

Original article

Prevalence, risk factors and awareness of diabetic retinopathy among admitted diabetic patients at a tertiary level hospital in Kathmandu

Raba Thapa,^{1,2} Deepak Man Joshi,² Aparna Rizyal,^{2,3} Nhukesh Maharjan,¹ Rajesh Dhoj Joshi²

¹Tilganga Institute of Ophthalmology

²Kathmandu Model Hospital

³Nepal Medical College

Kathmandu, Nepal

Abstract

Introduction: Diabetic retinopathy (DR) is one of the commonest causes of visual impairment and blindness in Nepal. **Objectives:** The study aims to explore the prevalence, risk factors and awareness of DR among admitted diabetic patients. **Materials and methods:** A non-interventional case series study was conducted among the inpatient diabetic cases referred for ophthalmic consultation. The patients' detailed demographics, awareness on DR, concurrent systemic problems, and glycemic control status were recorded. DR was graded using the Early Treatment Diabetic Retinopathy Study Criteria. **Main outcome measures:** The prevalence, risk factors and awareness of diabetic retinopathy among the study participants was analyzed. **Results:** A total of 277 diabetic patients were enrolled in the study. The mean age was 62.25 ± 13.26 years. Only one-third (34.6 %) of the cases were admitted for sugar control and newly diagnosed cases comprised of 19.49 %. Nearly half of the cases (46.6 %) were not aware of diabetic retinopathy and dilated fundus evaluation was done for the first time in 44.4 %. DR was found in 38.26 % of the cases and was diagnosed in 13 % of the new cases. Almost four-fifths (78 %) of the diabetics had had the disease for a duration of 16 to 20 years. Clinically significant macular edema was found in 5.78 % and proliferative DR in 2.52 %. DR was significantly associated with the duration of diabetes (P value = 0.001) and concurrent hypertension (P value = 0.004). **Conclusion:** The prevalence of DR was 38 % among the admitted diabetic cases and the DR was significantly associated with the duration of diabetes and systemic hypertension. Almost half of the cases had been unaware of DR before referral. This emphasizes the importance of the collaboration of the physician and the ophthalmologist for an early DR detection.

Keywords: Awareness, diabetic retinopathy, prevalence, risk factors

Introduction

Diabetic retinopathy (DR), the commonest ocular complication of diabetes mellitus, is

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Address for correspondence

Dr Raba Thapa, MD

Vitreo-retina Unit Tilganga Institute of Ophthalmology

Gaushala, Kathmandu, Nepal

Phone no. 977-1-4493775; Fax no. 977-1-447493775

Email: rabathapa@live.com

globally the fifth leading cause of visual impairment and blindness (WHO, 2005). It is the commonest cause of new-onset blindness among working age adults in the developed world (Klaver et al, 1998; The eye diseases prevalence research group, 2004). With the rapid

rise of diabetes in low and middle income countries, DR is becoming a major public health problem for these countries as well. More than half of the world's diabetics are presumed to be in the Asian countries (Chan et al, 2009; Wild et al, 2004). In Nepal, diabetes is taken as an epidemic health problem in the urban areas (Singh & Bhattarai, 2003); and although DR is a preventable cause of blindness (Early Treatment Diabetic Retinopathy Study Research Group, 1981; The Diabetic Retinopathy Study Research Group, 1985), patients usually present late in our country and visual recovery is nearly impossible in the majority of those that have developed DR. The major factor behind this scenario has been the lack of awareness about DR (Thapa et al, 2012; Shrestha et al, 2007; Paudyal et al, 2008). As diabetes is a chronic disorder with multisystem affection, the close collaboration among treating physicians and ophthalmologists could help in the timely detection of sight-threatening retinopathy (Thapa et al, 2012). This study is expected to assess the prevalence, risk factors, and awareness of diabetic retinopathy among the diabetic patients admitted at a tertiary-care-level general hospital.

