

**PREVALENCE AND PROGRESSION OF DIABETIC RETINOPATHY IN PATIENTS  
NEWLY DIAGNOSED WITH TYPE 2 DIABETES MELLITUS****Dr. B.V.S Lakshmi<sup>1\*</sup>, Vishala Nanduri<sup>2</sup>, T. Kiran Kumar<sup>1</sup> and M.Sudhakar<sup>1</sup>**<sup>1</sup>Department of Pharmacology, Malla Reddy College of Pharmacy, Dhulapally, Secunderabad, Telangana-500100.<sup>2</sup>Department of General Medicine, Assoc. Prof, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad-500065.**\*Corresponding Author: Dr. B.V.S Lakshmi**

Department of Pharmacology, Malla Reddy College of Pharmacy, Dhulapally, Secunderabad, Telangana-500100.

Article Received on 15/03/2017

Article Revised on 05/04/2017

Article Accepted on 25/04/2017

**ABSTRACT**

**Context:** Many diabetic patients fear visual loss as the worst consequence of diabetes. In most studies the main eye pathology is assigned as the cause of visual impairment. Diabetic retinopathy, the most frequent cause of blindness among adults, affects 60% of people with Type 2 diabetes during the first 2 decades of the disease. **Aims:** To assess the prevalence of diabetic retinopathy in newly diagnosed type 2 patients. **Settings and design:** A hospital based Prospective observational Study was carried out on 80 patients. **Materials and methods:** In this study, the patients detected with Diabetes Mellitus recently (within 6 months) aged  $\geq 35$  years were enrolled. Subjects were guided to the ophthalmology department to be assessed for the presence of Diabetic Retinopathy. (Tests such as Visual acuity, dilated exam, and Slit lamp test, Funduscopic test) was performed. Based on the tests the patients were categorised into- Non proliferative Diabetic Retinopathy, Proliferative Diabetic Retinopathy. Data was obtained to assess the prevalence of Diabetic Retinopathy and Health related QOL questionnaire was used to assess impact of this complication on patient's quality of life. **Results:** At diabetes diagnosis median age was 60.28 years. Over 6 months, the prevalence of Diabetic Retinopathy was found to be 12.5% and the prevalence of NPDR was found to be 25%, PDR was found to be 10%. Male sex ( $P=0.0304$ ), high HbA1c value  $> 10\%$  ( $P= 0.0260$ ) and Physical activity ( $P=0.0451$ ) were found to be major risk factors. Impact of Diabetic Retinopathy on QOL parameters included Anger, difficulty in using public transport, 57.14% effect on their finance, 35.71% visual differences in both eyes, 64.28% patients reported pain and 46.42% patients reported difficulty in reading. **Conclusions:** This study underlines the need of early detection of Type 2 DM along with its microvascular complication like Diabetic Retinopathy, to prevent or retard its progression.

**KEYWORDS:** Diabetic Retinopathy, Newly Diagnosed Type 2 Diabetes Mellitus, Non proliferative Diabetic Retinopathy, Proliferative Diabetic Retinopathy, Quality of Life.

**KEY MESSAGE:** Prevalence and progression of disease even before diagnosis of diabetes leads to impairment in the quality of life of the patients.

**INTRODUCTION**

In Europe and the United States severe visual impairment may be 2-3 times more common among people with diabetes than in the general population,<sup>[1,2]</sup> but this difference decreases with age.<sup>[2]</sup> Diabetic retinopathy (DR) is regarded as the cause of blindness in 5-15% of the blind in the general population<sup>[3-5]</sup> and in 30-50% of blind type 2 diabetic patients.<sup>[6,7]</sup> There are, however, huge regional differences in presumed causes of blindness across the world.<sup>[8]</sup> DR is considered the leading cause of blindness among people of working age in many countries,<sup>[3-5]</sup> while age-related macular degeneration (AMD) is considered the leading cause in people over 65 years.<sup>[3-5,9]</sup> Diabetes with even mildly to

moderately impaired sight has a negative impact on perceived quality of life and psychosocial functioning giving rise to feelings of vulnerability, worries about the future and loss of independence and mobility.<sup>[10-12]</sup> A sizeable proportion of type 2 diabetic patients fear visual loss intensely<sup>[13]</sup> and consider loss of vision the worst complication of diabetes.<sup>[10]</sup> For the health practitioner visual acuity is a ubiquitous and handy measure of visual function, but visual acuity is not a suitable measure of future visual loss as the sight-threatening eye pathologies often are present for many years before vision begins to decline as a result of these pathologies.<sup>[14]</sup> In the history of diabetes treatment, the development of diabetic retinopathy has been included in the outcome of numerous clinical trials though prevention of visual loss

