetes:

Table – 1: Duration of Diabetes

| DURATION OF DIABETES(YRS)	MILD NPDR	MOD NPDR	SEVERE NPDR	NON HIGH RISK PDR	HIGHRISK PDR
<5	0	22	0	0	0
5-10	25	39	108	10	15
10-20	35	64	112	20	40
>20	0	0	74	0	38
NEW	31	19	0	0	0

Observation: The prevalence of NPDR 10-20 years after the inception if noninsulin-dependent diabetes mellitus was more. After 20 or more years, the cases of Severe NPDR increased. Eleven or more years after the inception, 9.8% of the patients had PDR.

Inference: DR and its severity are associated with duration of diabetes. Prolonged exposure to hyperglycemia is a triggering factor for DR.

2.Smoking:

Table – 2: Association with smoking

|	NPDR	PDR	Normal	Total
Smoking	124	54	68	246
Non Smoking	123	52	79	254
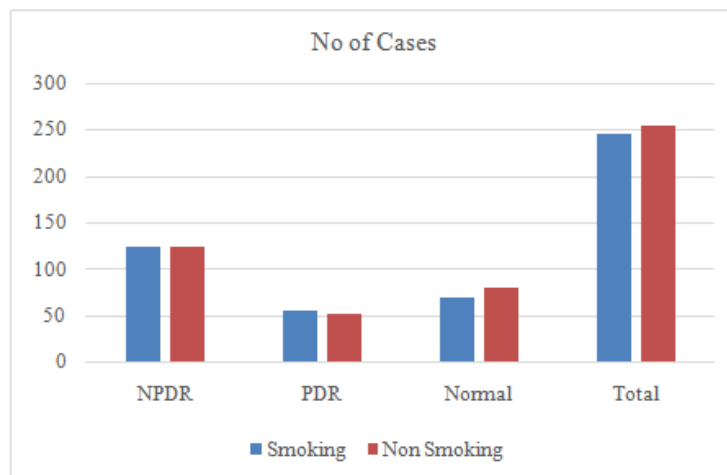
Observation: In this study, out of 500 patients, 246 patients have a known H/o of smoking, 54 Patients have an extended H/o evident with High risk PDR.

Inference: Vasoconstriction caused by smoking leads to aggravation of the disease.

3.Hyperlipidemia:

Table – 3 : Association with Hyperlipidemia

S. Cholesterol	NPDR	PDR	Normal	Total
<200 mg/dl	91	48	65	204
>200 mg/dl	96	118	82	296
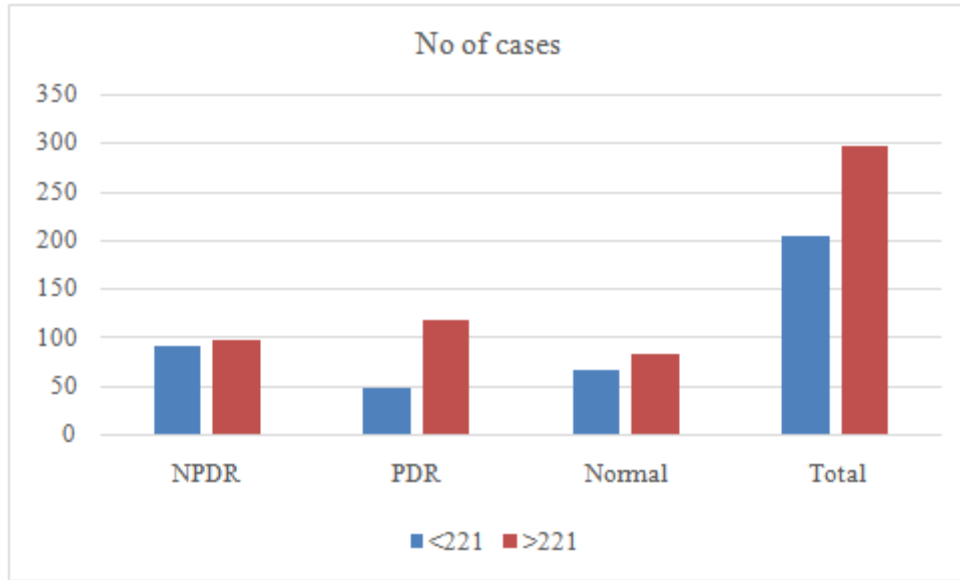
Observation: In this study, out of 500 patients, 296 patients have raised. Triglycerides &S.Cholestrol.
Inference: Dyslipidemia is strongly associated with the development and progression of DR.

