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Original Research Article

Evaluation of histopathological patterns in kidney disease: an overview from a tertiary health care center

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ABSTRACT

Background: The clinical manifestation of renal pathologies exhibits considerable heterogeneity. The incidence of kidney diseases is not only region-specific but also varies within different locales of the same country. This study was undertaken at a tertiary care hospital in central India to know the prevalence of various kidney diseases. The lack of a comprehensive national registry in India hampers the ability to compile detailed documentation of the diverse clinical presentations and histopathological characteristics of renal conditions nationwide. Consequently, this study aims to provide a histopathological diagnosis of kidney diseases proved by biopsy results.
Methods: We collected demographic profile and native kidney biopsy reports of 154 patients who underwent kidney biopsy from January 2022 to January 2024 in the Department of Nephrology at our tertiary health care.
Results: A total of 154 native kidney biopsies were analyzed, mean age was 33.58±15.79 years. The most common clinical presentation and indication for renal biopsy was nephrotic syndrome (59.74%). Most common histological pattern was primary glomerular disease in 92 (62.33%), followed by secondary glomerular in 26 (16.88%). The leading histopathological diagnoses were FSGS (18.8%) in >18 years and MCD (33.33%) in <18 years of age. MN and IgAN in 10.38% patients.
Conclusions: The predominant indication for renal biopsy in our cohort was nephrotic syndrome. The spectrum of renal diseases varies by geographic location and is subject to temporal fluctuations. Consequently, the establishment of a renal biopsy registry is imperative for monitoring the evolving patterns of renal pathologies in India.

Keywords: Focal segmental glomeruloseclerosis, Membranoproliferative glomerulonephritis, Membranous nephropathy, Minimal change disease, Secondary glomerular disease, Acute kidney injury

INTRODUCTION

Kidney diseases comprise a variety of disorders that impair the structure and function of kidney. Glomerular diseases can lead to significant renal impairment, presenting as hematuria, proteinuria, edema, renal dysfunction and hypertension. Their multifactorial etiology includes genetic, autoimmune, infectious and environmental factors, underscoring the importance of timely diagnosis and management.

Kidney biopsy is a critical diagnostic tool, providing histological insights into conditions like glomerulonephritis and interstitial nephritis. While minimally invasive techniques, such as percutaneous ultrasound guided are preferred, the procedure carries risk that necessitate careful patient selection. Despite advances in non-invasive imaging, Kidney biopsy remains an indispensable tool for accurate diagnosis and effective management of various renal diseases. The incidence of biopsy-proven types of the renal disease depends on age, gender, ethnicity, and geographical area, also on nutritional, environmental and socio-economic factors.[1,2]

Kidney diseases manifest as a nephrotic syndrome (NS), nephritic syndrome (NES), rapidly progressive renal

failure (RPRF), acute kidney injury (AKI), chronic kidney disease (CKD), macroscopic hematuria, or as isolated proteinuria or hematuria. Various diagnostic tests help to make a diagnosis, but the histopathological examination is the gold standard in establishing the diagnosis of kidney diseases.

Given the regional variability in kidney disease being multifactorial, our study aims to provide a comprehensive assessment of current frequency of various kidney diseases in Central India. By analyzing histopathological findings from our tertiary health care and teaching institute, we seek to highlight the patterns of kidney biopsy proven kidney diseases in this region.

A national kidney biopsy registry serves as a crucial resource for enhancing the understanding of kidney diseases across diverse populations, especially in countries like India having a cultural diversity. A national registry generates a database allowing to identify trends in kidney diseases and effective treatment protocols, facilitating evidence-based practices.

Establishing a national registry would standardize biopsy practices.

Therefore, this study was conducted at a tertiary care teaching hospital in central India to illustrate the current prevalence of various types of kidney diseases based on histopathological findings specific to this region.

This study will be a contribution towards the generation of national registry.

METHODS

We collected demographic profile and kidney biopsy reports of 154 patients who underwent native kidney biopsy from January 2022 to January 2024 in the Department of Nephrology at Sri Aurobindo medical college and post graduate institute Indore, Madhya Pradesh.

