Prevalence of diabetic retinopathy in diabetics of rural population belonging to Ramanagara and Chikkaballapura districts of Karnataka

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Abstract- **AIMS:** To estimate the prevalence of diabetic retinopathy among the diabetics of Chikkaballapur and Ramanagara Districts of Karnataka, India.

METHODS: A descriptive population based cross sectional study for a period of six months from October 2013 to March 2014 was carried out. All diabetics from five taluks of Chikkaballapur and four taluks of Ramanagara were examined on predetermined date and time at taluk hospitals. Detailed history, detailed ocular examination, height, weight, blood pressure, fasting blood sugar were recorded in a proforma with structured questionnaire on awareness of diabetes and diabetic retinopathy(DR). DR was clinically graded according to Early Treatment Diabetic Retinopathy Study (ETDRS) classification.

RESULTS: 321 patients (642 eyes) were examined with male preponderance and prevalence of DR was found to be 21.2% (68), out of which 85.3% (58) was non proliferative DR, 14.7% (10) was proliferative DR.

CONCLUSION: DR is becoming an important cause for visual disability in India. Rural communities have limited access to medical services. Preventive measures have to be taken by creating awareness, screening programmes for detecting early disease. Early intervention and timely management are required to reduce the burden of visual loss due to DR.

Index Terms- Diabetic retinopathy, rural diabetes screening, diabetic macular edema

I. INTRODUCTION

Diabetes mellitus is defined as a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both.[1] Epidemiologic data suggest that diabetic retinopathy is the leading cause of new cases of blindness in people between the age group of 20-74 years.[2] The prevalence of diabetic retinopathy (DR) in the Chennai Urban Rural Epidemiology (CURES) Eye Study in south India was 17.6 per cent, which is significantly lower than age-matched western counterparts. Prevalence of diabetic macular edema (DME) in the total diabetic population was 5.0 per cent while among the known diabetic subjects it was 6.3 and 1.1 per cent among the newly diagnosed diabetic subjects. This study also showed that the major systemic risk factors for onset and progression of DR are duration of diabetes, degree of glycaemic control and hyperlipidaemia.[3] Visual impairment associated with diabetes mellitus and diabetic eye disease may result from macular ischemia, DME, vitreous hemorrhage, or tractional retinal detachment. Of these, macular edema is the most common cause of visual impairment. Further data from the Wisconsin Epidemiologic Study of Diabetic Retinopathy suggest that the 14-year incidence of DME is 26%.[4] DR is the commonest cause of blindness in the age group of 45-65 year old in developed countries. Further this is a consequence of diabetic maculopathy or proliferative diabetic retinopathy and its sequelae. Of these two, diabetic maculopathy is more frequent and is the cause of visual loss in over 75% of adults with diabetes mellitus.[5] DR is a vascular disorder affecting the microvasculature of retina. Capillary damage is apparent in the earliest stages of DR by loss of the retinal pericytes that is the mural cells and capillary basement membrane thickening.[6] With increasing duration and severity of hyperglycemia, there occurs eventual capillary closure and microaneurysm formation.[7] Majority of diabetics have no symptoms until late stages by which it may be too late for effective treatment. It is one of major cause of morbidity in patients suffering from diabetics mellitus of longer duration.

WHO estimates the global prevalence of diabetes mellitus will increase from 2.8% to 4.4% for the year 2000 to 2030. India is known as 'Diabetic capital of the World' with a diabetic population of 40.9 million, projected to rise to 79.4 million by year 2030. With 41 million Indians having diabetes, every fifth diabetic in the world is an Indian.[8] This is fast becoming an important cause for visual disability in India. The associated systemic risk factors being hypertension, high glycosylated hemoglobin, systolic blood pressure, pulse pressure, lipoprotein level and body mass index. The significant sight threatening risk factors are chronic kidney disease, cardio vascular disease and hyperlipidaemia.An international clinical severity scale was developed for diabetic retinopathy and diabetic macular edema (DME). This is based on Early Treatment Diabetic Retinopathy Study (ETDRS) which is graded into mild, modular, severe, very severe, proliferative diabetic retinopathy, high risk and advanced diabetic retinopathy.[9,10] The screening tools used to stage the disease are Direct Ophthalmoscope, Indirect Ophthalmoscope, Slit Lamp Biomicrosope and Fundus Photography. Frequent follow ups and control of hyperglycemic states are required for reducing the visual loss due to diabetic retinopathy.

