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PREVALENCE OF DIABETIC NEPHROPATHY AMONG RURAL AND URBAN DIABETIC PATIENTS

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Abstract:

Background *: Diabetic nephropathy is a major microvascular complication of diabetes mellitus and an important cause of chronic kidney disease. The prevalence of diabetic nephropathy is increasing due to poor glycemic control, obesity, hypertension, and lifestyle changes.*

Methodology *: A retrospective, prospective, and observational study was conducted in the Department of Nephrology, Government General Hospital, Guntur, from October 2024 to March 2025. A total of 120 diabetic patients were included. Data regarding demographic profile, GRBS levels, serum creatinine levels, hypertension, BMI, and prevalence of diabetic nephropathy were collected and analyzed statistically using Chi-square test.*

Results: *Among 120 diabetic patients, 83 patients were diagnosed with diabetic nephropathy. Urban patients (60.24%) showed higher prevalence compared to rural patients (39.76%). Male patients, overweight individuals, and hypertensive patients were more commonly affected.*

Conclusion: *The study showed significantly higher prevalence of diabetic nephropathy among urban diabetic patients. Early screening, glycemic control, lifestyle modification, and patient education are essential to prevent renal complications.*

Keywords: *Diabetic nephropathy; Diabetes mellitus; Rural population; Urban population; Hypertension; Glycemic control.*

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INTRODUCTION:

Diabetes mellitus is one of the most common long-term diseases affecting people all over the world. It occurs when the body cannot properly control blood sugar levels because of problems related to insulin production or insulin action. The number of diabetic patients is increasing rapidly due to unhealthy food habits, lack of physical activity, obesity, stress, and sedentary lifestyle. Diabetes can affect many organs of the body, including the eyes, nerves, heart, blood vessels, and kidneys. Among these complications, diabetic nephropathy is considered one of the most dangerous because it slowly damages the kidneys and may finally lead to kidney failure if not treated properly and at an early stage.[1,2]

Diabetic nephropathy is a kidney disease that develops in diabetic patients due to long-term uncontrolled blood sugar levels. High blood glucose damages the small blood vessels present in the kidneys, reducing their ability to filter waste products from the blood effectively. Over time, this condition can lead to protein loss in urine, swelling of the body, high blood pressure, and eventually chronic kidney disease. Many patients may not notice symptoms during the early stages, making regular screening very important. Early diagnosis through urine tests, serum creatinine estimation, and blood glucose monitoring can help in preventing disease progression and serious kidney-related complications among diabetic patients.[3,4]

Several risk factors contribute to the development of diabetic nephropathy. Poor glycemic control, obesity, hypertension, smoking, unhealthy diet, lack of exercise, increasing age, and longer duration of diabetes are some of the major contributing factors. Urbanization and modern lifestyle changes have further increased the burden of diabetes and kidney complications. Urban populations are more likely to consume processed foods, engage in less physical activity, and experience higher stress levels compared to rural populations. At the same time, rural populations may face lack of healthcare facilities, delayed diagnosis, and poor awareness regarding diabetes management. These differences may influence the prevalence of diabetic nephropathy between rural and urban diabetic patients.[5,6]

Diabetic nephropathy is one of the leading causes of chronic kidney disease and end-stage renal disease worldwide. Patients with advanced diabetic nephropathy may require dialysis or kidney transplantation for survival, which increases both emotional and financial burden on families and healthcare systems. Proper management of diabetes and blood pressure plays an important role in preventing kidney damage. Lifestyle modifications such as regular exercise, healthy diet, weight reduction, smoking cessation, and adherence to medications can significantly reduce disease progression. Regular monitoring of kidney function and blood sugar levels is also essential for identifying high-risk patients and providing early treatment to prevent complications.[7,8]

Although many studies have been conducted regarding diabetic nephropathy, limited information is available comparing the prevalence of diabetic nephropathy among rural and urban diabetic populations in Andhra Pradesh. Understanding these differences is important for improving preventive strategies and healthcare planning. Therefore, the present study was conducted to evaluate the prevalence of diabetic nephropathy among rural and urban diabetic patients admitted to a tertiary care hospital. The study also aimed to assess demographic and clinical risk factors such as age, gender, obesity, hypertension, serum creatinine levels, and glycemic status associated with diabetic nephropathy among diabetic patients.[9,10]

MATERIALS AND METHODS:

Study Design : The study was a retrospective, prospective, and observational study.