All the kidney biopsies were performed by nephrologist ultrasound guided percutaneous approach after taking written informed consent, using automated biopsy gun (16 G, 18 G), two biopsy core taken and transported in 10% formaldehyde and Michell's transport medium for histopathological evaluation by pathologist for light microscopy and immunofluorescence. Electron microscopy was done in cases where needed.

Inclusion criteria

All patients admitted in Sri Aurobindo Medical college and PG Institute, Indore undergoing native kidney biopsy during study period, adequate biopsy specimen, with complete clinical records and provide consent for study were included in this study.

Exclusion criteria

Patients with end stage kidney disease on dialysis, renal transplant recipients, hematological disorders, inadequate tissue for diagnosis, missing essential clinical information, and failure to give written consent for participation in the study were excluded.

We collected following data: age, gender, serum creatinine, need for RRT, 24-hour proteinuria, clinical presentation: NS, NES, AKI, CKD, and RPRF.

Histopathological group

Histopathological groups included: primary glomerular disease (PGD), secondary glomerular disease (SGD), tubulointerstitial disease (TID) and vascular lesion.

Histological findings

The primary glomerular diseases included minimal change disease (MCD), membranous nephropathy (MN), IgA nephropathy (IgAN), focal segmental glomerulosclerosis (FSGS), membranoproliferative glomerulonephritis (MPGN), mesangioproliferative glomerulonephritis (MesPGN), crescentic glomerulonephritis (CrGN), C3 glomerulopathy (C3GN), diffuse proliferative glomerulonephritis (DPGN), C1q nephropathy (C1qN), and fibrillary glomerulonephritis. The secondary glomerular diseases subcategorized as infection- related glomerulonephritis (IRGN), lupus nephritis (LN), systemic vasculitis, renal amyloidosis, monoclonal immunoglobulin deposition disease, and diabetic nephropathy (DN). Tubulointerstitial diseases included acute tubular necrosis/acute tubular injury (ATN/ATI), acute tubulointerstitial nephritis (ATIN), and chronic tubulointerstitial nephritis (CTIN). The vascular lesions comprised of cases of thrombotic microangiopathy (TMA), hypertension nephrosclerosis, and acute cortical necrosis (ACN).

RESULTS

Total 168 kidney biopsies performed in the department of Nephrology during the study period of January 2022 to January 2024. 12 were allograft biopsies which are not included in study. Out of 166 biopsies 2 biopsies were having inadequate samples (<10 glomeruli), thus total native kidney biopsies included in study were 154.

The study group was divided in three age groups as ≤18 years (15.58%), 19–59 years (75.97%) and ≥60 years (7.79%) as depicted in Figure 1. Average age of the study population was 33.58±15.79 years.

71 (46.10%) were male and 83 (53.89%) were females (Table 1).

81 (52.59%) patients were having creatinine >1.5 gm/dl and 72 (46.75%) with sr. creatinine >1.5 gm/dl. As for the

RRT requirement, 39 (25.32%) patients underwent hemodialysis while 115 (74.67%) did not.

Table 1: Demographic profile of patients.

Parameters	Number (%)
Age (mean)	33.58±15.79 years
Male	71 (46.10%)
Female	83 (53.89%)
Sr. creatinine >1.5 gm/dl	72 (46.75)
Patient underwent hemodialysis	39 (25.32)

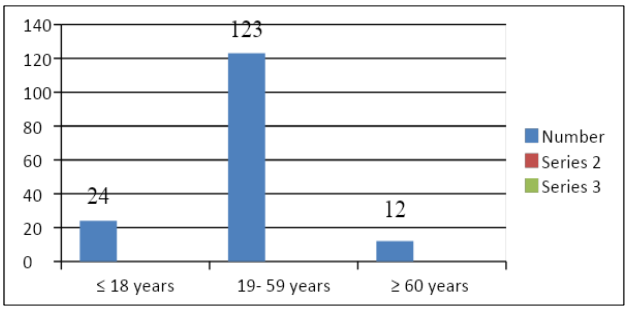

Figure 1: Age distribution of patients.

Clinical presentation of patients

Out of 154 patients, NS 94 (61.03%) was the most common indication for kidney biopsy followed by AKI 39 (25.32%) being second most common clinical presentation. 12 (22.22%) present as nephritic syndrome, 7 (4.54%) present as RPRF and only 2 (1.29%) presented as CKD as shown in Table 2.