II. MATERIALS AND METHODS

A descriptive cross sectional study for period of 6 months was conducted from October 2013 to March 2014. Two districts

of Karnataka i.e. Ramanagara and Chikkaballapura were selected for pilot project. Each district had 4-5 taluks each. Every month one taluk of each district were selected for visit at predetermined time and date by ophthalmologists, ophthalmic assistants, and refractionist. The taluk Medical Officer, community workers, block health educators would direct all diabetics for screening at taluk head quarter hospital.All patient details were documented in the proforma containing name, age, contact details, detailed history, family history, risk factors, diabetic status, height, weight, FBS (fasting blood sugar), co morbidities, life style and awareness level was assessed with a structured questionnaire. Visual acuity was tested with snellens' chart or illiterate E-chart. Detailed anterior and posterior segment evaluation was done with direct and indirect ophthalmoscope. FBS checked at the taluk hospital.The patients clinically graded according to ETDRS

Study. The patients with no diabetic retinopathy changes were asked for regular annual check-up. Mild to moderate diabetic retinopathy patients were asked to review with HBA_1C, Lipid profile, FBS and PPBS reports after three months. Very severe and PDR patients were referred to base hospital for further management. The awareness meetings were conducted for all diabetics, educated about frequent follow-up, life style modification, diet, control of hyperglycemic state.

III. RESULTS

321 rural diabetic patients were examined and the overall prevalence was found to be 21.2%. Of these, 85.3% patients had NPDR and 14.7% had PDR.
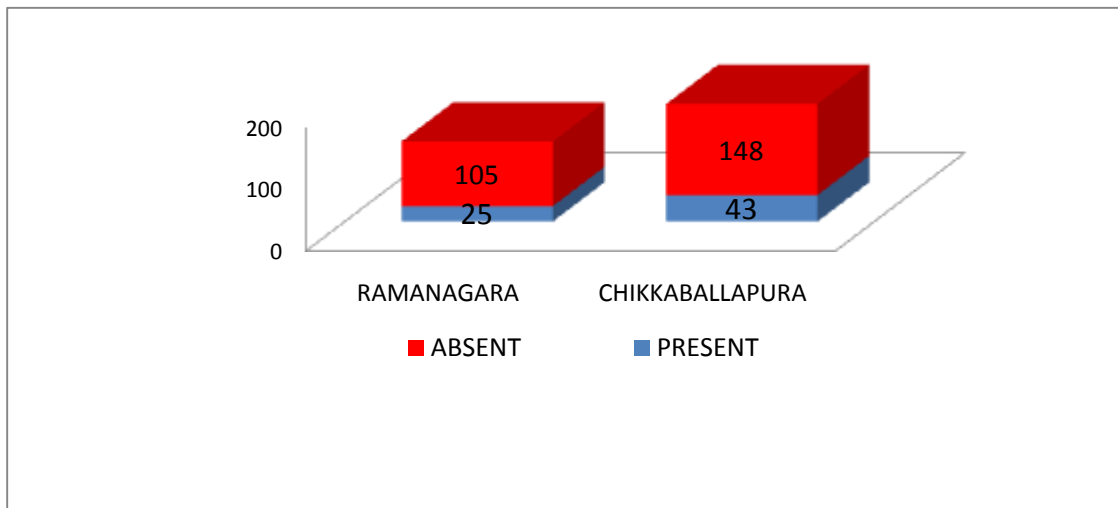

