

**PREVALENCE OF DIABETIC RETINOPATHY AND MICROALBUMINURIA IN PREDIABETIC PATIENTS ATTENDING OPD IN TERTIARY CARE CENTRE IN NORTH KARNATAKA**

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ABSTRACT **BACKGROUND:** Diabetes is a chronic disease that arises when insulin generation is insufficient or insulin cannot be used in the body. India is one country with greater number of diabetic patients. Prediabetes is a precursor for future diabetes and related complications. Detecting prediabetes on time and early intervention will slow down the progression into diabetes. Microalbuminuria and diabetic retinopathy are the early indicator of pre diabetes. **AIM& OBJECTIVES** To study the prevalence of microalbuminuria & diabetic retinopathy in patients with prediabetes in rural India. **MATERIALS AND METHODS** A retrospective study conducted in tertiary care hospital in rural India for a period of 6 months. Patients details collected from available medical records. The study population consisted of individuals who visited the medicine outpatient department who were screened for prediabetes, defined according to the American Diabetes Association (ADA) criteria. Baseline data, including demographic profile, history of blood pressure, were collected. Microalbuminuria analyzed using an immuno-turbidimetric test for quantitative determination of urine albumin was extracted from records. Additionally, fundus examination was performed by ophthalmoscopy by experienced ophthalmologist. **RESULTS** The prevalence of microalbuminuria in this study is 20% and diabetic retinopathy is 8.3%. **CONCLUSION** This study highlights the importance of medical intervention in individuals with prediabetes, in addition to those with diabetes mellitus, to control blood glucose levels. The presence of chronic microvascular complications, such as nephropathy and retinopathy, in our prediabetic population emphasizes the need for regular screening for complications in all individuals with prediabetes. While lifestyle modification is the mainstay of therapy for prediabetes, medical treatment should be considered as adjuvant therapy. Additionally, other risk factors in prediabetes should be taken into account for effective management. The high prevalence of chronic complications in prediabetes suggests that the threshold for blood glucose levels to diagnose diabetes mellitus and prediabetes should be reevaluated.

KEYWORDS : Pre diabetes, Diabetic retinopathy, Microalbuminuria, Prevalence.

INTRODUCTION:

Diabetes is a chronic disease that arises when insulin generation is insufficient, or the generated insulin cannot be used in the body, resulting in a long-term metabolic disorder. Diabetes affects an estimated 537 million adults worldwide between the age of 20 to 79 (10.5% of all adults in this age range). By 2030, 643 million people will have diabetes globally, increasing to 783 million by 2045. According to the IDF 10th edition, the incidence of diabetes has been rising in South-East Asia (SEA) nations (1). The countries with the highest number of adults with diabetes include China, India, and the USA. The estimated prevalence of diabetes and prediabetes in India is 101 million and 136 million, respectively (2).

Prediabetes is an alarming condition where blood sugar levels are higher than normal, but not high enough yet to be diagnosed as type 2 diabetes, affecting 373.9 million people globally (3). India has 136 million people with prediabetes (2). Studies indicated that nearly 40% to 50% of Indian prediabetics may develop type 2 diabetes over three to five years (3).

Microalbuminuria represents an abnormally elevated urine albumin level that cannot be detected with the use of a urinalysis dipstick. Microalbuminuria is an early predictor and a sensitive assay to detect urinary albumin excretion which can precede the development of overt nephropathy in T2DM. Prompt detection and treatment can reduce the risk and possibly delay the development of ESRD. The American Diabetes Association recommends annual screening for microalbuminuria in patients of T2DM (4). Microalbuminuria is also commonly associated with cardiovascular risk. Microalbuminuria is strongly associated with diabetic retinopathy and can be used as a reliable marker of diabetic retinopathy (5).

Diabetic retinopathy is second leading cause of blindness in India. It is an early indicator of vascular abnormalities in diabetes. The pathophysiology of diabetic retinopathy is loss of pericytes, endothelial damage which leads to formation of microaneurysm, hemorrhages and cotton wool spots. Undetected cases can lead to complications like retinal detachment, macular ischemia and

permanent blindness (6).

ETDRS Classification of diabetic retinopathy helps in early treatment and followup.

TABLE 1: ETDRS CLASSIFICATION (6)

GRADING	FINDINGS
Mild NPDR	At least one microaneurysm, AND criteria not met for more severe Retinopathy.
Moderate NPDR	Hemorrhages/microaneurysms AND/OR cotton-wool spots, venous beading, or IRMA definitely present; AND criteria not met for more severe retinopathy
Severe NPDR	Any of the following (4-2-1 rule) >20 intra retinal hemorrhages in each four quadrants Definite venous beading in two or more quadrants Prominent IRMA in one or more quadrants AND criteria not met for more severe retinopathy.
Early PDR	New vessels; AND criteria not met for high-risk PDR
High-risk PDR	New vessels on or within one disc diameter of the optic disc (neovascularization of the disc [NVD]) ≥ with or without vitreous or preretinal hemorrhage; OR vitreous and/or preretinal hemorrhage accompanied by new vessels, either NVD < standard or new vessels elsewhere (NVE) ≥ disc area.