Table 2: Clinical presentation of patients.

Clinical presentations	Number (%)
NS	94 (61.03)
NES	12 (7.79)
AKI	39 (25.32)
CKD	2 (1.29)
RPRF	7 (4.54)

Broad histopathological subdivision of biopsy finding was done.

PGD is the most common broad histopathological group in 94 (61.03%) patients followed by SGD 27 (17.53%). TID contributing (17.53%). patients and vascular lesions in 13 (17.53%). patients. 2 biopsies were normal (1.29%) as shown in Figure 2.

Prevalence of various glomerular diseases and non-glomerular diseases observed in our study is depicted in Table 3.

Out of 154 biopsies reports, 116 patients were having glomerular (primary and secondary) diseases. 116 patients were divided in three groups according to age- <18 years, 19- 59 years and >60 years as shown in Figure 3.

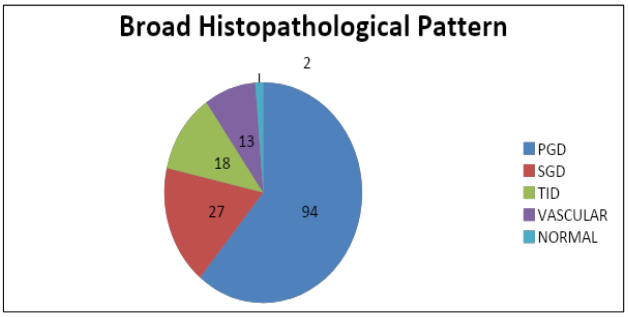

Figure 2: Distribution of broad histopathological pattern.

Table 3: Glomerular diseases.

Glomerular diseases	Number (%)
PGD	
MCD	24 (15.58)
FSGS	29 (18.80)
MN	16 (10.38)
IgAN	16 (10.38)
C3GN	3 (1.94)
DPGN	4 (2.59)
Anti-GBM disease	2 (1.29)
MPGN	1 (0.64)
SGD	
Lupus nephritis	16 (10.38)
Diabetic nephropathy	3 (1.94)
Amyloidosis (SAA)	7 (4.54)
TID	
ATN	16 (10.38)
TIN	1 (0.64)
ATI	1 (0.64)
Vascular lesion	
TMA	5 (3.24)
ACN	7 (4.54)
Vasculitis	1(0.64)

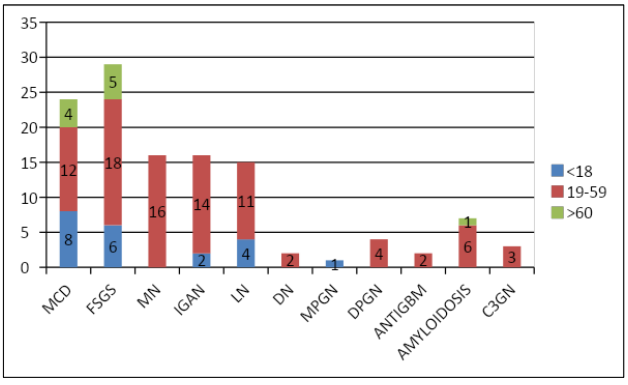

Figure 3: Age-wise distribution of glomerular diseases.

In the <18 years age group MCD is the most common histopathological diagnosis in biopsy while in the 19-59 years and >60 years age group, FSGS is the most common PGD.

11 (7.14%) patients out of 154 were anuric at presentation, 80 (51.94%) patients were having nephrotic range proteinuria (>3.5 gm/day) and non- nephrotic range proteinuria was seen in 63 (40.90%) patient as in Table 4.

Table 4: Urinary presentation.

Proteinuria	Number (%)
Nephrotic range	83 (53.89)
Non-nephrotic range	60 (38.96)
Anuria	11 (7.14)

FSGS, MCD and MN usually present with nephrotic range proteinuria, IgA nephropathy 56.89% also presented with nephrotic range proteinuria as shown in Figure 4.