Materials and methods

A prospective, non-interventional, case series study was conducted, from June 2010 to December 2011, among the inpatient diabetic patients referred for ophthalmic consultation at Kathmandu Model Hospital, a tertiary-level hospital. The study was conducted as per the Declaration of Helsinki. Informed consent was obtained from the patients before enrollment in the study. Patients excluded were those with ocular media haze where fundus evaluation was not possible.

The detailed history taken included the demographics, duration of diabetes, type of diabetes, and concurrent systemic diseases like hypertension, hyperlipidaemia, heart diseases, etc. Likewise, information regarding the

awareness of DR, source of awareness, previous fundus evaluation and treatment were also noted. Visual acuity for those referred to the outpatient department (OPD) were assessed with Snellen's chart but those unable to come to the OPD were assessed grossly at the bed side with counting fingers at different distances. The anterior segment was evaluated with a torch light and a slit lamp wherever possible. The fundus evaluation was done under mydriasis with direct ophthalmoscope at the bed side and also with indirect ophthalmoscopy with a 90 D lens (Acular, USA) at the OPD for those who are able to walk. Diabetic retinopathy was graded using the classification of the Early Treatment Diabetic Retinopathy Study Research Group, 1981.

The results of the fasting and post-prandial blood sugar, glycosylated hemoglobin, lipid panel, and urine routine examination and urine micro-albumin tests were recorded from the medical records wherever available. Diabetes was taken as newly diagnosed where the diabetes was diagnosed during the present admission. The data was entered and analyzed with the SPSS program. The association of DR with other factors was assessed using the Chi-square test.

Results

A total of 277 diabetic patients were enrolled during the study period. The age ranged from 25 to 87 years with the mean of 62.25 ± 13.26 years. The majority of patients were between 61 to 70 years (26.35 %), followed by 71 to 80 years (24.9 %), and 51 to 60 years (20.93 %). One-fifth (21.63%) of the patients were below 50 years of age (**Table 1**).

Table 1: The age-distribution of the patients

Age group	Number	Percent
< 30 years	1	0.36 %
31 - 40 years	16	5.77 %
41 - 50 years	43	15.5 %
51 - 60 years	58	20.93 %
61 - 70 years	73	26.35 %
71 - 80 years	69	24.9 %
> 80 years	17	6.13 %

Of the 277 patient participants in this study, 139 were female and 138 male. The majority of the patients were from Kathmandu valley (69 %). Only 38.6 % patients were literate. The majority

were housewives (42.2 %), followed by service holders (22.02 %), farmers (16.96 %) and businessmen (14.4 %). Of the total 277 patients, 275 had Type 2 diabetes mellitus (**Table 2**).

Table 2: Demographic characteristics and type of diabetes among the patients

Characters		Frequency	Percent
Sex	Male	138	49.8 %
	Female	139	50.2 %
Address	Kathmandu valley	191	68.95 %
	Outside Kathmandu	86	31.5 %
Literacy	Literate	107	38.6 %
	Illiterate	170	61.9 %
Occupation	Housewives	117	42.2 %
	Service	61	22.02 %
	Business	40	14.4 %
	Agriculture	47	16.96 %
	Others	12	4.3 %
Type of Diabetes	Type 1	2	0.7 %
	Type 2	275	99.3 %

The duration of the diabetes of the patients was as follows: recently diagnosed 19.49 %, of less than five years 35.74 %, between 6 to 10 years 23.82 %, between 11 to 15 years 12.27 % and of more than 15 years 8.65 %. DR was found in

12.96 % of the newly diagnosed cases, in 56 % with the diabetes duration of 6 to 10 years and in 77.78 % among those with diabetes for 16 to 20 years (**Table 3**).