is the ultimate target for the patients.<sup>[15-17]</sup> Diabetic retinopathy (DR) is a common microvascular complication of Diabetes, and it is the leading cause of blindness in the working aged population. In its later proliferative stage, significant irreversible vision loss commonly occurs.<sup>[18]</sup> Qualitative studies have referred to a plethora of emotional reactions to DR, related vision loss and treatment including worry, loss of confidence, loss of independence, anger, depression and low self-esteem as well as a negative impact on family functioning, work and social life. However, these studies have been relatively small, especially regarding patients at the severe spectrum of DR.<sup>[19]</sup>

## MATERIALS AND METHODS

### Study Population

Study was conducted at Department of General Medicine. The study is a prospective observational study which included 80 consecutive patients with newly diagnosed T2DM over a period of 6 months (January 2016 and June 2016). Inclusion criteria included age  $\geq 35$  years, Patients willing to co-operate, Patients detected with Type 2 DM recently (within 1 YEAR) and Patients with FBS-  $> 120$  mg/dl, HbA1c-  $> 6.5\%$ . Patients diagnosed with DM for more than 1 year, Patients with preexisting complication like visual impairment, Patients with Type 1 DM, Patients with Gestational Diabetes Mellitus were excluded from the study. The protocol was approved by the Institutional ethics committee. Informed written consent was obtained from all subjects. The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000.

All participants underwent a standardized clinical evaluation. Height was measured using a stadiometer, while weight was recorded with a weighing machine with a beam balance. Waist and hip circumference were measured and mean of two readings was taken for calculating the waist - hip ratio (WHR).

### Screening for Diabetic Retinopathy

Subjects were guided to the ophthalmology department immediately after diabetes diagnosis to be assessed for the presence of Diabetic Retinopathy. The general practitioner referred the patient to a practicing ophthalmologist who did a standard eye examination. Tests such as Visual acuity was performed where in a chart of letters/symbols of different sizes were used and the patient was asked to read from a predetermined distance generally 14-20 feet away closing one eye and repeated with other eye. This test showed how well the patient can see shapes and letters. Dilated exam was done where a mydriatic drop was placed in the eye to widen the pupil enabling to examine retina for signs of damage. Slit lamp test was used to check eyelids, cornea, retina optic nerve for signs of damage. Funduscopy was a test used to check the back of the eye (fundus). In this test the ophthalmoscope was used to

check the fundus while the patient was asked to look in certain directions. Based on the following tests the patients were categorised into: Non proliferative Diabetic Retinopathy, Proliferative Diabetic Retinopathy.

Health related QOL questionnaires was used to obtain the data regarding the impact of Diabetic complications on the patient's quality of life. We developed an interview schedule for the focus group. The questions in the interview schedule began generally (e.g. "How do your diabetic eye problems impact on your QOL?" and "What areas of your life are affected by your diabetic eye problems?") and progressed to more specific questions about emotional well-being, social life and so on, depending on participants.

### Statistical analysis

Prevalence expressed in percentages and graphs. Chi square test used to assess impact of risk factors on prevalence of complications. Mann Whitney test used to assess impact of patient counseling on QOL of patients. SPSS software version 7.2 was used for analysis of the data.

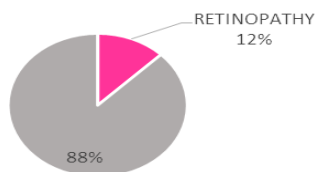
## RESULTS

At diabetes diagnosis median age was 60.28 years (Table 1). Over 6 months, the prevalence of Diabetic Retinopathy was found to be 12.5% (Figure 1) and the prevalence of NPDR was found to be 25%, PDR was found to be 10% (Figure 2, 3). Male sex ( $P=0.0304$ ), high HbA1c value  $> 10\%$  ( $P= 0.0260$ ) and Physical activity ( $P=0.0451$ ) were found to be major risk factors for the prevalence of Diabetic Retinopathy (Table 2, Figure 4). Impact of Diabetic Retinopathy on QOL parameters included Anger as the major emotional symptom, 60.71 % of the patients with DR reported difficulty in using public transport (mobility domain), 57.14% of the patients reported major effect on their finance, 35.71% patients reported visual differences in both eyes, 64.28% patients reported pain and 46.42% patients reported difficulty in reading (Figure 5).