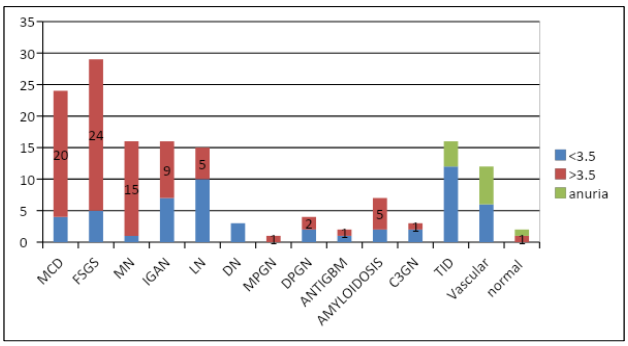

Figure 4: Distribution of proteinuria and various kidney diseases.

DISCUSSION

We conducted this study to analyze the histopathological patterns of various kidney diseases at our tertiary healthcare center, which serves the lower and lower-middle socioeconomic demographics of the rural population in central India. The research also facilitates comparisons with similar studies conducted across different regions of India. The prevalence of kidney disease is influenced by factors such as age, gender, ethnicity, geographic location, and socioeconomic status.[1,2] Given the absence of a comprehensive registry for kidney biopsies in India, this study is instrumental in establishing a robust reference registry and advancing clinical understanding of the potential etiologies of kidney diseases in our region.

In our study, majority patients were females (53.89%) with male to female ratio of 1:1.2.

Similar results from studies conducted in different regions of India and even in Egyptian and Iranian studies.[3-5] On the contrary one study conducted in Eastern Indian region by Krishna et al, male predominance was seen, probably related to fact that more male patients seek medical advice than females reflecting gender bias in health care access in their region.[6]

The mean age of patient was 33.58±15.79 years in our study population which is comparable to studies conducted in Indian subcontinent. The predominant clinical presentation and indication for kidney biopsy identified in our study was nephrotic syndrome, which was observed in 59.74% of patients. This finding aligns with results from numerous studies conducted globally as well as in Indian Subcontinent. Single center study from central India conducted by Banode et al provides same results of most common indication of kidney biopsy being nephrotic syndrome in 49.9% patients.[7]

In our findings FSGS (18.8%) is the most common histopathological diagnosis in biopsy proven primary glomerular kidney diseases in age group >18 years, in the pediatric population < 18 years MCD is most common histopathological finding in 33.33%. Banode et al study concluded same result MCD being most common in <18 years of age.[7] Similar findings in studies conducted by Rathi et al, Banode RK, Krishna et al and Golay et al FSGS is most common findings in their studies as 30.6%,17.25%, 23.02% and 24.63%, respectively.[5,7-9] FSGS is most common lesion found in studies conducted in African and south American studies as well.[8] However, a single center study conducted in Central India by Balwani et al, most common histopathological finding was IgA nephropathy which is similar to findings in studies conducted in Korea and Japan.[10,11]

The second most common PGD in our study was MCD, followed by MN and IgA nephropathy. The prevalence of IgA nephropathy, compared to studies conducted 15 to 20 years ago, which reported rates of 5-8%, has shown a significant increase. In the current study, IgA nephropathy was identified in 10.38% of patients. The most prevalent SGD identified was lupus nephritis, occurring in 9.74% of patients, followed by renal amyloidosis at 4.54%, and DN at 1.94%. The findings for DN are consistent with other studies, such as those by Banode et al which reported a prevalence of 1.9%, and Krishna et al, which reported 0.99%.[5,7] Variability in prevalence is likely due to differing criteria for renal biopsy among diabetic patients, as well as the timing of referrals to nephrologists, often occurring when renal function is already compromised and progression towards end-stage kidney disease (ESKD) has occurred.

In our study, the IgA nephropathy was 16 patients, 56.25% patients presented with nephrotic range proteinuria and 43.75% with non-nephrotic range proteinuria. This was in contrast to the Indian study done by Khairwa et al but in another study conducted by Siddappa et al in South Indian region came across nephrotic syndrome being most common presentation for IgA nephropathy patients in accordance with our study.[12,13]

The tubulointerstitial diseases, acute tubular necrosis/acute tubular injury is the most common diagnosis in 10.38% patients and tubulointerstitial nephritis in 0.64% patients. The vascular lesion seen is 7.79 % patients out of which most common is acute cortical necrosis in 4.54% followed by TMA in 3.25% patients. The acute cortical necrosis cases 87.3% were complication of pregnancy, putting light on poor health care services, irregular ANC follow up and ignorance of safe delivery practices in rural and lower socioeconomic strata.