Figure 1: District wise prevalence: 321 patients

Retinopathy changes are significantly increased with duration of diabetes and male   preponderance.(Figure 2)
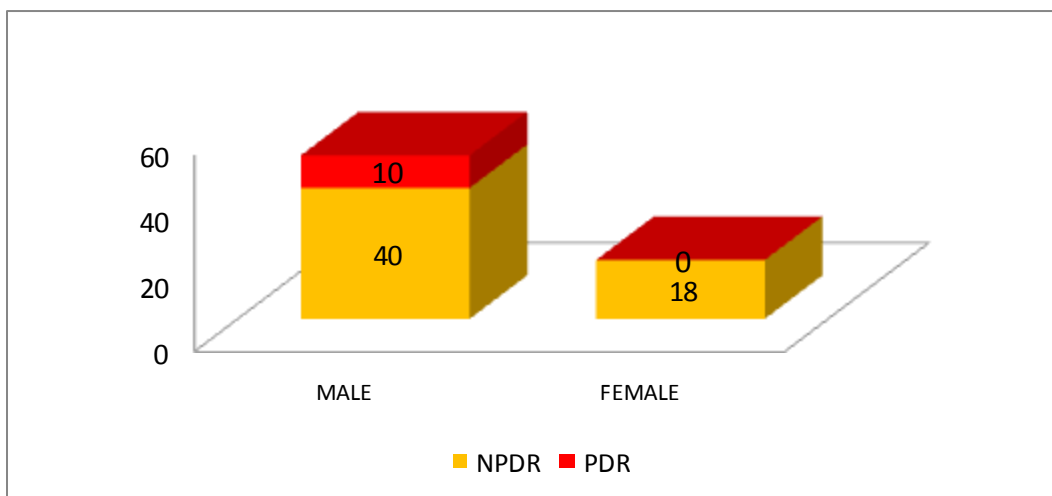

Figure 2: Gender wise distribution of diabetic retinopathy
p=0.052

DR was found to be the maximum (45%) in patients with diabetes mellitus for more than 15 years. While only 11.5% of the diabetics with duration of DR less than five years had diabetic retinopathy. (Figure 3)
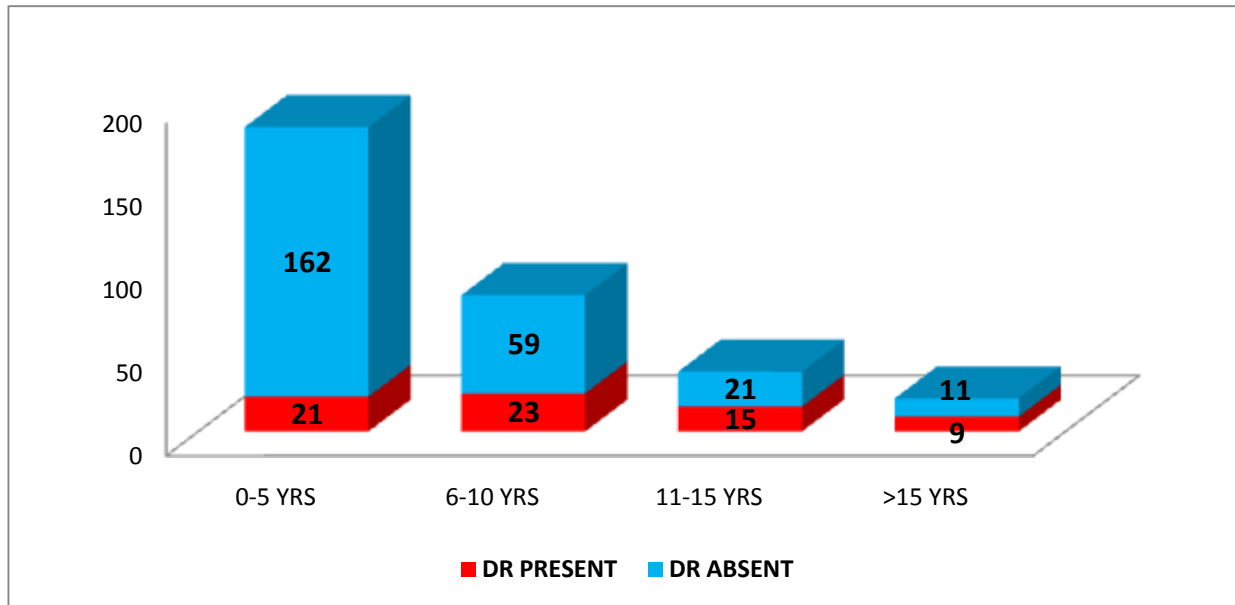

