Pakistan Journal of Intensive Care Medicine
eISSN: 2708-2261; pISSN: 2958-4728
www.pjicm.com
DOI: https://doi.org/10.54112/pjicm.v5i02.182
*Pak. J. Inten. Care Med., volume 5(2), **2025**: 182*
Original Research Article

FREQUENCY OF NEPHROTIC SYNDROME AMONG DIABETES MELLITUS PATIENTS PRESENTING WITH PROTEINURIA AT SAIDU GROUP OF TEACHING HOSPITAL

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(Received, 05th June 2025, Revised 18th June 2025, Accepted 06th July, Published 14th July 2025)

ABSTRACT

Background: *Diabetes mellitus is a leading cause of chronic kidney disease worldwide, often presenting with proteinuria as an early indicator of renal involvement. However, the occurrence of nephrotic syndrome in diabetic patients with proteinuria varies and carries important clinical implications for disease management and prognosis.* ***Objective:*** *To determine the frequency of nephrotic syndrome among diabetes mellitus patients presenting with proteinuria at Saidu Group of Teaching Hospitals (SGTH), Swat.* ***Study Design:*** *Cross-sectional study.* ***Setting:*** *Department of Medicine, Saidu Group of Teaching Hospitals (SGTH), Swat, Pakistan.* ***Duration of Study:*** *From 29-11-2024 to 29-05-2025.* ***Methods:*** *A total of 189 patients aged 30–70 years with confirmed diabetes mellitus and proteinuria were enrolled. Nephrotic syndrome was defined as a urine protein-to-creatinine ratio (uPCR) ≥200 mg/mmol and serum albumin ≤2.5 mg/L. Demographic data, comorbidities, and biochemical findings were recorded. Statistical analysis was performed using SPSS version 23, and associations were evaluated using the Chi-square test with a significance threshold of $p < 0.05$.* ***Results:*** *The mean age of participants was 57 ± 11 years, with a male predominance (118; 62.4%). Hypertension was observed in 117 (61.9%) patients. Nephrotic syndrome was identified in 88 (46.6%) of the study participants. A significant association was found between hypertension and nephrotic syndrome ($p = 0.001$).* ***Conclusion:*** *Nephrotic syndrome was highly prevalent among diabetic patients presenting with proteinuria in this study. The strong association with hypertension underscores the need for early screening and integrated management of renal and cardiovascular risks in diabetic populations.*

Keywords: Diabetic Nephropathy, Nephrotic Syndrome, Proteinuria, Hypoalbuminemia

INTRODUCTION

Type 2 diabetes, formerly known as non-insulin-dependent diabetes mellitus, is a medical condition characterized by elevated blood glucose levels and insulin resistance (1). Type 1 diabetes is distinguished by the malfunction of pancreatic islet cells, which contributes to a deficiency in insulin. The disorder is marked by variable hyperglycemia and changes in glucose and lipid metabolic pathways. There are two main types of adverse reactions resulting from elevated glucose levels: macrovascular and microvascular (2-4). Proteinuria is characterized by elevated levels of protein in urine. This condition serves as an important indication for potential kidney dysfunction, along with many other factors predicting adverse outcomes. Proteinuria in diabetes mellitus underscores the complex interplay among metabolic imbalances, alterations in blood flow, and structural abnormalities of the renal microvasculature (5).

This indicates not only damage to the kidney but also disorders of the tubules and surrounding tissue. Additionally, the occurrence of proteinuria within diabetes mellitus indicates serious harm to blood vessels, affecting not only the kidneys but also raising the risk of heart disease or mortality (6, 7). Nephrotic syndrome frequently occurs in cases of diabetes, particularly in individuals who have encountered long-term diabetes management difficulties. The complex connection among kidney injury caused by elevated blood sugar levels and genetic factors contributes to the development of nephrotic syndrome in affected individuals (8). The underlying cause of nephrotic syndrome in diabetes encompasses several mechanisms, including thickening of the glomerular basement membrane, damage to podocytes, and alterations in blood vessel permeability (9). A study revealed that the rate of development of nephrotic syndrome in patients with diabetes mellitus who presented with proteinuria was 40.22% (10).

This study aims to determine the frequency of nephrotic syndrome among patients with diabetes mellitus presenting with proteinuria at Saidu Group of Teaching Hospital, given the limited local literature on this topic. It is essential to understand the connection between nephrotic syndrome and diabetes mellitus, particularly in relation to proteinuria. This understanding will facilitate improved patient care and outcomes by enabling timely Diagnosis of the condition and the implementation of tailored treatments to prevent serious morbidity.