One of the most disturbing trends seen in India is the shift in age of onset of diabetes to a younger age in the recent years. This has a direct impact on nation's health and economy. It is also linked with a higher prevalence of retinopathy.

MATERIALS AND METHODS

A retrospective study was conducted in the Department of General Medicine from June 2023 to December 2023, spanning a period of six months. Data was collected from medical records available in the General Medicine Department and NCD Clinic. The study population consisted of patients who presented to the General Medicine OPD and underwent evaluation for diabetes mellitus. The following data was collected Patient's age and sex, History of hypertension, Family history of diabetes. Investigations including fasting blood sugar level, postprandial blood sugar level, HbA1C and Microalbuminuria detected by Immuno-turbidometric test for quantitative determination of urine albumin using Beckman Coulter Values of microalbuminuria level were noted. Additionally, patients were referred to the Ophthalmology OPD for fundus examination using Slit lamp with 90D lens, Indirect ophthalmoscope with 20D lens.

INCLUSION CRITERIA.

1. Patients ≥ 20 years of age
2. Patients with FBS 100-125 mg/dl
3. Patients with PPBS 140-199 mg/dl
4. Patients with HbA1C 5.7% to 6.4%

EXCLUSION CRITERIA

1. Patients < 20 years of age
2. Type 1 diabetes patients
3. Microalbuminuria due to other causes

RESULT

The following tables represents the frequency and percentage distribution of various characteristics of the study population, including age, sex, history of hypertension, family history of diabetes, Fasting blood sugar level, post prandial blood sugar level, glycosylated hemoglobin level, microalbuminuria and diabetic retinopathy.

TABLE 2: AGE DISTRIBUTION

AGE OF THE PATIENT	NO OF PATIENTS	PERCENTAGE
20-35	4	6.6
35-50	12	20
50-65	28	46.6
65-80	16	26.6

TABLE 3: SEX DISTRIBUTION

	NO OF PATIENTS	PERCENTAGE
MALE	36	60
FEMALE	24	40

TABLE 4: HISTORY OF HYPERTENSION

	NO OF PATIENTS	PERCENTAGE
PRESENT	14	23.3
ABSENT	46	76.6
TOTAL	60	100

TABLE 5: FASTING BLOOD SUGAR LEVEL

FASTING BLOOD SUGAR LEVEL	NO OF PATIENTS	PERCENTAGE
NORMAL	26	43.3
PRE DIABETIC	34	56.6
TOTAL	60	100

TABLE 6: POST PRANDIAL BLOOD SUGAR LEVEL

POST PRANDIAL BLOOD SUGAR LEVEL	NO OF PATIENTS	PERCENTAGE
NORMAL	23	38.3
PRE DIABETIC	37	61.6
TOTAL	60	100

TABLE 7: HbA1C LEVEL

HbA1C LEVEL	NO OF PATIENTS	PERCENTAGE
NORMAL	31	51.6
PRE DIABETIC	29	48.3
TOTAL	60	100

TABLE 8: URINE MICROALBUMIN LEVEL

URINE MICROALBUMIN LEVEL	NO OF PATIENTS	PERCENTAGE
PRESENT	12	20
ABSENT	48	80
TOTAL	60	100

TABLE 9: DIABETIC RETINOPATHY

DIABETIC RETINOPATHY	NO OF PATIENTS	PERCENTAGE
PRESENT	5	8.3
ABSENT	55	91.6
TOTAL	60	100

TABLE 10: GRADING OF DIABETIC RETINOPATHY

GRADING	NO OF PATIENTS	PERCENTAGE
Mild NPDR	3	5
Moderate NPDR	2	3.3
Severe NPDR	0	0
PDR	0	0

DISCUSSION

This retrospective study was conducted in a rural area of north Karnataka and included 30 prediabetic patients diagnosed according to ADA criteria. The study population consisted of patients between 20-80 years old, with a mean age of 52.5 years (Table 2). The gender distribution was 60% males (36 patients) and 40% females (24 patients) (Table 3).

The study found that 23.3% (14 patients) had hypertension (Table 4), which is an important factor in ruling out other causes of albuminuria.

The study also found that 56.6% (34 patients) had fasting blood sugar levels in the prediabetic range (Table 5), 61.6% (37 patients) had postprandial blood sugar levels in the prediabetic range (Table 6) and 48.3% (29 patients) had HbA1C levels in the prediabetic range (Table 7).