Figure 3: Prevalence according to duration of diabetes. p<0.001

The glycaemic control too had an effect on the presence of DR. Patients with a fasting blood sugar more than 140 mg/dl had 24.5% DR prevalence as compared to 14.3% in those with fasting sugar less than 140 mg/dl. (Figure 4)
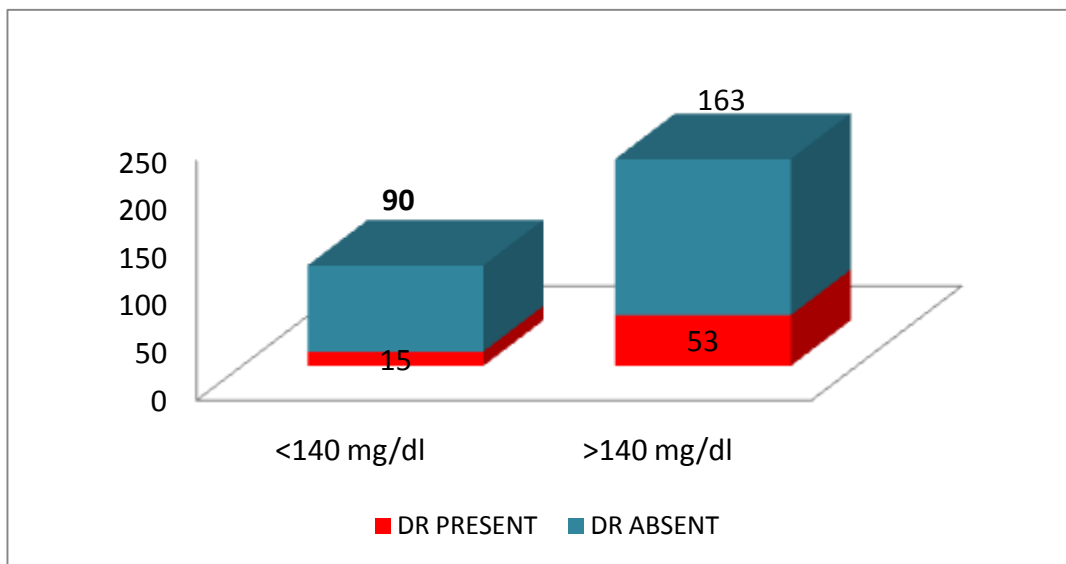

Figure 4: Prevalence according to FBS levels p=0.035

BMI (Body mass index) was also associated with DR. Patients with BMI more than 25 had a higher prevalence of DR. (Figure 5)
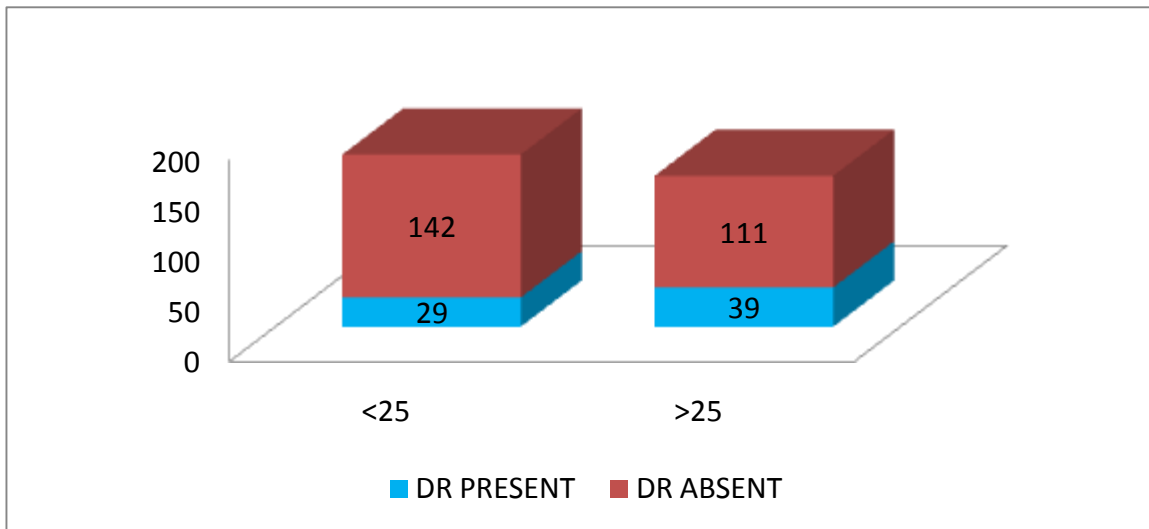
Figure 5*: Diabetic retinopathy prevalence according to BMI p=0.048