METHODOLOGY

This cross-sectional study was conducted in the General Medicine department of Saidu Group of Teaching Hospital, Swat. Ethical approval was obtained from the hospital. The study was conducted from 29-11-2024 to 29-05-2025. We calculated a sample of 189 patients using a frequency of nephrotic syndrome of 40.22%10 from a previous study, a confidence level of 95%, and a margin of error of 7%. Consecutive nonprobability sampling was used to enroll patients. We enrolled patients aged 30 to 70 years, both males and females. These patients were presented with diabetes mellitus along with proteinuria. Diabetes was diagnosed based on the symptoms such as polyphagia, polyuria with excessive thirst, along with an HbA1c level greater than 6.5%, a fasting blood sugar test result ≥ 126 mg/dL, and ongoing diabetic treatment. Proteinuria was identified in patients presenting with clinical symptoms such as bubbly urine, edema, and fatigue, and in those with urinalysis showing>150 mg/day of protein. Patients who were pregnant, had chronic kidney disease, or had acute cardiovascular complications were excluded. Patients gave their consent to participate in the research. Data collection was performed using a structured proforma to record demographic and clinical variables. Patients were examined for the presence of nephrotic syndrome, which was identified based on patients having excessive

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protein in the urine, edema, fatigue, and malaise. Diagnosis was confirmed if the urine protein-to-creatinine Ratio (uPCR) was ≥200 mg/mmol, and the hypoalbuminemia level was ≤2.5 mg/L on the blood test. Blood samples for albumin measurement were collected under aseptic conditions. All evaluations were conducted under the supervision of a consultant with at least 5 years of post-fellowship experience. For the statistical analysis, the collected data were analyzed using IBM SPSS Statistics 23. The normality of continuous variable distributions was assessed using the Shapiro-Wilk test. Gender, nephrotic syndrome, smoking, hypertension, employment status, education status, smoking hypertension, and socioeconomic status were shown as frequencies and percentages. Age, height, weight, BMI, protein levels, uPCR, and hypoalbuminemia levels were calculated as means and standard deviations. Nephrotic syndrome was stratified by demographics and clinical variables using the chi-square test; p-values of 0.05 or less were considered significant.

RESULTS

We had 189 patients in this study; the cohort had a mean age of 57 ± 11 years. Regarding gender distribution, male patients accounted for 118 (62.4%) and female patients for 71 (37.6%). Concerning medical history, one hundred seventeen patients had hypertension (61.9%), and 43 patients (22.8%) were smokers (Table 1). In our cohort of diabetic patients, nephrotic syndrome was present in 88 (46.6%) patients (Table 2). The majority of the patients with nephrotic syndrome were over the age of 50 years, but this difference was not notable. Hypertension was notably associated with nephrotic syndrome, as the majority of the patients with hypertension had nephrotic syndrome (P = 0.001) (Table 3).

Table 1: Baseline variables of the study

Baseline variables			
Mean			**SD**
Age (Years)		57	11
Height (Meter)		1.72	.04
Weight (Kg)		85	6
Proteinuria level (mg/day)		200.78	16.78
uPCR level		205.73	47.52
n			**%**
Gender	Male	118	62.4%
	Female	71	37.6%
Socioeconomic status	Lower class	38	20.1%
	Middle class	127	67.2%
	Upper class	24	12.7%
Education status	Educated	84	44.4%
	Uneducated	105	55.6%
Residence	Rural	98	51.9%
	Urban	91	48.1%
Employment status	Employed	91	48.1%
	Unemployed	98	51.9%
Hypertension	Yes	117	61.9%
	No	72	38.1%
Smoking	Yes	43	22.8%
	No	146	77.2%

Table 2: Frequency of nephrotic syndrome

Nephrotic syndrome	**n**	**%**
Yes	88	46.6%
No	101	53.4%

Table 3: Association of nephrotic syndrome with various parameters

Parameters		**Nephrotic syndrome**				**P value**
		Yes		**No**		
		n	%	n	%	
Age distribution	30 to 50	25	28.4%	21	20.8%	0.22
	> 50	63	71.6%	80	79.2%	
BMI (Kg/m^2)	18.5 to 25	11	12.5%	14	13.9	0.78
	> 25	77	87.5%	87	86.1%	
Gender	Male	59	67.0%	59	58.4%	0.22
	Female	29	33.0%	42	41.6%	
Socioeconomic status	Lower class	15	17.0%	23	22.8%	0.50
	Middle class	60	68.2%	67	66.3%	
	Upper class	13	14.8%	11	10.9%	
Education status	Educated	38	43.2%	46	45.5%	0.74
	Uneducated	50	56.8%	55	54.5%	
Residence	Rural	39	44.3%	59	58.4%	0.05
	Urban	49	55.7%	42	41.6%	
Employment status	Employed	44	50.0%	47	46.5%	0.63
	Unemployed	44	50.0%	54	53.5%	
Hypertension	Yes	69	78.4%	48	47.5%	0.001
	No	19	21.6%	53	52.5%	
Smoking	Yes	28	31.8%	15	14.9%	0.006
	No	60	68.2%	86	85.1%	