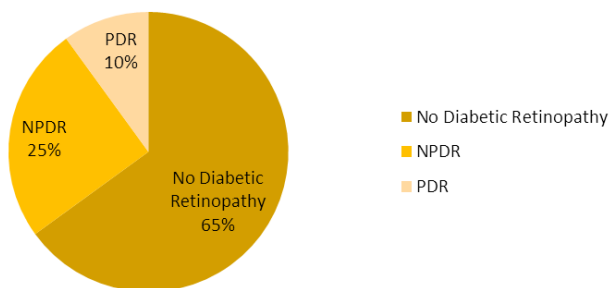
**Table 1: Anthropometric measurement details.**

Parameter		Males (N = 40)	Females (N = 40)
Age	< 60 years	16 (40 %)	12 (30 %)
	> 60 years	24 (60 %)	28 (70 %)
HBA1C (%)	< 10 %	8 (20 %)	14 (35 %)
	> 10 %	32 (80 %)	26 (65 %)
FBS (MG/DL)	< 200 mg/dl	24 (60 %)	22 (55 %)
	> 200 mg/dl	16 (40 %)	18 (45 %)
PLBS (MG/DL)	< 250 mg/dl	16 (40 %)	12 (30 %)
	> 250 mg/dl	24 (60 %)	28 (70%)
RBS (MG/DL)	< 180 mg/dl	6 (15 %)	10 (25 %)
	> 180 mg/dl	34 (85 %)	30 (75 %)

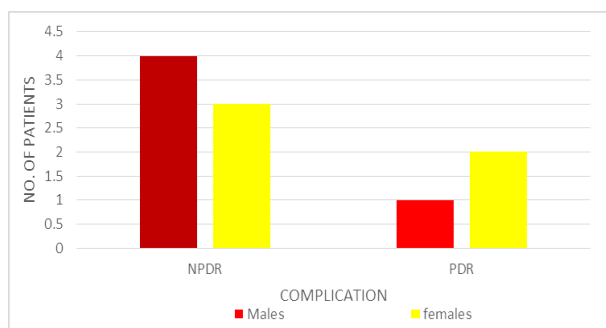
**PREVALENCE OF RETINOPATHY (SINGLE COMPLICATION)**



**Figure 1: Prevalence of Diabetic Retinopathy.**



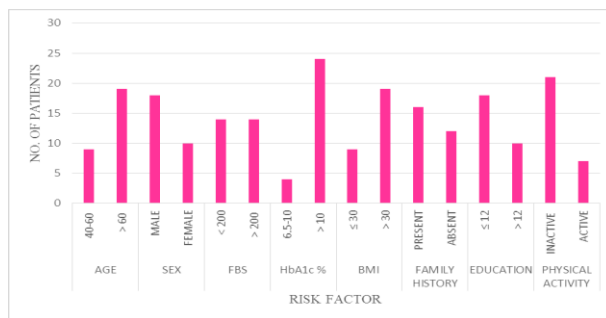
**Figure 2: Prevalence of types of Diabetic Retinopathy.**



**Figure 3: Distribution according to sex.**

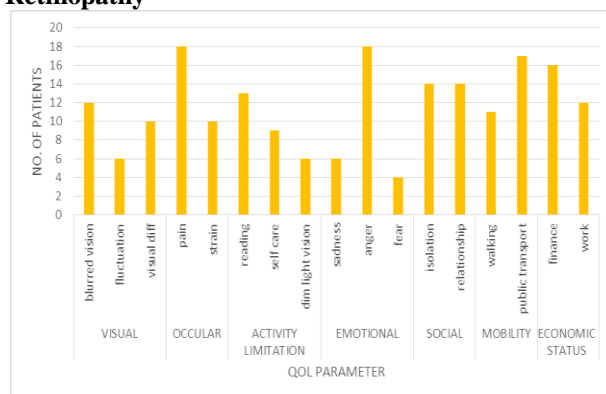
**Table 2: CHI Values In Case of Diabetic.**

Risk Factor	Complication	P Value		CHI Value	
		Yes	No		
Age (years)	40-60	9	19	0.4414	0.022
	> 60	19	33		
Sex	Male	18	22	0.0304	3.516
	Female	10	30		
FBS (mg/dl)	< 200	14	32	0.1597	0.992
	> 200	14	20		
HbA1c (%)	6.5 – 10	4	18	0.0260	3.773
	> 10	24	34		
BMI Kg/m <sup>2</sup>	≤ 30	9	21	0.2338	0.527
	> 30	19	31		
Family History	Present	16	29	0.4530	0.014
	Absent	12	23		
Education	≤ 12	18	29	0.2302	0.545
	> 12	10	23		
Physical Activity	Inactive	21	29	0.0451	2.872
	Active	7	23		



