



ORIGINAL RESEARCH PAPER

Medicine

PREVALENCE OF DIABETIC RETINOPATHY AND NEPHROPATHY IN DIABETICS OF RURAL POPULATION BELONGING TO VINDHYA REGION AT TERTIARY CARE CENTRE REWA

KEY WORDS: Diabetes, Retinopathy, Nephropathy, Rural population

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| Keshav Singh | Assistant Professor Department Of Medicine, Shyam Shah Medical College And S.G.M.H, Rewa M.P. |
| Praveen Kumar Baghel | Professor Department Of Medicine, Shyam Shah Medical College And S.G.M.H, Rewa M.P. |
| Umesh Pratap Singh | PG Resident Department Of Medicine, Shyam Shah Medical College And S.G.M.H, Rewa M.P. |

ABSTRACT

BACKGROUND: Diabetes is a major public health problem in our country and complications of diabetes like Retinopathy and Nephropathy are a major cause of morbidity and mortality. The prevalence of diabetes and its complications is now rapidly increasing in India among the poor in the urban slum dwellers, the middle class and even in the rural areas. There is a need to quantify the complications in order to improve our strategies for prevention and management.

MATERIAL AND METHODS: 500 Type 2 Diabetic patients from rural area of Vindhya region were included in the study. A detailed history, physical examination, Blood investigations like FBS, PPBS, lipid profile, blood urea and serum creatinine and Urine routine microscopy was done. Retinopathy was diagnosed by ophthalmoscope and Nephropathy was diagnosed on the basis of microalbuminuria or gross albuminuria or deranged urea and creatinine level or Ultrasonography.

OBSERVATIONS AND RESULTS: Prevalence of Retinopathy was 17.2% and Nephropathy was 23.4%. Trend analysis showed significant association of rising prevalence of retinopathy and nephropathy with age, male gender, illiteracy, duration of diabetes, insulin use, irregular treatment, hypertension, smoking, obesity, uncontrolled blood sugar and dyslipidemia. (p<0.05).

CONCLUSION: DR is becoming an important cause for visual disability and DN is common cause of end stage renal disease 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 and renal failure due to DN.

INTRODUCTION:

Diabetes mellitus is accepted as a worldwide epidemic with an estimated increase in prevalence from 2.8% in 2000 to 4.4% by 2030.¹ Diabetes is always associated with long-term complications. Preventing complications is important because of the morbidity, mortality, and health care costs associated with diabetes complications. Microvascular complications such as Diabetic Retinopathy and Diabetic Nephropathy are common. Diabetic nephropathy is the single most common cause of end-stage renal disease² and Diabetic Retinopathy (DR) is the leading cause of vision loss in adults aged 20–74 years.³ The prevalence of diabetes and its complications is now rapidly increasing in India among the poor in the urban slum dwellers, the middle class and even in the rural areas. This is due to changes in lifestyle and dietary habits associated with urbanization and globalization. The earlier a person is diagnosed and management initiated, the better the chances of preventing harmful and costly complications.

MATERIAL AND METHODES:

This study was carried out in 500 patients attending Medicine OPD and those admitted in Department of Medicine, S.S. Medical College and associated S.G.M. Hospital, Rewa (M.P.) from April 2016 to July 2017. Study group include persons who were type 2 Diabetic (ADA 2011 criteria)⁴ living in rural area of Vindhya region.

After informed consent, data was collected on gender, age, duration of diabetes, educational status, tobacco chewing, smoking and hazardous drinking habits, type of treatment, adherence to treatment, past history of HTN, CVA and CAD. They underwent a thorough physical examination which includes weight, height, waist circumference and BMI was calculated. Blood investigation like Fasting blood sugar (FBS), post prandial blood sugar (PPBS), blood Urea, Serum Creatinine and lipid profile was done. Urine routine microscopy was done for sugar, ketone and albumin in urine. USG Abdomen was done in selected patients.