Study Site : The study was conducted in the Department of Nephrology at Government General Hospital, Guntur, Andhra Pradesh.

Study Duration : The study was carried out over a period of six months from October 2024 to March 2025.

Sample Size : A total of 120 diabetic patients were included in the study.

Inclusion Criteria

- Patients diagnosed with diabetes mellitus.
- Patients aged between 20–80 years.
- Patients willing to participate in the study.
- Patients belonging to both rural and urban populations.

Exclusion Criteria

- Non-diabetic individuals.
- Patients with type 1 diabetes mellitus.
- Pregnant and lactating women.
- Patients with severe physical or mental disabilities.

- Patients with HIV, Hepatitis B, or Hepatitis C infections.
- Pediatric patients below 18 years.
- Patients undergoing chemotherapy.
- Patients above 80 years of age.

Data Collection : Data were collected from patient case sheets, laboratory reports, treatment charts, questionnaires, and patient interviews. Information regarding age, gender, BMI, blood glucose levels, hypertension, smoking history, and diabetic nephropathy status was documented.

Statistical Analysis : All collected data were entered into Microsoft Excel 2010 and analyzed using descriptive statistics and Chi-square test. Results were expressed in frequencies and percentages.

RESULTS:

Table 1: Demographic Characteristics of Study Population

Parameter	Category	Number of Patients (n=120)	Percentage (%)
Age Group (Years)	30–39	2	1.67
	40–49	25	20.83
	50–59	47	39.17
	60–69	38	31.67
	70–80	8	6.67
Gender	Male	79	65.83
	Female	41	34.17
BMI Category	Normal	37	30.83
	Overweight	60	50.00
	Obese Class I	14	11.67
	Obese Class II	2	1.67
	Underweight	7	5.83
Area	Rural	59	49.17
	Urban	61	50.83

Table 1 shows the demographic characteristics of the study population. Most patients belonged to the 50–59 years age group (39.17%), followed by 60–69 years (31.67%). Male patients (65.83%) were more common than females. Overweight individuals accounted for 50% of the study population. Urban patients (50.83%) were slightly higher in number compared to rural patients (49.17%).

Table 2: Distribution of GRBS Levels Among Study Population

GRBS Range (mg/dL)	Number of Patients (n=120)	Percentage (%)
100–149	30	25.00
150–199	34	28.33
200–249	24	20.00
250–299	15	12.50
300–349	10	8.33
350–399	4	3.33
450–499	1	0.83
550–599	1	0.83
700–750	1	0.83

Table 2 represents the distribution of GRBS levels among diabetic patients. The majority of patients had GRBS levels between 150–199 mg/dL (28.33%), followed by 100–149 mg/dL (25%). About 20% of patients had GRBS levels between 200–249 mg/dL. Very high blood glucose levels above 450 mg/dL were observed only in a few patients.

Table 3: Distribution of Serum Creatinine Levels Among Study Population

Serum Creatinine Levels (mg/dL)	Number of Patients (n=120)	Percentage (%)
0–2	25	20.83
2–4	25	20.83
4–6	13	10.83
6–8	15	12.50
8–10	4	3.33
10–12	2	1.67

Table 3 shows the distribution of serum creatinine levels among study participants. Most patients had serum creatinine levels between 0–2 mg/dL and 2–4 mg/dL, each accounting for 20.83% of patients. Elevated creatinine levels between 6–8 mg/dL were observed in 12.50% of patients, indicating moderate to severe renal impairment among diabetic individuals.

Table 4: Prevalence Distribution of Diabetic Nephropathy According to Demographic and Clinical Parameters

Parameter	Category	Number of DN Patients (n=83)	Percentage (%)
Age Group (Years)	38–47	17	20.48
	48–57	33	39.76
	58–67	27	32.53
	68–77	6	7.23
Gender	Female	13	15.66
	Male	70	84.34
BMI Category	Normal	22	26.51
	Obese (Class I)	9	10.84
	Obese (Class II)	1	1.20
	Overweight	50	60.24
	Underweight	1	1.20
Hypertension Status	Yes	61	73.49
	No	22	26.51
Area	Rural	33	39.76
	Urban	50	60.24

Table 4 represents the prevalence distribution of diabetic nephropathy according to demographic and clinical parameters. Most DN patients belonged to the 48–57 years age group (39.76%). Male patients accounted for 84.34% of DN cases. Overweight patients constituted 60.24% of DN cases. Hypertension was present in 73.49% of DN patients, while urban patients showed higher DN prevalence than rural patients.