Table 3: Duration of Diabetes mellitus and prevalence of diabetic retinopathy

Duration	Number	Percentage	Diabetic retinopathy	Percent
Newly Diagnosed	54	19.49	7	12.96
< 5 years	99	35.74	26	26.26
6 - 10 years	66	23.82	37	56.06
11 - 15 years	34	12.27	18	53
16 - 20 years	18	6.49	14	77.78
> 20 years	6	2.16	4	66.67
Total	277		106	

One-third (34.6%) of the cases had been admitted for sugar control whereas the rest for treatment of other systemic conditions. Blood sugar was under control in only 12.63 % of the cases. A little over one-fourth (27.8 %) of the cases had a positive family history of diabetes in their first degree relatives. Concurrent

hypertension was found in 58.8 % of the study patients. Nearly half of the cases (46.6 %) were unaware of the possible diabetic retinopathy sequelae in the eyes. Fundus evaluation was done for the first time in 44.4 % of the cases (**Table 4**).

Table 4: Purpose of admission, systemic association and awareness of diabetic retinopathy

		Frequency	Percent
Purpose for admission	Sugar control	96	34.6
	Treatment of systemic diseases	181	65.4
Blood sugar	Under controlled	35	12.63
Family history of diabetes	Yes	77	27.8
Systemic association of cardiac diseases	Hypertension	163	58.8
	Others	3	1.08
Awareness of DR	Yes	148	53.4
Fundus evaluation	First time	123	44.4

Diabetic retinopathy was found in 38.26 % of the cases. The moderate type of non-proliferative diabetic retinopathy (NPDR) was seen in 15.16 %, followed by mild NPDR in 14.4 % and severe NPDR in 5.78 % of the cases. Clinically

significant macular edema was found in 5.78 % and proliferative diabetic retinopathy (PDR) in 2.52 % of the total cases that were taken as sight threatening retinopathy (**Table 5**).

Table 5: Diabetic retinopathy among the total diabetic patients

Types of DR	Frequency	Percentage
NO DR	171	61.73
Mild NPDR	40	14.4
Moderate NPDR	42	15.16
Severe NPDR	16	5.78
Very severe NPDR	1	0.36
PDR	7	2.52
CSME	16	5.78

Risk factors: DR was significantly higher with the duration of diabetes and concurrent hypertension. In our group of patients, we found no significant association of DR with age ($P = 0.37$), glycaemic control ($P = 0.659$), smoking ($P = 0.091$) and proteinuria ($P = 0.072$) (**Table 6**).

DR: diabetic retinopathy, NPDR: Non-proliferative diabetic retinopathy, PDR: proliferative diabetic retinopathy, CSME: Clinically significant macular edema

Table 6: Association of diabetic retinopathy with other factors

Factors	Group	No DR	DR	P-value
Age	< 60 years	63(58.3%)	45(41.7%)	0.37
	= > 60 years	107(63.7%)	61(36.3%)	
Duration of diabetes	< 5 years	103(75.2%)	34(24.8)	0.001
	> 5 years	67(48.2%)	72(51.8%)	
Hypertension	No	76(72.4%)	29(27.6%)	0.004
	Yes	94 (55.0%)	77(45.0%)	
Sugar control	No	138(61.1%)	88(38.9%)	0.659
	Yes	20(57.1%)	15(42.9%)	
Smoking	No	65(56.5%)	50(43.5%)	0.091
	Yes	71(67.6%)	34(32.4%)	
Proteinuria	No	49(70.0%)	21(30.0%)	0.072
	Yes	70(56.9%)	53(43.1%)	

DR: Diabetic retinopathy



Discussion

Diabetes mellitus is a chronic disease with a multi-system affection as its complication which then leads to various disabilities to the patients. The mean age of the diabetic patients in our series (62.25 years) was higher than in the hospital-based studies conducted at eye hospitals (57 years) from Nepal (Thapa et al, 2012; Shrestha et al, 2007). This could be due to the fact that patients who need to be hospitalized for systemic problems are older than those who don't need to. There was just a slight female preponderance in our series as in some other (Shrestha et al, 2007; Paudyal et al, 2008; Shrestha et al, 2007), although males were higher in other hospital-based studies (Thapa et al, 2012; Shrestha et al, 2011). Nearly two-thirds of our cases were from the Kathmandu valley where the hospital is located. Three-fifths of the cases were illiterate and the majority were housewives followed by service holders. This demographic pattern of our series was consistent with that of studies conducted in other eye hospitals (Thapa et al, 2012; Shrestha et al, 2007).