Hypertension was diagnosed according to JNC-7 criteria, those with systolic blood pressure >140 mmHg and diastolic blood pressure >90 mmHg or who were taking antihypertensive

medication were considered to have hypertension.⁵ Blood sample for lipid profile was taken after an overnight fast. Dyslipidemia was defined if patient had Total cholesterol >200mg/dl, Serum Triglyceride >150 mg/dl, Serum HDL <40 mg/dl in males, <50 mg/dl in female and Serum LDL >100 mg/dl.⁶

Fundus examination was done using ophthalmoscope after full mydriasis by tropicamide. Early diagnosis and treatment of retinopathy study (EDTRS)⁷ classification was used to diagnose retinopathy. Nephropathy was diagnosed on the basis of microalbuminuria or gross albuminuria or deranged urea and creatinine level or Ultrasonography. Data was expressed in means and proportion. Statistical analysis is done using Chi square test and SPSS Version 22.0 software.

OBSERVATION AND RESULTS:

Out of 500 patients 86 (17.2%) patients showed evidence of Diabetic Retinopathy. This comprised of 38 (44.18%) patients of mild NPDR, 25 (29.06%) of moderate NPDR, 14 (16.27%) of Severe NPDR, 4 (4.65%) of Very Severe NPDR and 5 (5.81%) patients of PDR. 117 (23.4%) patients showed evidence of Diabetic Nephropathy. (Fig 1)

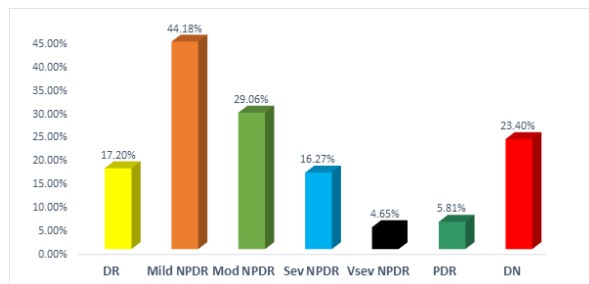


Figure 1: Prevalence of DR and DN

Table 1: Association of DR and DN

| DR | DN Present | DN Absent |
|-----------------------|-------------|--------------|
| Present (n=86) | 51 (59.30%) | 35 (40.69%) |
| Absent (n=414) | 66 (15.94%) | 348 (84.05%) |

| | | |
|---------------|-------|-------|
| Total (n=500) | n=117 | n=383 |
|---------------|-------|-------|

X² = 74.691 p value < 0.0001

Out of 86 patients of DR, 51 (59.30%) patients had DN and 35 (40.69%) patients have no DN. Significant association between Retinopathy and Nephropathy. (p<0.001) (Table 1)

Table 2: Variables associated with Retinopathy and Nephropathy

| Variable | Category | Diabetic Retinopathy | | Diabetic Nephropathy | |
|--------------------|--------------------|----------------------|---------|----------------------|---------|
| | | Percentage | P value | Percentage | P value |
| Gender | Male (n=277) | 62(22.38%) | 0.0006 | 76(27.43%) | 0.0175 |
| | Female (n=223) | 24(10.76%) | | 41(18.38%) | |
| Age group (years) | 31-40 (n=30) | 3 (10%) | 0.0429 | 4 (13.33%) | 0.0353 |
| | 41-50 (n=150) | 20 (13.33%) | | 26 (17.33%) | |
| | 51-60 (n=153) | 37 (24.18%) | | 48 (31.73%) | |
| | 61-70 (n=94) | 16 (17.02%) | | 21 (22.34%) | |
| | >70 (n=73) | 10 (13.69%) | | 18 (24.65%) | |
| Educational status | Illiterate (n=280) | 58 (20.71%) | 0.0188 | 80 (28.57%) | 0.002 |
| | Literate (n=220) | 28 (12.72%) | | 37 (16.81%) | |
| Tobacco smoking | Present (n=140) | 32 (22.85%) | 0.0436 | 42 (30%) | 0.0297 |
| | Absent (n=360) | 54 (15%) | | 75 (20.83%) | |

Diabetic Retinopathy and Diabetic Nephropathy was significantly higher in males as compared to females, illiterate as compared to literate and tobacco smoker as compared to non-smoker. (p value < 0.05). Retinopathy and Nephropathy was maximum in the age group of 51-60 year. (Table 2)