Table 5: Distribution of Diabetic Nephropathy and Non-Diabetic Nephropathy Among Rural and Urban Diabetic Patients

Area	Diabetic Nephropathy Present	Diabetic Nephropathy Absent	Total	Chi-square value (χ^2)	P-value
Rural	33	26	59	8.35	0.00386
Urban	50	11	61		
Total	**83**	**37**	**120**		

Table 5 shows the distribution of diabetic nephropathy among rural and urban diabetic patients. Among 83 diabetic nephropathy patients, 50 patients belonged to urban areas and 33 patients belonged to rural areas. The Chi-square test showed a statistically significant difference between rural and urban diabetic patients (χ^2 = 8.35, p = 0.00386), indicating higher prevalence of diabetic nephropathy among urban patients.

DISCUSSION:

The demographic findings of the present study showed that most patients belonged to the 50–59 years age group (39.17%), followed by 60–69 years (31.67%). Male patients constituted 65.83% of the study population, while females accounted for 34.17%. Urban patients were slightly higher (50.83%) compared to rural patients (49.17%). Similar findings were reported by John et al., who observed male predominance and higher diabetic nephropathy prevalence among middle-aged patients in South India. Mohan et al. also reported increased diabetes-related complications among urban South Indian populations due to sedentary lifestyle and reduced physical activity.[11,12]

The present study showed that most patients had GRBS levels between 150–199 mg/dL (28.33%), followed by 100–149 mg/dL (25%) and 200–249 mg/dL (20%). These findings indicate poor glycemic control among diabetic patients. Persistent hyperglycemia contributes to oxidative stress, endothelial dysfunction, and renal damage, increasing the risk of diabetic nephropathy. Similar observations were reported by Skar et al., who identified poor glycemic control and obesity as major contributors to diabetes progression in urban South Indians. Mohan et al. also reported that unhealthy dietary habits and elevated blood glucose levels were strongly associated with worsening diabetic complications in urban populations.[13,14]

The serum creatinine analysis revealed that 20.83% of patients had creatinine levels between 0–2 mg/dL and another 20.83% had levels between 2–4 mg/dL. Elevated creatinine levels between 6–8 mg/dL were observed in 12.50% of patients, indicating impaired renal function among diabetic individuals. Serum creatinine is an important marker for kidney damage and progression of diabetic nephropathy. Similar findings were reported by Viswanathan et al., who observed significant renal impairment among diabetic nephropathy patients in South India. Bodhini et al. also emphasized that diabetic nephropathy patients commonly exhibit elevated renal function markers and progressive kidney dysfunction.[15,16]

The prevalence of diabetic nephropathy in the present study was 69.17%, with 83 out of 120 diabetic patients diagnosed with DN. Among DN patients, 60.24% belonged to urban areas and 39.76% belonged to rural areas. Male patients accounted for 84.34% of DN cases, and overweight patients constituted 60.24% of DN patients. Hypertension was present in 73.49% of DN patients. The Chi-square test showed a statistically significant difference between rural and urban prevalence of diabetic nephropathy ($\chi^2 = 8.35$, $p = 0.00386$). Similar findings were reported previous studies, observed higher prevalence of diabetic complications among urban South Indian diabetic populations.[17,18]

CONCLUSION:

Diabetic nephropathy is one of the most serious complications of diabetes mellitus and remains a major cause of chronic kidney disease among diabetic patients. The present study demonstrated a high prevalence of diabetic nephropathy, with 83 out of 120 diabetic patients affected. Urban patients showed greater prevalence compared to rural patients, while male gender, overweight status, hypertension, poor glycemic control, and elevated serum creatinine levels were identified as important risk factors associated with disease progression. Statistical analysis also showed a significant association between area of residence and diabetic nephropathy prevalence. Early diagnosis through regular screening, strict blood glucose control, blood pressure monitoring, lifestyle modifications, patient counseling, and proper medication adherence are essential to reduce renal complications, delay disease progression, and improve the overall quality of life among diabetic patients.

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