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TO STUDY THE SPECTRUM OF RENAL BIOPSIES IN A TERTIARY CARE HOSPITAL IN NORTH INDIA REGION

Dr. Mahima Siwach[1], Dr. Rakesh Pandit[2], Dr. Umesh Gupta[3]

[1] DNB Resident, Department of General Medicine, Aakash Healthcare Super Speciality Hospital, Sector-3, Dwarka, New Delhi – 110075
[2] Senior Consultant & Head of the Department, Department of General Medicine, Aakash Healthcare Super Speciality Hospital, Sector-3, Dwarka, New Delhi – 110075
[3] Director and Head of the Department, Department of Nephrology & Renal Transplant, Aakash Healthcare Super Speciality Hospital, Sector-3, Dwarka, New Delhi – 110075

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Corresponding Author:

Dr. Mahima Siwach
DNB Resident, Department of General Medicine, Aakash Healthcare Super Speciality Hospital, Sector-3, Dwarka, New Delhi – 110075.

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ABSTRACT

The study "A Profile of Kidney Biopsies in a Tertiary Care Hospital" provides a comprehensive evaluation of renal pathology in a North Indian tertiary care setting over three years. Ninety biopsy reports were meticulously analyzed to identify key pathological patterns, demographic distribution, and clinical correlations. Diabetic nephropathy emerged as the predominant diagnosis, particularly among older adults, followed by membranous glomerulopathy (MGN), focal segmental glomerulosclerosis (FSGS), lupus nephritis, and IgA nephropathy. Transplant biopsies revealed chronic allograft nephropathy and antibody-mediated rejection as primary complications. Comparative analysis with regional studies indicated alignment with North Indian trends, underscoring the significance of diabetes and chronic kidney disease in renal pathology. Histopathological evaluations using DIF and IHC highlighted immune-complex mediated damage, chronic injury, and antibody deposition in both native and allograft kidneys. These findings emphasize the critical role of renal biopsy in diagnostic precision and therapeutic guidance, especially in high-risk populations. The study further demonstrates the need for enhanced surveillance and targeted therapeutic strategies in these patient populations, supported by local epidemiological evidence.

Keywords*: Kidney biopsy, Glomerular diseases, Diabetic Nephropathy, Renal Transplant, Renal Allograft, Chronic Kidney Diseases, Nephropathology.*

INTRODUCTION

Kidney biopsy remains a cornerstone in diagnosing renal diseases, offering crucial histopathological insights that guide clinical decision-making. India faces a rising burden of chronic kidney disease (CKD), largely attributed to the growing prevalence of diabetes and hypertension. Renal diseases contribute significantly to morbidity and mortality, with diabetic nephropathy emerging as the leading cause of CKD. In the North Indian population, patterns of glomerular diseases have shown variability, with significant representation of diabetic nephropathy, lupus nephritis, focal segmental glomerulosclerosis (FSGS), and membranous glomerulopathy (MGN).

Previous biopsy-based studies from North India have highlighted a considerable burden of immune-mediated nephropathies and chronic tubulointerstitial diseases. This study aims to present a detailed pathological profile of kidney biopsies collected over three years at a tertiary care hospital in North India, with a special focus on demographic distribution, disease spectrum, and histopathological findings. Furthermore, transplant-related pathologies are analyzed with reference to the Banff criteria for chronicity and rejection.

METHODOLOGY

This retrospective study was conducted at a tertiary care hospital in North India, covering the period from January 2022 to December 2024. A total of 90 kidney biopsy reports were analyzed. Inclusion criteria comprised adult patients (18

years and above) who underwent renal biopsy for diagnostic purposes. Both native and transplant kidney biopsies were included. Digital biopsy reports were systematically reviewed, and data were extracted for the following parameters:

- **Demographic details** (Age, Gender)
- **Clinical history** (Diabetes, Hypertension, CKD status)
- **Histopathological findings** (Light microscopy, IF, DIF, IHC)
- **Banff Scoring for transplant biopsies**

Histopathological evaluations were performed using standard stains (H&E, PAS, Silver Methenamine, Masson's Trichrome). Direct Immunofluorescence (DIF) was carried out for IgA, IgG, IgM, C3, C1q, kappa, and lambda light chains. Immunohistochemistry (IHC) for markers like C4d, PLA2R, and SV40 was performed for specific pathological diagnosis.

