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Original Article

Prevalence and Associated Risk Factors for Diabetic Retinopathy among in-patients Diagnosed with Diabetes Mellitus: A Retrospective Study Conducted in Nobel Medical College and Teaching Hospital, Biratnagar.

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Abstract

Background: Diabetes mellitus (DM) being disease of modern world occurrence of Diabetic retinopathy (DR) has become more frequent. Knowledge on the prevalence and associated risk factors of diabetic retinopathy helps to detect the disease in its early course. The objective of the study was to establish the prevalence and to analyze the associated risk factors and help to screen the disease as early as possible so as to prevent and /or to delay the onset as well as progression of DR.

Materials and Methods: A hospital based retrospective study conducted among 213 in-patients of Nobel Medical College, Biratnagar diagnosed with DM.

Result: The prevalence of diabetic retinopathy was 32.39% and prevalence of mild NPDR, moderate NPDR, severe NPDR, very severe NPDR, proliferative diabetic retinopathy and clinically significant macular edema was 12.7%, 8.9%, 6.1%, 5%, 1.9% & 2.3% respectively. There was statistically significant relation of diabetic retinopathy with duration of diabetes (p value 0.004) and the mean duration was 8.704 years.

Conclusions: The prevalence of diabetic retinopathy among in-patients was 32.39%. Though there was no significant relation with occurrence of DR with type of diabetes, age, sex, alcoholism, smoking and drug intake history, the duration of diabetes and hyperlipidemia, poor hyperglycemic control were highly significantly associated with DR while high BP showed marginally insignificant relation with the same.

Key words:

diabetic retinopathy, In-patients, CSME, Hyperlipidemia

Introduction

Diabetes mellitus is the emerging disease in the modern world. Diabetic retinopathy the most common micro vascular complication of DM is predicted to be principle reason of new blindness among working populations [1]. 425 million people have diabetes mellitus in the world, out of which 82 million people were from the South-East Asia only and it is estimated that this will rise to 151 million by the year 2045. There

were 657,200 cases of diabetes mellitus reported in 2017 in Nepal [2]. Several epidemiological studies have reported a high prevalence of DR ranging from 11.9% to 43.1% [3]. There are multiple risk factors for the development and progression of diabetic retinopathy. Relationship of DM with factors like age of onset of diabetes, gender preponderance, Hyperglycemic control, duration of diabetes, type of diabetes, systolic BP,

smoking, alcoholism, BMI, anemia, hyperlipidemia, heart rate, BUN and serum creatinine (Sr. Cr.) were studied in various literatures [3,8,9,11-16]. There is 29 times higher risk to develop blindness due to diabetic retinopathy than non-diabetic of similar age and gender [4].

The aim of the study was to find the prevalence and to establish the associated risk factors for diabetic retinopathy among in-patients diagnosed with diabetes mellitus in Nobel Medical College and Teaching Hospital, Biratnagar so as to take measures to prevent and/or to delay the progression of potentially blinding diabetic retinopathy.

Materials and Methods

This is a retrospective study in which all the in-patients (213 patients) admitted by department of Internal Medicine of Nobel Medical College and Teaching Hospital, Biratnagar from November 2017 to March 2018 diagnosed with diabetes mellitus were included. Verbal informed consent was obtained from the patient before enrollment in the study. The patients with hazy ocular media where fundus examination was not possible were excluded in this study.

A proforma was prepared that includes demographic data of the patients, type and duration of diabetes, drug history, family history, history of smoking and alcoholism. Laboratory investigations considered are measuring blood HbA1C, fasting blood glucose and lipid profile including Triglyceride (TG), total cholesterol (TC) low density lipoprotein (LDL) and Sr. Cr. HbA1C was measured using Nycocard Reader and Fasting Blood Glucose was measured by glucose-peroxidase colorimetric enzymatic method (Biodiagnosis), lipid profile was measured by RANDOX fully automatic biochemistry analyzer. Visual acuity was assessed with Snellen's chart but those who were unable to come to OPD were assessed grossly at the bed side with counting of fingers at

different distances. The anterior segment was evaluated by torch light and a slit lamp of APAASAMY ASSOCIATES Model no: Acc002. The fundus evaluation was done under mydriasis (tropicamide 0.5%) by direct Ophthalmoscopy (HEINE Beta 200) and indirect ophthalmoscopy (HEINE SIGMA 150 KC). Baseline blood pressure was recorded at the time of presentation with mercury sphygmomanometer applying auscultatory method technique and blood pressure <140/90 mmHg is considered normal and blood pressure \geq 140/90 mmHg considered high blood pressure according to JNC classification of blood pressure. TG level <250 mg/dl was taken as normal and \geq 250mg/dl was taken as high. TC <200 mg/dl considered as normal and \geq 200 as high and LDL <130mg/dl as normal and \geq 130mg/dl as taken as abnormal. Similarly, serum creatinine \leq 1.2 mg/dl considered as normal and >1.2mg/dl taken as high according to Harrison's principle of internal medicine, 19th edition [5,6].

