Prevalence Of Diabetic Retinopathy in Type 2 Diabetic Patients Attending Tertiary Care Hospital In Sikkim

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Purpose: To estimate the prevalence of Diabetic Retinopathy and to find its association with age, gender and disease severity among type 2 diabetes mellitus.

Methods: This was a hospital based cross-sectional study conducted in the department of Ophthalmology. A total of 1000 type 2 diabetes mellitus patients underwent detailed ocular examinations for diabetic retinopathy. The International Classification of diabetic retinopathy was followed to categorize the severity of retinopathy.

Results: The overall prevalence of diabetic retinopathy was 17.4%, out of which, 55.17% were males and 44.8% females. 91.9% had non proliferative diabetic retinopathy among which, 51.7% had mild, 35.6% moderate and 4.6% severe retinopathy, whereas 8% patients had proliferative diabetic retinopathy. 14% were observed to be suffering from macular edema which on further classification showed as 42.8% mild, 31.4% moderate and 25.71% severe edema. 1.5% diabetic patients developed retinopathy after five years and 30.6% developed after more than 20 years.

Conclusion: This was the first study of its kind which estimated the prevalence of DR in a north east Indian hospital-based type 2 diabetic population (17.4%). The study also observed that the presence of DR, despite vision being near normal, strengthens a case for regular ocular examinations in diabetic patients. Our study also created awareness among the patients about DR who were evaluated during the course of the study.

Introduction
Type 2 Diabetes Mellitus (T2DM), a global epidemic, is a consortium of diseases linked to chronic hyperglycemia due to insulin resistance. The incidence rates of T2DM has increased alarmingly with World Health Organization predicting the occurrence of more than 200 million type 2 diabetes cases in the next decade. India has 31.7 million diabetic patients and the number is expected to increase upto 79.4 million by 2030. Indians are highly vulnerable to diabetes with 7.1% of adult population (>62 million) suffering from T2DM. Sikkim, a small Himalayan state in northeast India, reports the highest prevalence of diabetes (13.6%) in the country. Diabetic Retinopathy (DR), one of the most serious complications of T2DM has become the leading cause of vision loss resulting in irreversible blindness among adults and is estimated to affect 1/3rd of people with diabetes. The chances of developing DR increases with age and males are more prone to its development. This condition is of vascular origin, and is characterized by signs of retinal ischemia as well as signs of increased vascular permeability. The development of DR depends on a variety of factors, such as the duration of diabetes, effective glucose control, blood pressure and blood lipid levels. It is a well-known fact that retinopathy often goes unnoticed until vision loss occurs, hence early detection, timely treatment and appropriate care can protect or delay the vision loss. High prevalence of DR also imposes a large economic burden and public health concern on the national healthcare system. This emphasizes the need for epidemiologic studies on diabetes-related complications among the diabetic population. Despite the consequences of this problem, and its rising prevalence of diabetes in India, there are few precise estimates of the prevalence of DR in India and no such published data available in Sikkim till date. We aim to estimate the prevalence of DR and to find its associations with age, gender and the effect of duration of diabetes on the severity of DR among type 2 DM patients.

Materials and Methods
Study design: This was a hospital based cross-sectional study conducted in the department of Ophthalmology from February 2015 to February 2017.

A total of 1000 patients with type 2 diabetes mellitus (DM) attending the eye out patient department (OPD), were selected with approval from the Institutional Ethics Committee (IEC). Detailed history along with blood pressure measurement and written informed consent were obtained from each patients prior to the study.

Inclusion criteria: Patients with 18 years of age and above, diagnosed with Type 2 DM, following the standard diagnostic criteria recommended by American Diabetic Association.

Exclusion Criteria: Patients with mature cataracts and hazy media, those with hypertensive retinopathy, exposure to radiation and sickle cell disease were also excluded as they could mimic fundus features with diabetic retinopathy.

Procedure for assessing DR
Visual acuity was assessed by Snellen chart. To diagnose DR in diabetic patients, 90D and binocular indirect ophthalmoscopy examination was done by a single examiner.
Diabetic retinopathy is one of the most severe microvascular complications in patients with diabetes and is a leading cause of irreversible vision loss in working-aged adults (20–74 years). The high prevalence of DR in type 2 diabetic patients imposes a large economic burden. Severity of hyperglycemia, presence of hypertension and duration of diabetes are widely recognized as major risk factors for the development of DR. In our study, the prevalence of DR was 17.4% and similar to that observed by Rema et al (17.6%) and Raman et al (18.1%) in studies done in the southern states of India. Even NPDR was more prevalent as compared to PDR just like in other studies done in South India. This may further suggest that the possibility of differences in the prevalence of DR may be non-existent among type 2 diabetic patients of different geographical origins and ethnic groups, however the possibility may be explored by doing larger population based studies across the country. Males were more affected (55.17%) than females as the issues of gender bias and social barriers to treatment modifying access to screening and treatment.