**Figure 4: Effect of Risk Factors on Diabetic Retinopathy.**

**Retinopathy**



**Figure 5: Effect of Retinopathy on QOL of diabetic patients.**

**DISCUSSION**

In a Hospital-based Prospective observational Study of patients newly diagnosed with clinical, often symptomatic type 2 diabetes, Prevalence of Diabetic Retinopathy as a single complication was found to be 12.5%, Prevalence of NPDR was found to be 25%, PDR was found to be 10%. Male sex and high HbA1c value (> 10%) were found to be major risk factors for the prevalence of Diabetic Retinopathy.

In the previous study, it was found that DR and associated visual loss had a substantial impact on a range of QOL parameters. Crucially, socioemotional factors, such as frustration, feeling misunderstood, poor self-perception, social isolation and role limitations, were of great importance. Clinicians, researchers and rehabilitation workers should be aware of the detrimental socioemotional issues experienced by participants with DR, in addition to understanding their vision-related activity limitations. We have used the data from this study to generate items for a DR-specific QOL item bank to assess comprehensively DR related QOL impact and treatment outcomes.<sup>[18]</sup>

Participants described experiencing blurred, hazy and distorted vision and seeing black lines and dots and also described experiencing fluctuating vision and periods of temporary ‘blackness’ due to retinal hemorrhage. Participants reported difficulty with self-care activities, seeing in dim lighting, at night and in glare conditions,

and difficulty adjusting from dim to bright lights or vice versa. Many also found it challenging to move in crowded places, avoid tripping, cross a street and negotiate uneven pavements or suspended objects. Participants generally had little trouble moving about in their own homes but reported some difficulty moving around at work or other people's houses. Issues with catching public transport included getting on and off buses, trams and trains. Many participants complained of reading difficulties, especially with newspapers, books, labels, ingredients or prices. Particular difficulties included missing lines or parts of words. Several participants reported feeling depressed due to their DR and some even admitted to having suicidal thoughts. Others described feeling sad or low, upset, miserable and devastated. Many participants reported feeling frustrated because of the limitations imposed by their vision loss from DR. Participants described feeling angry, annoyed, moody and agitated, especially in cases where their eye condition continued to worsen despite vigilant diabetic control. The time of diagnosis of DR was very frightening for participants. Others described feeling scared when unexpected events occurred such as sudden loss of vision from a hemorrhage.

The diverse emotional reactions revealed in our study, such as frustration, uncertainty, fear of becoming blind, concern about driving, working and independence in the future and self-perception issues, are supported by previous qualitative work<sup>[20,21,22]</sup> Strain on personal relationships, social isolation, inability to maintain responsibilities, loss of employment and financial implications were also key themes in Devaney and colleagues' recent exploratory study.<sup>[20]</sup>

## CONCLUSION

To conclude, severely reduced sight is a very real challenge for patients with newly diagnosed type 2 diabetes. After diabetes diagnosis visual acuity deteriorates considerably. Patients newly diagnosed with type 2 diabetes should be made aware that there is an inevitable age related decline in sight but that further vision loss associated with diabetes is largely preventable through diligent ophthalmological follow up and surgical intervention. This study underlines the need of early detection of Type 2 DM along with its microvascular complication like Diabetic Retinopathy and also to prevent or retard its progression. Sex and HbA1c were found to be major risk factors for the prevalence of Diabetic Retinopathy. Patients with Diabetic Retinopathy experience negative impact on Quality of life in many aspects including anger (emotional symptom), Mobility, finance visual symptoms, pain, and vision related activity limitation (reading).

## ACKNOWLEDGEMENTS

We thank all participating pharmacists, General surgeons and patients for their collaboration in this study.