Microalbuminuria was present in 20% (12 patients) of the study population (Table 8), which is consistent with previous studies. For example, Branda JIF et al (7) found a prevalence of 26% in patients with microalbuminuria, while Bahar et al (8) reported a prevalence of 15.5%. This suggests that microalbuminuria is an early indicator of kidney injury in prediabetic patients.

The study also found a prevalence of diabetic retinopathy of 8.3% (Table 9), which is consistent with previous studies. For example, Shrestha A et al reported a prevalence of 5.67%, (9) while a systematic review by Kirthi et al (10) found a prevalence range of 0.3-14.1% in pre diabetic patients. In this study, 3 patients had mild NPDR, 2 had moderate NPDR, and no severe NPDR or PDR cases were reported (Table 10).

The findings suggest that microalbuminuria is an early indicator of kidney injury and diabetic retinopathy is a marker of vascular changes in the prediabetic state.

CONCLUSION

Our study showed prevalence of microalbuminuria and diabetic retinopathy mild NPDR grade in pre diabetic patients. This results shows the importance of screening of people for prediabetes and need of early intervention by life style modification and medication. Early intervention prevents diabetic kidney disease and blindness due to nephropathy. Other risk factors also should take into account.

LIST OF ABBREVIATION

1. ADA - American Diabetic Association
2. ETDRS - Early Treatment Diabetic Retinopathy Study
3. HbA1C - Glycosylated Hemoglobin
4. IRMA - Intra-retinal Microvascular Abnormalities
5. NCD - Non-Communicable Disease
6. NPDR - Non-proliferative Diabetic Retinopathy
7. NVD - Neovascularisation of Disc
8. NVE - Neovascularisation Elsewhere
9. OPD - Outpatient Department
10. PDR - Proliferative Diabetic Retinopathy
11. SEA - South East Asia
12. T2DM - Type 2 Diabetes Mellitus

Conflict of Interest- NIL

Financial Interest-NIL**REFERENCES**

1. Kumar A, Gangwar R, Zargar AA, Kumar R, Sharma A. Prevalence of Diabetes in India: A Review of IDF Diabetes Atlas 10th Edition. *Curr Diabetes Rev.* 2024;20(1):e130423215752. doi: 10.2174/1573399819666230413094200. PMID: 37069712.
2. Anjana RM, Mohan V, Viswanathan M, et al. Metabolic non-communicable disease health report of India: the ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). *Lancet Diabetes Endocrinol.* 2023;11(7):474-489.
3. Achuth KS, Subramanian M, Pradeep C. Prevalence of pre-diabetes and its associated risk factors among people in rural field practice area of Vydehi Institute of Medical Sciences and Research Centre, Bangalore. *Int J Community Med Public Health.* 2024;
4. Sana MA, Chaudhry M, Malik A, Iqbal N, Zakiuddin A, Abdullah M. Prevalence of Microalbuminuria in Type 2 Diabetes Mellitus. *Cureus.* 2020;12(12):e12318. doi: 10.7759/cureus.12318. PMID: 33520516; PMCID: PMC7837669.
5. Chawla S, Trehan S, Chawla A, Jaggi S, Chawla R, Kumar V, Singh D. Relationship between diabetic retinopathy, microalbuminuria, and other modifiable risk factors. *Prim Care Diabetes.* 2021;15(3):567-570. doi: 10.1016/j.pcd.2021.01.012. PMID: 33551334.
6. Ryan S, Schachat A, Wilkinson C, Hinton D, Sada S, Wiedemann P. *Retina.* 7th ed. London: Elsevier Health Sciences; 2013. p. 1833.
7. Branda JIF, de Almeida-Pittito B, Ferreira SRG. Prevalence of diabetic kidney disease in prediabetes. *Obes Med.* 2019;15:100105. doi: 10.1016/j.obmed.2019.100105
8. Bahar A, Makhloogh A, Yousefi A, Kashi Z, Abediankenari S. Correlation Between Prediabetes Conditions and Microalbuminuria. *Nephrourol Mon.* 2013 Spring;5(2):741-744.
9. Shrestha A, Suwal R, Adhikari S, Shrestha N, Shrestha B, Khatri B. Diabetic Retinopathy among Patients with Prediabetes Attending the Outpatient Department of Ophthalmology in a Tertiary Eye Care Centre: A Descriptive Cross-sectional Study. *J Nepal Med Assoc.* 2023;61(260):351-354
10. Kirithi V, Nderitu P, Alam U, et al. The prevalence of retinopathy in prediabetes: A systematic review. *Surv Ophthalmol.* 2022 Sep-Oct;67(5):1332-1345.