### Discussion

Diabetic retinopathy is one of the most severe microvascular complications in patients with diabetes and is a leading cause of irreversible vision loss in working-aged adults (20–74 years). The high prevalence of DR in type 2 diabetic patients imposes a large economic burden. Severity of hyperglycemia, presence of hypertension and duration of diabetes are widely recognized as major risk factors for the development of DR. In our study, the prevalence of DR was 17.4% and similar to that observed by Rema et al (17.6%) and Raman et al (18.1%) in studies done in the southern states of India. Even NPDR was more prevalent as compared to PDR just like in other studies done in South India. This may further suggest that the possibility of differences in the prevalence of DR may be non-existent among type 2 diabetic patients of different geographical origins and ethnic groups, however the possibility may be explored by doing larger population based studies across the country. Males were more affected (55.17%) than females as the issues of gender bias and social barriers to treatment modifying access to screening and

### Table 1: Prevalence and frequency distribution of patients with diabetes mellitus and diabetic retinopathy (DR)

| Total | Percentage (%) | With DR | Percentage (%) |
|-------|----------------|---------|----------------|
| Total | 1000           | 174     | 17.4           |
| Males | 512            | 96      | 55.17          |
| Females | 488        | 78      | 44.8           |

### Table 2: Frequency distribution of severity of different groups of DR and ME severity

| Severity of Diabetic Retinopathy | Number of Patients | Percentage (%) |
|----------------------------------|--------------------|----------------|
| Mild NPDR                        | 90                 | 51.72          |
| Moderate NPDR                   | 62                 | 35.63          |
| Severe NPDR                     | 8                  | 4.6            |
| PDR                             | 14                 | 8.04           |
| Total                            | 174                | 99.98          |

### Table 3: Development of diabetic retinopathy based on the duration of DM

| Duration of DM (yrs) | No. of Patients with DM | No. of Patients with DR | Percentage (%) of patients with DR |
|----------------------|-------------------------|-------------------------|-----------------------------------|
| < 5 yrs              | 268                     | 4                       | 1.5                               |
| 5-9 yrs              | 376                     | 68                      | 18                                |
| 10-14 yrs            | 192                     | 56                      | 29                                |
| 15-19 yrs            | 92                      | 24                      | 26                                |
| >20 yrs              | 72                      | 22                      | 31                                |
| Total                | 1000                    | 174                     | 100                               |

### Table 4: Diabetic Retinopathy distribution according to age group

| Age of the patient | No. of Patients with DM | No. of Patients with DR | Percentage (%) of patients with DR |
|--------------------|-------------------------|-------------------------|-----------------------------------|
| 30-39              | 28                      | 1                       | 3.5                               |
| 40-49              | 220                     | 16                      | 7.2                               |
| 50-59              | 312                     | 56                      | 18                                |
| 60-69              | 300                     | 66                      | 22                                |
| 70-79              | 112                     | 26                      | 23                                |
| More than 80       | 28                      | 9                       | 32                                |
| Total              | 1000                    | 174                     | 100                               |
treatment are known to exist. We observed the duration of diabetes to be related with the development of DR and the percentage of patients affected with DR increases with the increasing duration of Type 2 Diabetes Mellitus. According to our findings, DR appeared as early as <5 yrs of DM in 1.5% of the population and 31% patients developed DR after 20 years of DM. This observation strengthened the fact that the duration of DM is the single most common predictor to affect the severity of DR. On categorization of DR based on its severity, we observed that the maximum number of patients had mild NPDR followed by moderate and severe forms. The diabetic patients above 80 years of age were found to have the highest prevalence of DR whereas the lowest prevalence was seen between 30-39 years of age. A study has shown the overall age standardized prevalence of DR to be 34.6% with a mean age of 58 years whereas in our study 18% patients with retinopathy were found to be between the age group of 50-59 years. Only 4% of patients had their retina examined at the first attendance and none had annual retinal examination. Therefore in our study, we tried to create awareness among the diabetics about the advantages of early and regular ocular examination.