4.Hypertension:

Table – 4 : Association with Hypertension

Number of patients	Hypertensive	Normotensive
500	362	138

Table – 5 : Showing association with Hypertension

Hypertensive	NPDR	PDR	Normal
362	176	74	112

Table – 6 : DR in normotensives

Normotensive	NPDR	PDR	Normal
138	71	32	35

Observation: In this study, out of 500 patients, 362 patients have systemic hypertension, out of which uncontrolled cases usually have proliferative retinopathy.
Inference: Uncontrolled HTN stimulates the progression of DR.

5.Effect of Control of Blood sugars:
Elevated levels of glycosylated haemoglobin (HbA1C) in all the patients indicates the state of chronic hysterical hyperglycemia which leads to the progression of background retinopathy to a state of proliferative retinopathy.Most of the patients under study have a value of HbA1c of >7.1%

Table – 7 : Effect of Control of Blood sugars

HbA1C	NPDR	PDR	Normal	Total
<7.1%	30	11	15	56
>7.1%	217	95	132	444

Observation: In this study, out of 500 patients, 444 patients had uncontrolled HbA1C out of which 217 had NPDR.

Inference: Most of the cases in study had HbA1C more than 7.1% which shows the strong association with development of DR.

Statical analysis of risk factors:

Multiple logistic regression analysis of dependent variables obtained by Chi-square test . P value <0.01 statististically significant

Table – 8 : Statistical analysis

VARIABLES	Chi square	P value
HbA1C	49.9	0.00001
Smoking	2.68	0.44
Hypertension	33.2	0.00001
S.Cholesterol	10.1	0.01

Inference: According to my study Hypertension, S.cholesterol and HbA1C had significant correlation with the development of diabetic retinopathy but smoking did not show any significant relation with the development of diabetic retinopathy.

IV. Discussion

Longer duration of diabetes may represent a longer period of retinal toxicity induced by high glucose levels leading to vascular and neural death in the layers of retina[6]. According to this study, duration of diabetes was between 10-20 years of onset of disease and least being less than 5 years of duration of DM. The results are that prevalence of NPDR after 10-20 years of onset of DM is high (27.10%) and severity of the retinopathy has increased as the duration of DM is increased and 6% developed PDR in 10-20 years.

According to a study conducted by Robert J. McCarter[7] on Biological Variation in HbA1c in diabetic retinopathy patients patients with high Hemoglobin glycation index (HGI = observed HbA1c - predicted HbA1c) had three times greater risk of retinopathy and six times greater risk of nephropathy compared with the low-HGI group.In present study most of the diabetics had abnormal FBS and PPBS levels and HbA1c value more than 7.1%.According to Klein et al, relationship between blood pressure and progression of diabetic retinopathy was not certain.

In present study, out of 500 cases 362 were hypertensives out of which 176 developed NPDR (48.62%), 74 developed PDR (20.44%) and 112 (30.94%) did not develop retinopathy.According to Ramchandran Mohan et al, smoking was associated with progression of diabetic retinopathy. In present study 246 were smokers out of which 124 developed NPDR (50.41%), 54 developed PDR (21.95%) and 68 did not develop any retinopathy.Dyslipidemia is a modifiable and independent risk factor for macro- and microvascular diseases, and control of serum lipids helps to prevent complications due to DR[8,9,10]. In present study, 296 cases had hyperlipidaemia out of which 96 developed NPDR (32.43%), 118 developed PDR (39.86%) and 82 cases (27.70%) did not develop any retinopathy.

V. Conclusion

Concomitant avoidance of predictive risk factors like hyperglycemia, hyperlipdemia, smoking and hypertension and early diagnosis and treatment of the disease will definitely make the Diabetic individual to live with good health and have a fruitful vision.

Limitations

Short duration of study only 2 years

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