This retrospective study focuses solely on patients who sought healthcare services and underwent further evaluation. A nationwide registry is essential for enhancing the understanding and diagnosis of kidney diseases. Conducting a small, single-center study would represent a valuable initial step toward expanding research in this field.

CONCLUSION

In our study, we retrospectively evaluated 154 patients who underwent kidney biopsies, focusing on demographic and clinical aspects. The findings indicated that NS is the most common indication for kidney biopsy; however, the histopathological diagnosis varied. This underscores the role of kidney biopsy as the gold standard for diagnosing kidney diseases. FSGS was identified as the most common PGD, while LN was the most prevalent SGD. In patients under 18 years of age, MCD was the most frequently diagnosed condition. A single-center study conducted over a limited timeframe does not adequately reflect the disease patterns required for definitive conclusions. Consequently, it is imperative to conduct large-scale, multicentric studies and establish a nationwide registry for kidney biopsies. This would promote comprehensive analyses and improve the treatment of kidney diseases.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Research Group on Progressive Chronic Renal Disease. Nationwide and long-term survey of primary glomerulonephritis in Japan as observed in 1,850 biopsied cases. Nephron. 1999;82(3):205-13.
2. Naumovic R, Pavlovic S, Stojkovic D, Basta-Jovanovic G, Nesic V. Renal biopsy registry from a single centre in Serbia: 20 years of experience. Nephrology Dialysis Transplantation. 2009;24(3):877-85.
3. Bosan IB. Recommendations for early diagnosis of chronic kidney disease. Ann Afr Med. 2007;6(3):130-6.
4. Jamil M, Bhattacharya PK, Raphael V, Khonglah Y, Lyngdoh M, Roy A. Spectrum of Glomerular Diseases in Adults: A Study from North Eastern India. J Assoc Physicians India. 2018;66(8):36-9.
5. Sliem HA, Tawfik GA, Atwa M, Keshawy MM. The histopathological profile of kidney diseases in a single center in Egypt: An overview of 14 years of experience. J Clin Diagn Res. 2011;5(2):295-300.
6. Krishna A, Singh PP, Sinha S, Vardhan H, Kumar O. Histopathological Spectrum of Native Kidney Biopsy from Eastern India: A Single-Center Observational Study. Turkish J Nephrol. 2023;30(4):310-5.
7. Banode RK, Kimmatkar P, Bawankule C, Adamane V, Ramteke V. Kidney Disease Patterns diagnosed by Kidney Biopsy: A Single-center Experience from Central India. J Assoc Physicians India. 2022;70(9):25-31.
8. Rathi M, Bhagat RL, Mukhopadhyay P, Kohli HS, Jha V, Gupta KL, et al. Changing histologic spectrum of adult nephrotic syndrome over five decades in north India: A single center experience. Indian J Nephrol. 2014;24(2):86-91.
9. Golay V, Trivedi M, Abraham A, Roychowdhary A, Pandey R. The spectrum of glomerular diseases in a single center: A clinicopathological correlation. Indian J Nephrol. 2013;23(3):168-75.
10. Bhawane A, Pasari AS, Tolani P, Balwani MR. Spectrum of Biopsy-proven Native Kidney Disease in Central India. Saudi J Kidney Dis Transplant. 2022;33(5):688-92.
11. O'Shaughnessy MM, Hogan SL, Thompson BD, Coppo R, Fogo AB, Jennette JC. Glomerular disease frequencies by race, sex and region: results from the International Kidney Biopsy Survey. Nephrol Dialysis Transplant. 2018;33(4):661-9.
12. Khairwa A. Indian scenario of IgA nephropathy: a systematic review and meta-analysis. Afr Health Sci. 2021;21(1):159-65.
13. Siddappa S, Kowsalya R, Mythri KM. IgA nephropathy in a tertiary care center from south India. Indian J Nephrol. 2011;21(4):230-4.

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