Diabetic retinopathy was classified as no retinopathy, mild non-proliferative diabetic retinopathy (NPDR), moderate NPDR, severe NPDR, very severe NPDR, proliferative diabetic retinopathy (PDR) and clinically significant macular edema (CSME)[7].

The data was entered and then analyzed with SPSS program version 22. The associations of diabetic retinopathy with other factors were assessed using Chi-square test.

Result

Out of 213 diabetic patients, 144 (67.6%) were found to have no diabetic retinopathy whereas 12.7% had mild NPDR, 8.9% had moderate NPDR, 6.1% had severe NPDR, 0.5% had very severe NPDR, 1.9% had PDR and 2.3% had CSME^[Table 1]. Most of them (74.6%) have normal or mild visual impairments, whereas 21.6% had moderate visual impairment, 2.8% had severe visual impairment and 0.9% was

blind according to WHO blindness classification [Table2].

Among total patients, 32.9% have multiple associated conditions followed by 21.6% with only cardiac and 11.3% with only renal problems while 18.3% patients have no other associated conditions with DM with/without DR [Table6].

Age of the patients varied from 19 years to 87 years with mean age of 56.51(± 12.73) with majority of patients were in age group of (50 – 59) years (34.7%) and minority of patients in the age group of ≥80 years (3.8%) and <40 years (9.4%). Diabetic retinopathy was found in highest frequency in the age group of (50 – 59) years (34.8%) and in lowest frequency in age group of <40 years (8.7%). Of total diabetic patients with DR, 60.9% were male. [Table3,4]

Age was not found to be a significant risk factor for development of diabetic retinopathy (p=0.804). Similarly, other factors viz. sex, fasting blood sugar blood Triglyceride level, Blood pressure, family history, alcohol intake, smoking and drug intake (in the form of oral hypoglycemic agents or S/C insulin) were not found as statistically significant associated factors for development of diabetic retinopathy [Table7].

Among studied patients, 2.3% had type 1 DM while 97.7% had type 2 DM and its association with development of diabetic retinopathy was found statistically insignificant (p = 0.095) [Table5].

However, the duration of diabetes was found highly statistically significant associated risk factor for development of retinopathy in diabetics (p=0.004). Majority of Diabetic patients with retinopathy had duration of 5-9 years (43.5%), and minority them had duration of <5 years (10.1%) [Table7]. Mean duration to develop diabetic retinopathy was found to be 8.7(±4.64) years. Similarly, poor glycemic control in diabetic patients as

represented by high HbA1c was found statistically highly significant (p=0.002) as well as serum total cholesterol level and LDL level also found to be highly significant associated risk factors for development of diabetic retinopathy with p – value of 0.001 each [Table7].

Table 1: Types of DR

DR types	Frequency	Percent
No DR	144	67.6
Mild NPDR	27	12.7
Moderate NPDR	19	8.9
Severe NPDR	13	6.1
Very severe NPDR	1	.5
PDR	4	1.9
CSME	5	2.3
Total	213	100.0

Table 2: Vision in diabetic patients

Visual acuity	Frequency	Percent
6/6-6/18	159	74.6
< 6/18-6/60	46	21.6
< 6/60-3/60	6	2.8
3/60-PL	2	.9
Total	213	100.0

Table 3: Age wise distribution of DR

Age (years)	NO DR	DR	p-value
< 40	14(9.7%)	6(8.7%)	0.804
40-49	21(14.6%)	12(17.4%)	
50-59	50(34.7%)	24(34.8%)	
60-69	34(23.6%)	12(17.4%)	
70-79	21(14.6%)	11(15.9%)	
≥80	4(2.8%)	4(5.8%)	
Total	144(100%)	69(100%)	

Table 4: Association of DR with duration of disease

Duration of diabetes (years)	NO DR	DR	p-value
< 5	34(23.6%)	7(10.1%)	0.004
5 – 9	68(47.2%)	30(43.5%)	
10 – 14	32(22.2%)	17(24.6%)	
≥ 15	10(6.9%)	15(21.7%)	
Total	144(100%)	69(100%)	

Table 5: Relationship of diabetes type with duration of disease

DM Type	<5	5-9	10-14	≥15	P value
1.00	3	1	0	1	0.095
2.00	38	97	49	24	
	41	98	49	25	

Table 6: Associated conditions with diabetes

Associated conditions	Frequency	Percent
Neurological	7	3.3
Cardiac	46	21.6
Respiratory	10	4.7
Renal	24	11.3
Multiple	70	32.9
Others	17	8.0
No conditions	39	18.3
Total	213	100.0