Except for two cases of the 277, all cases had Type 2 diabetes mellitus, which is the predominant type worldwide. The majority had had their diabetes for less than 10 years and one-fifth of the total cases were diagnosed only at the time of admission. Although almost two-thirds of the cases had been admitted for treatment of other systemic problems besides diabetes mellitus, blood sugar was under control in only 12 % of the cases. This reflects that blood sugar remains uncontrolled in the majority in our diabetic patients.

Concurrent hypertension was found in more than half of the patients (58 %) in our study. This rate was higher than in other series (Thapa et al, 2009; Shrestha et al, 2007, Shrestha et al, 2007). The higher rate in our series could be due to the hypertensive patients with concurrent diabetes admitted for control of blood pressure and other

hypertensive sequelae. Nearly one-third of the cases in our study with first-degree relatives suffering from diabetes suggests that hereditary factors or similar dietary habits of the extended family might be playing a key role in the causation of diabetes mellitus in Nepal (Thapa et al, 2012). On the other hand, nearly half of the cases were unaware of diabetic retinopathy and 44 % of the cases had never undergone prior dilated fundus examination. These figures were consistent with previous hospital and population-based studies in Nepal and reflect the inadequate counseling diabetic patients receive regarding the ocular complications (Thapa et al, 2012). Close collaboration between different sub-specialty physicians and ophthalmologists in the management of diabetes in a holistic way together with extensive DR awareness activities at different levels could be an effective in improving the situation.

Diabetic retinopathy was found in 38 % of the hospitalized diabetics. Although this figure including sight-threatening retinopathy was less compared to those of studies from other tertiary referral eye hospitals (Thapa et al, 2012; Shrestha et al, 2007), it was higher than that of some clinic-based and population-based studies (Paudyal et al, 2008; Shrestha et al, 2011; Rema et al, 2007; Wong et al, 2008; Thapa et al, 2013). DR in 12.96 % of the newly-diagnosed diabetics, which is quite high compared to that of other studies (Klein et al, 1985), reflects the late diagnosis of the disease in our country. A significant number of cases had a sight-threatening stage of retinopathy. Almost half of the cases never had had dilated fundus evaluation. The lack of awareness of diabetic retinopathy and the large number of young patients in our study reflects the gravity of this public health concern that needs immediate attention.

In our series, DR was significantly associated with the duration of diabetes and with systemic

hypertension, as in other studies (Shrestha et al, 2007; Klein et al, 1985; Tapp et al, 2003, Dandona et al, 1999). Similar to that in some other studies (Rema et al, 2007; Reddy et al, 2013), DR was not found significantly associated with smoking in our series. Poor glycaemic control and proteinuria also did not have a significant relation, unlike that reported in the literature (Rema et al, 2007; Wong et al, 2008, Dandona et al, 1999; Reddy et al, 2013; Al-Shammari et al, 2005). This difference may be due to the many patients with recently diagnosed diabetics and proteinuria secondary to other systemic causes like urinary tract infections rather than diabetic nephropathy in our series.

The limitation of this study is that as the majority of the patients were bedridden, indirect ophthalmoscopy with a 90D lens was not possible in all the cases, and this might have underestimated the clinically significant macular edema (CSME).

Conclusion

The prevalence of diabetic retinopathy was 38 %, with sight-threatening retinopathy in 8.3 %, among the admitted diabetics in our tertiary general hospital. Almost half of the cases were unaware of diabetic retinopathy and fundus evaluation was done for the first time in 44 % of the cases. The duration of diabetes and systemic hypertension were the significant risk factors for diabetic retinopathy. The findings of the study strongly imply that collaboration between ophthalmologists and physicians has to be strengthened in all the institutions for the early detection of sight-threatening retinopathy so that this can help reduce blindness from diabetes mellitus in Nepal.

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