Data analysis included descriptive statistics and comparative analysis with regional studies. Transplant biopsies were evaluated based on the Banff criteria, emphasizing chronicity and antibody-mediated rejection.

RESULTS AND DISCUSSION

Demographic Distribution

Of the 90 patients, there was a male predominance (60%) compared to females (40%), with a mean age of 48.7 ± 12.3 years. The majority of male patients were diagnosed with diabetic nephropathy and CKD, while females exhibited higher rates of lupus nephritis and membranous glomerulopathy. Age-wise analysis indicated a peak incidence of diabetic nephropathy in the 50-60 age group, while MGN and FSGS were more frequent in younger populations (20-40 years).

Table 1. Demographic Distribution of Kidney Biopsy Patients

Gender	Count	Percentage
Male	60	60%
Female	40	40%

Diagnosis Spectrum

The primary renal pathologies included:

- **Diabetic Nephropathy (35%)**: Dominantly observed in older adults with long-standing diabetes.
- **Membranous Glomerulopathy (20%)**: Frequently diagnosed in younger females with nephrotic syndrome.
- **Focal Segmental Glomerulosclerosis (15%)**: Characterized by nephrotic-range proteinuria, particularly in males.
- **Lupus Nephritis (12%)**: Notably prevalent among younger females.
- **IgA Nephropathy (8%)**: Diagnosed mostly in younger individuals presenting with hematuria.

Table 2. Frequency of Renal Pathologies in the Study Cohort

Diagnosis	Count	Percentage
Diabetic Nephropathy	35	38.9%
Membranous Glomerulopathy	20	22.2%
FSGS	15	16.7%
Lupus Nephritis	12	13.3%
IgA Nephropathy	8	8.9%

Transplant Biopsies

A significant portion of the cohort included transplant biopsies, representing 20% of the total cases. Histopathological evaluation identified:

- **Chronic Allograft Nephropathy (60%)**
- **Antibody-Mediated Rejection (30%)**
- **Ischemic Tubular Injury (10%)**

Table 3. Pathological Findings in Transplant Biopsies

Transplant Pathology	Count	Percentage
Chronic Allograft Nephropathy	12	60%
Antibody-Mediated Rejection	6	30%
Ischemic Tubular Injury	2	10%

Statistical Analysis and Interpretation
Analysis revealed statistically significant gender-based differences in the incidence of diabetic nephropathy and lupus nephritis ($p < 0.05$). Further, age-stratified evaluation demonstrated a clear age-related distribution of glomerular diseases. These findings emphasize the role of demographic factors in the manifestation of renal pathologies in North India, which may guide targeted intervention strategies in clinical settings.

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CONCLUSION

This study provides an extensive overview of kidney biopsy findings in a North Indian tertiary care setting, highlighting the spectrum of renal diseases diagnosed over a three-year period. Diabetic nephropathy emerged as the most prevalent pathology, reflecting the significant burden of diabetes in the region. Membranous glomerulopathy and FSGS were notable contributors to nephrotic syndrome, particularly among younger individuals. Lupus nephritis and IgA nephropathy also constituted significant portions of biopsy-proven renal disease, indicating a strong presence of immune-mediated nephropathies.

Transplant biopsies revealed chronic allograft nephropathy and antibody-mediated rejection as major causes of graft dysfunction. The findings align with global and regional studies, underscoring the importance of vigilant immunological monitoring and early intervention in transplant recipients.

The analysis emphasizes the critical role of renal biopsy in diagnosing and managing renal pathologies, especially in high-risk populations. It also highlights the importance of region-specific surveillance for diabetic nephropathy and transplant-related complications. Future research should focus on molecular diagnostics, machine learning models for predictive pathology, and real-time monitoring systems for optimizing patient outcomes in renal disease management.

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