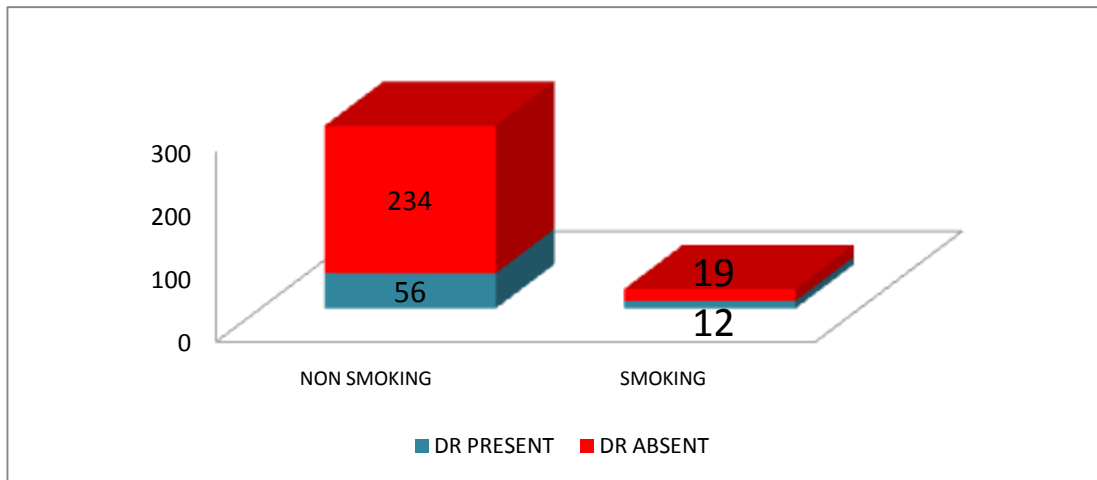Smokers are found be having a higher prevalence of DR as compared to the non-smoking population. (Figure 6)

Figure 6: Diabetic retinopathy prevalence according to smoking. p=0.012

Table 1. The prevalence of diabetic retinopathy in our study is 21.2% which is more compared to previous studies

Study	Prevalence	Duration of dm(yrs)				Prevalence with FBS (mg/dl)	
		<5	5-10	10-15	>15	<140	>140
Present study	21.2%	11.5%	28%	41.7%	45%	14.3%	24.5%
SN-dreams iii11	10.3%	6.3%	18.1%	27.8%	37.1%	-	-
Suraj eye hospital 12	9.6%	-	-	-	-	-	-

IV. DISCUSSION

The prevalence of adult diabetes worldwide is anticipated to rise from 4.0% in 1995 to 5.4% by 2025.[13] Given this rising prevalence, it is expected that diabetic retinopathy and diabetic macular edema will continue to be common and will be important causes of vision impairment. DR is the leading cause of legal and functional blindness for people in their working years (ages 25–75 years) worldwide. The overall incidence of DR continues to be in the rising trend looking at the population with new onset diabetes mellitus.[14]Present study conducted in the rural areas points towards rising trend of diabetic retinopathy. A similar population based study conducted by Narendran el al. among 260 diabetics found a prevalence rate of DR to be 26.8%.[15] A study conducted in the urban population of Andhra Pradesh had 22.4% prevalence of DR amongst the diabetics.[16] The Diabetes Control and Complications Trial (DCCT) reported that 27% of patients with DR develop macular edema within nine years of diabetes onset.[17]The rural areas are underprivileged in terms of medical facilities in the form of screening as well as treatment. This calls for an urgent need of attention towards this less fortunate part of our society. This sight threatening condition can be controlled with timely intervention and thus, spreading awareness and provision of good eye care facilities can reduce the burden of visual handicap in the so called urbanizing rural population.

V. CONCLUSION

Prevalence of diabetic retinopathy in rural population is significantly high as compared to previous studies which is affected by the glycaemic control state and associated risk factors. Considering the large burden of diabetic retinopathy is important to identify them at the earliest by screening programmes to modify the course of the disease. There is a need to create awareness among health professionals about timely referral for evaluation. Patient education and formulation of appropriate health care policies is need of the hour to prevent this burden of visual impairment.

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