Table 7: Association of different factors with DR

Sr cr.			
≤1.2mg/dl	94(65.3%)	45(65.2%)	0.993
> 1.2mg/dl	50(34.7%)	24(34.8%)	
Total	144(100%)	69(100%)	
TG			0.246
≤250mg/dl	107(74.3%)	46(66.7%)	
> 250mg/dl	37(25.7%)	23(33.3%)	
Total	144(100%)	69(100%)	
Total cholesterol			0.001

< 200mg/dl	108(75%)	36(52.2%)	0.001
≥200mg/dl	36(25%)	33(47.8%)	
Total	144(100%)	69(100%)	
LDL			0.001
≤130mg/dl	112(77.8%)	38(55.1%)	
> 130mg/dl	32(22.2%)	31(44.9%)	
Total	144(100%)	69(100%)	

Factors analyzed	NO DR	DR	P – value
Sex			0.309
MALE	77(53.5%)	42(60.9%)	
FEMALE	67(46.5%)	27(39.1%)	
Total	144(100%)	69(100%)	
FBS			0.585
< 100	22(15.3%)	8(11.6%)	
100 – 125	53(36.8%)	30(43.5%)	
≥ 126	69(47.9%)	31(44.9%)	

Total	144(100%)	69(100%)	0.941
HbA1c			
< 6.5	66(45.8%)	32(46.4%)	
≥ 6.5	78(54.2%)	37(53.6%)	
Total	144(100%)	69(100%)	0.062
BP			
< 140/90	21(14.6%)	4(5.8%)	
≥140/90	123(85.4%)	65(94.2%)	
Total	144(100%)	69(100%)	0.693
Family hx			
Yes	129(89.6%)	63(91.3%)	
No	15(14.4%)	6(8.7%)	
Total	144(100%)	69(100%)	0.284
Alcohol hx			
Yes	59(41.0%)	23(33.3%)	
No	85(59.0%)	46(66.7%)	
Total	144(100%)	69(100%)	0.657
Smoking hx			
Yes	58(40.3%)	30(43.5%)	
No	86(59.7%)	39(56.5%)	
Total	144(100%)	69(100%)	0.480
Drug hx			
Yes	16(11.1%)	10(14.5%)	
No	128(88.9%)	59(85.5%)	
Total	144(100%)	69(100%)	

Discussion

The prevalence of diabetic retinopathy in our study was 32.39% that is found to be lower than worldwide prevalence (34.6%) but much higher than its prevalence in Asians in general (19.9%) [8]. But some studies have suggested that South Asians are more likely to have DR as compared to white Europeans, but Asians with DR are younger, the course of disease is short, blood pressure and plasma sugar level are higher [9]. Although there is no ethnic difference among Asian countries, [10] the prevalence observed in our study is far higher than in other Asian countries such as India (21.7%) [11] and Bangladesh (21.6%)[12] but lower than Singapore(35%) [13]. These differences among studies may be caused by the type of study population, the sample size, age of the patients, different methods of fundus evaluation and the average levels of various variables.

Our study also confirms commonly accepted risk factor for DR i.e. duration of diabetes.

The glycemic control as indicated by HbA1C level was found to be insignificant for association with DR. The high BP was found to be only marginally insignificant associated factor for DR.

However, the present study showed that blood lipids were strongly associated with occurrence of DR that is also supported by American studies which found that occurrence of hard infiltration in the fundus of the population with high TC and LDL was twice as much as that found in normal population [14] but other studies could not establish this association [15]. Hence further studies are needed for the relationship between serum lipid profile and DR.

Although some studies indicated that Sr. Cr. was an independent risk factor for DR [10], the result of this study did not reveal any association between Sr. Cr. and DR.

As the prevalence of diabetes in developing countries is growing higher than that in developed countries, the prevalence of diabetes in Nepal is also steadily increasing and diabetes is diagnosed at younger age [16]. Our study, in the similar way, found that the prevalence of diabetes and DR had the most important growth in younger age i.e. 60.9% diabetic patients with DR are younger than 60 years. The mean age of diabetics was found to be 56.51 years with majority of patients were in age group of (50 – 59) years for both diabetes and DR.

Though the selection criteria and the limitations of the study could limit the generalization of our study, the screening programmes for patients with diabetes in general population and DR in diabetic patients should be implemented especially in individuals who have risk factors for diabetes and diabetic complications like retinopathy (eg. high BP, dyslipidemia and diabetes of longer duration).

Conclusion

At last, in conclusion, we found that the prevalence of DR was 32.39% among inpatients diagnosed with diabetes in our study. And the disease duration and dyslipidemia were strongly associated factors while BP was marginally insignificant factor as associated risk for DR in diabetic patients.

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