DISCUSSION

Our findings indicated that nephrotic syndrome is a frequent complication, which was found in 46.6% of the studied diabetic patients with proteinuria. This is in alignment with several studies: Sharma et al. reported nephrotic syndrome in 42% of patients, Al-shamakh et al. reported 25.5%, Najam et al. reported 67.05%, and Stoycheff et al. reported 44% (11-14).

The mean age of our patients was 57 ± 11 years. This aligns closely with the demographic profiles reported in several other studies. Sharma et al. from India reported a mean age of 49 ± 7 years, while the cohort in the IDNT trial analyzed by Stoycheff et al. had a mean age of 59 ± 8 years (11, 13). The consistency across these studies suggests that the presentation of significant renal complications in diabetes, including nephrotic syndrome, normally occurs in middle to late adulthood. Our cohort demonstrated male predominance, with males accounting for 62.4% of the study population. This finding is

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strongly consistent with multiple studies conducted locally and internationally. Sharma et al. documented 64.3% males, while Najam-ud-Din et al. in Peshawar reported 69.6% males in their nephrotic syndrome cohort (11, 13). This recurring pattern may reflect a higher underlying prevalence of Type 2 Diabetes Mellitus in males or potentially different susceptibilities that lead to progressive kidney disease.

An important finding from our investigation was the high prevalence of hypertension present in 61.9% of our patients. This observation is strongly corroborated by the study from Yemen by Al-Shammakh et al., which identified hypertension as a potential, independent predictor of pathological proteinuria, with an adjusted odds Ratio of 3.44 (12). The high frequency of hypertension in our cohort is similar to the 60.7% reported by Sharma et al., which underscores the combined nature of these conditions. It highlights the importance of blood pressure management as Part of a comprehensive renal protection strategy in diabetic patients (11). In contrast, smoking was reported by a smaller segment of our population (22.8%) and did not emerge as a dominant factor. This aligns with the multivariate analysis by Al-Shammakh et al., which also did not find smoking to be a significant independent predictor for proteinuria (12). This suggests that while smoking is a well-established cardiovascular risk factor, its direct contribution to the development of nephrotic-range proteinuria in diabetes is not noteworthy.

The laboratory parameters in our study offer a clear pathophysiological link to the clinical Diagnosis of nephrotic syndrome. The mean serum albumin level —the key diagnostic criterion —was 2.85 ± 0.90 mg/L, firmly in the hypoalbuminemic range. This finding is consistent with the pathophysiology of nephrotic syndrome, in which urinary albumin loss leads to a decline in serum albumin levels. Stoycheff et al., in their rigorous evaluation of nephrotic syndrome in diabetic kidney disease, explicitly used a serum albumin cutoff of <3.5 g/dL as a defining characteristic, a threshold that a significant portion of our cohort would meet (14).

The profound impact of nephrotic-range proteinuria on kidney prognosis is a recurring theme in the literature. Our finding that nearly half of our patients had developed this complication points to a group at very high risk for progressive decline in their kidney function. This concern is strongly supported by Ruggenenti et al., who focused specifically on diabetic patients with nephrotic-range proteinuria (UACR ≥2200 mg/g) (15). Their research demonstrated that this subgroup experienced a drastically accelerated rate of kidney function loss and was at a substantially higher risk for adverse kidney outcomes compared to diabetic patients without such severe proteinuria (15). This underscores the critical importance of identifying these high-risk patients early.

CONCLUSION

In conclusion, our study found a high frequency of nephrotic syndrome (46.6%) in diabetic patients with proteinuria. We found a notable association between nephrotic syndrome and hypertension.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

JAWAD ALI (Postgraduate Resident)

Data Collection, Analysis, Review of Literature, Manuscript drafting, and final approval of manuscript.

MUHAMMAD AYUB KHAN (Associate Professor)

Supervision, Study Design, Conception of Study, and Final approval of manuscript.

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