**CONFLICTING INTEREST (If present, give more details):** No conflicts of interest have been declared.

## REFERENCES

1. Hayward LM, Burden ML, Burden AC, Blackledge H, Raymond NT, Botha JL, Karwatowski WS, Duke T, Chang YF: What is the prevalence of visual impairment in the general and diabetic populations: are there ethnic and gender differences? *Diabet Med*, 2002; 19: 27-34.
2. Zhang X, Gregg EW, Cheng YJ, Thompson TJ, Geiss LS, Duenas MR, Saaddine JB. Diabetes mellitus and visual impairment: national health and nutrition examination survey, 1999-2004. *Arch Ophthalmol*, 2008; 126: 1421-7.
3. Rosenberg T, Klie F. Current trends in newly registered blindness in Denmark. *Acta Ophthalmol Scand*, 1996; 74: 395-8.
4. Ghafour IM, Allan D, Foulds WS. Common causes of blindness and visual handicap in the west of Scotland. *Br J Ophthalmol*, 1983; 67: 209-13.
5. Bamashmus MA, Matlhaga B, Dutton GN: Causes of blindness and visual impairment in the West of Scotland. *Eye*, 2004; 18: 257-61.
6. Jeppesen P, Bek T. The occurrence and causes of registered blindness in diabetes patients in Arhus County, Denmark. *Acta Ophthalmol Scand*, 2004; 82: 526-30.
7. Prasad S, Kamath GG, Jones K, Clearkin LG, Phillips RP: Prevalence of blindness and visual impairment in a population of people with diabetes. *Eye*, 2001; 15: 640-3.
8. Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, Mariotti SP: Global data on visual impairment in the year 2002. *Bull World Health Organ*, 2004; 82: 844-51.
9. Buch H, Vinding T, La CM, Nielsen NV. The prevalence and causes of bilateral and unilateral blindness in an elderly urban Danish population. The Copenhagen City Eye Study. *Acta Ophthalmol Scand*, 2001; 79: 441-9.
10. Coyne KS, Margolis MK, Kennedy-Martin T, Baker TM, Klein R, Paul MD, Revicki DA: The impact of diabetic retinopathy: perspectives from patient focus groups. *Fam Pract*, 2004; 21: 447-53.
11. Woodcock A, Bradley C, Plowright R, Ffytche T, Kennedy-Martin T, Hirsch A. The influence of diabetic retinopathy on quality of life Interviews to guide the design of a condition-specific, individualised questionnaire: the RetDQoL. *Patient Educ Couns*, 2004; 53: 365-83.
12. Brown MM, Brown GC, Sharma S, Shah G. Utility values and diabetic retinopathy. *Am J Ophthalmol*, 1999; 128: 324-30.
13. Luckie R, Leese G, McAlpine R, MacEwen CJ, Baines PS, Morris AD, Ellis JD. Fear of visual loss in patients with diabetes: results of the Prevalence of Diabetic Eye Disease in Tayside, Scotland (P-DETS) study. *Diabet Med*, 2007; 24: 1086-92.

14. Miki E, Lu M, Lee ET, Keen H, Bennett PH, Russell D. The incidence of visual impairment and its determinants in the WHO multinational study of vascular disease in diabetes. *Diabetologia*, 2001; 44: S31-S36.
15. Nielsen NV: Diabetic retinopathy II. The course of retinopathy in diabetics treated with oral hypoglycaemic agents and diet regime alone. A one year epidemiological cohort study of diabetes mellitus. The Island of Falster, Denmark. *Acta Ophthalmol*, 1984; 62: 266-73.
16. Moss SE, Klein R, Klein BEK. The Incidence of Vision Loss in A Diabetic Population. *Ophthalmology*, 1988; 95: 1340-8.
17. Voutilainen-Kaunisto RM, Terasvirta ME, Uusitupa MIJ, Niskanen LK: Agerelated macular degeneration in newly diagnosed type 2 diabetic patients and control subjects - A 10-year follow-up on evolution, risk factors, and prognostic significance. *Diabetes Care*, 2000; 23: 1672-8.
18. Baba. D, Muthu Krishnan. V, Sandeep Bhaskaran, Pranav Kumar. S and Poovitha. R: Prevalence of Diabetic Retinopathy and Correlation With Systemic Risk Factors In Type 2 Diabetes Mellitus In A Tertiary Care Hospital, *SJAMS*, 2015; 3: 2659-64.
19. Eva Fenwic. K, Konrad Pesudovs, Jyoti Khadka, Mohamed Dirani, Gwyn Rees, Tien Wong. Y, Ecos. L and Lamoureu. X. The impact of Diabetic Retinopathy on Quality of Life: Qualitative findings from an item bank development project. *Qual Life Res*, 2012; 21: 1771-82.
20. Devenney. R, O'Neil. S: The experience of diabeticretinopathy: A qualitative study. *British Journal of Health Psychology*, 2010.
21. Woodcock, A., et al. The influence of diabetic retinopathy on quality of life: Interviews to guide the design of a conditionspecific, individualised questionnaire: the RetDQoL. *Patient Education and Counseling*, 2014; 53(3): 365-83.
22. Oehlergiarratana, J., & Fitzgerald, R. G. Group-therapy with blind diabetics. *Archives of General Psychiatry*, 1980; 37(4): 463-7.