**Conclusion**

This was a first study of its kind which estimated the prevalence of DR in a north east-Indian, hospital based type 2 diabetic population (17.4%). The study also observed that the presence of DR, despite vision being near normal, strengthens the case for regular ocular examinations in diabetic patients. Our study also created awareness among the patients about DR who were evaluated during the course of the study.

**References**

1. Giaccari A, Sorice G, Muscogiuri G: Glucose toxicity: the leading actor in the pathogenesis and clinical history of type 2 diabetes–mechanisms and potentials for treatment (review). *Nutr Metab Cardiovasc Dis* 2009; 19:365–77.
2. Whiting Dr, Guariguata L, Weil C, Shawj. IDF Diabetes atlas: Global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Res Clin Pract* 2011; 94:311-21.
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes, estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004; 27:1047–53.
4. Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. *Australas Med J* 2013; 6:524-31.
5. Alexander J. Sikkim reports highest number percent of diabetes, hypertension as per NPCDCS screening. pharmabiz.com. 2013: http://October12,2013.Pharmabiz.com.
6. Keenan TD, Johnston RL, Donachie PH, Sparrow JM, Stratton IM, Scanlon P. United Kingdom National Ophthalmology Database Study: Diabetic Retinopathy; Report 1: prevalence of centre-involving diabetic macular oedema and other grades of maculopathy and retinopathy in hospital eye services. *Eye (Lond)* 2013; 27:1397–404.
7. Wang J, Zhang RY, Chen RP, Sun J, Yang R, Ke XY, et al. Prevalence and risk factors for diabetic retinopathy in a high-risk Chinese population. *BMC Public Health* 2013; 13:633.
8. Jammal H, Khader Y, Alkhaiti S, Abuibara M, Alomari M, Ajlouni K. Diabetic retinopathy in patients with newly diagnosed type 2 diabetes mellitus in Jordan: prevalence and associated factors. *J Diabetes* 2013; 5:172-9.
9. Raman R, Ganesan S, Pal SS, Kulothungan V, Sharma T. Prevalence and risk factors for diabetic retinopathy in rural India. SankaraNethralaya Diabetic Retinopathy Epidemiology and Molecular Genetic Study III (SN-DREAMS III), report no 2. *BMJ Open Diabetes Research and Care* 2014; 2:000005.
10. Looker H.C, Nyangoma S.O, Cromie D, Olson JA, Leese GP, Black M et al. Diabetic retinopathy at diagnosis of type 2 diabetes in Scotland. *Diabetologia* 2013; 55:2335-42.
11. American Diabetes Association. Standards of medical care in diabetes - 2015. *Diabetes Care* 2015; 38:S1-S93.
12. Ryan SJ. Medical retina. 4th ed. Baltimore: Mosby; Chapter 67:1276.
13. The diabetes control and Complications Trial Research Group: The effect of intensive treatment of diabetes on the development and long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993; 329:977-86.
14. UK Prospective Diabetes Study (UKPDS) Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes. *Lancet* 1998; 352:837–53.
15. Rama M, Premkumar S, Anitha B, Deepa R, Pradeepta R, Mohan V. Prevalence of diabetic retinopathy in urban India: The Chennai urban rural epidemiology study (CURES) eye study. *J Invest Ophthalmol Vis Sci* 2005; 46:2328-33.
16. Raman R, Rani PK, Reddi RS, Gnanamoorthy P, Uthra S, Kumaramanickavel et al. Prevalence of diabetic retinopathy in India: Sankara Nethralaya diabetic retinopathy epidemiology and molecular genetics study report 2. *Ophthalmology* 2009; 116:311-8.
17. Jamalsumsh MA, Gunaid AA, Khanderk RV: Diabetic retinopathy, visual impairment and ocular status among patients with diabetes mellitus in Yemen: a hospital-based study. *Indian J Ophthalmol* 2009; 57:293-8.
18. Rani PK, Raman R, Chandrakantan A, Pal SS, Perumal GM, Sharma T: Risk factors for diabetic retinopathy in self-reported rural population with diabetes. *J Postgrad Med* 2009; 55:92-6.
19. Yau J, Rogers S, Kawasaki E, Lamoureux E, Kowalski J, Be T et al. Global Prevalence and Major Risk Factors of Diabetic Retinopathy. *Diabetes Care* 2012; 35:556-64.

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