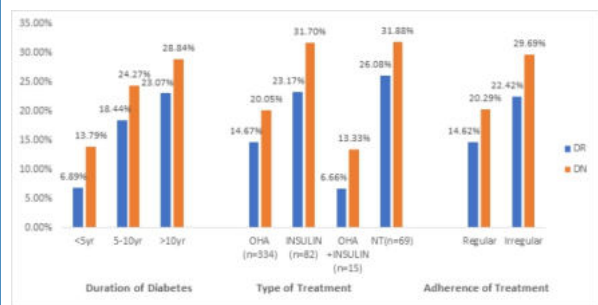


Figure 2: Prevalence according to duration of diabetes and type of treatment

Prevalence of Retinopathy and Nephropathy increased significantly (p<0.05) with increase in duration of diabetes. DR and DN was maximum in patients who were not on any treatment and in treatment group maximum with Insulin use. (p value < 0.05) (Fig 2)

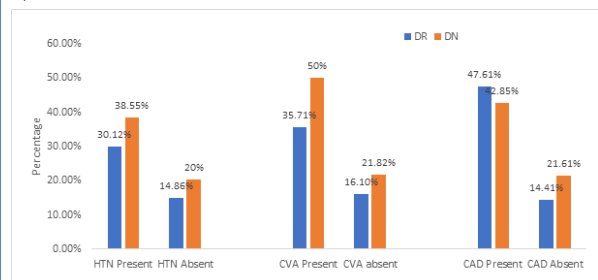


Figure 3: Effect of Hypertension, CVA and CAD on DR and DN

Patients with history of Hypertension, CVA and CAD are more prone for development of Retinopathy and Nephropathy as compared to patients without positive history. (p value < 0.001) (Fig 3)

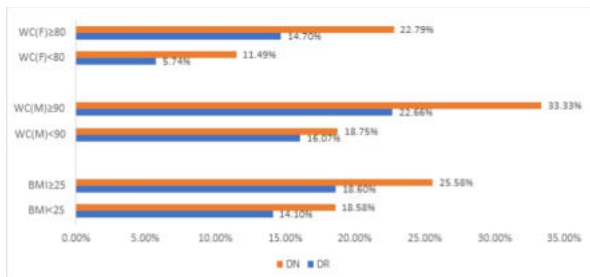


Figure 4: Effect of BMI and waist circumference on DR and DN

Diabetic Retinopathy and Diabetic Nephropathy was increased as BMI and central obesity (WC ≥90 cm for male and ≥80 cm for female) increases. (p value < 0.05) (Fig 4)

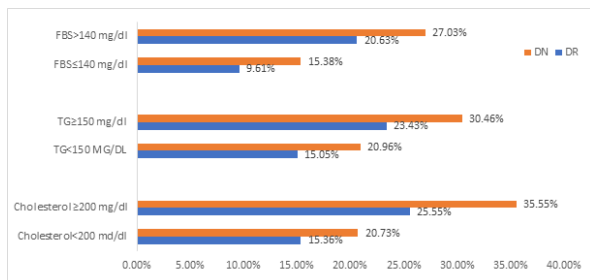


Figure 5: Relationship of DR and DN with Total Cholesterol, Triglycerides and Fasting Blood Sugar level

Diabetic Retinopathy and Diabetic Nephropathy was increased as Cholesterol, Triglyceride and Fasting Blood Sugar level increases. (p value < 0.05) (Fig 5)

DISCUSSION:

In our study prevalence of Retinopathy and Nephropathy was 17.2% and 23.4% respectively. 44.18% had mild NPDR, 29.06% had moderate NPDR, 16.27% had Severe NPDR, 4.65% had Very severe NPDR and 5.81% patients had PDR. Kumar HK et al⁸ reported that prevalence of diabetic nephropathy was 20% and diabetic retinopathy was 17%. Study conducted by Tanuja A et al⁹ found that 18.5% patients had evidence of diabetic retinopathy. This included 71.1% patients with mild to moderate non-proliferative diabetic retinopathy (NPDR), 17.4% patients with severe NPDR and 8.1% patients with proliferative diabetic retinopathy (PDR).

In this study retinopathy and nephropathy was strongly associated. Out of 86 patients of retinopathy, 51 (59.30%) patients had diabetic nephropathy. Similarly, Reddy YJ et al¹⁰ found strong association between diabetic retinopathy and diabetic nephropathy.

In this study Retinopathy and Nephropathy was more common in males (28.83% and 37.81%) as compared to females (12.06% and 22.52%) and in the age group of 51-60 yrs. Rema M et al¹¹ reported that prevalence of diabetic retinopathy was more in males as compare to females (21.3% vs 14.6%) and maximum in the age group of 40-49 yrs. Aishwarya VA et al¹² reported that prevalence of diabetic nephropathy was more in males as compare to females (22.5% vs 6.25%) and maximum in the age group of 40-60 yrs.

In this study we found that increase duration of diabetes, insulin use, illiteracy and non-adherence to treatment were significantly associated with development of Retinopathy and Nephropathy.

Similarly, **Raman R et al**¹³ found that retinopathy and **Klein R et al**¹⁴ found that nephropathy was significantly associated with duration of diabetes and insulin use. **Byun SH et al**¹⁵ showed that the risk for nephropathy and retinopathy increases as literacy decreases.

In this study hypertensive patients had more diabetic retinopathy (30.12 % vs 14.62%) and diabetic nephropathy (38.55 % vs 20.38%) as compared to normotensive patients. Similarly, **Raman R et al**¹³ concluded that prevalence of DR was higher in patients with systolic blood pressure of >140 mm Hg (19.8% vs 8.6%) and **Agrawal N et al**¹⁶ found that incidence of nephropathy increased significantly with increase in blood pressure.

History of CVA and CAD were significantly associated with development of Retinopathy and Nephropathy. Similarly, **Cheung N et al**¹⁷ found that diabetic retinopathy was associated with an increased risk of ischemic stroke and CHD event. **Chandy A et al**¹⁸ found that diabetic nephropathy was associated with increases risk of stroke and CAD.

In this study we found that there is significant association between tobacco smoking and prevalence of diabetic retinopathy (22.85% vs 15%) and diabetic nephropathy (30% vs 20.83%). **Orth SR et al**¹⁹ found similar association of tobacco smoking and progression of diabetic retinopathy and diabetic nephropathy.

Our study showed significant association between BMI and prevalence of Retinopathy and Nephropathy. **Narasimhamurthy B et al**²⁰ found that prevalence of DR with BMI>25 was 28.45% and with BMI <25 was found to be 15.64%. Study conducted by **Agrawal N et al**¹⁶ showed that incidence of nephropathy increased with increase in BMI.

In this study we found that central obesity (WC≥90 cm in male and WC≥80cm in female) was significantly associated with prevalence of Retinopathy and Nephropathy. **Dirani M et al**²¹ observed that greater WC (OR, 1.09; 95% CI, 1.01–1.21; P = 0.047) was significantly associated with any DR. **Azmi S et al**²² found that larger waist circumference was significantly associated with nephropathy.

In this study patients with hypercholesterolemia developed more diabetic retinopathy (25.55% vs 15.36%) and diabetic nephropathy (35.55% vs 20.73%) as compared to normal cholesterol level and similarly, patients with hypertriglyceridemia developed more diabetic retinopathy (24.43% vs 15.05%) and diabetic nephropathy (30.46% vs 20.96%) as compared to normal triglyceride level. **Rema M et al**¹¹ showed significant association of DR with total cholesterol and serum triglycerides. **Bannerji MA et al**²³ showed that incidence of nephropathy increased significantly with increasing dyslipidemia.

In this study patients with FBS ≥140 md/dl have more diabetic retinopathy (20.63% vs 9.61%) and diabetic nephropathy (27.03% vs 15.38%) as compared to patients with FBS <140md/dl. **Rema M et al**¹¹ found that subjects with retinopathy were higher fasting plasma glucose than subjects without retinopathy. **Kumar S et al**²⁴ found that fasting plasma glucose is positively associated with the incidence of diabetic nephropathy.

CONCLUSION:

Prevalence of diabetic retinopathy and diabetic nephropathy in rural population of Vindhya region is significantly high which is affected by illiteracy, nonadherence to drug, smoking, hypertension, uncontrolled blood sugar, obesity and dyslipidemia. Considering the large burden of diabetic retinopathy and nephropathy, it 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 blindness and renal failure.

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