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HISTOPATHOLOGICAL PATTERNS OF RENAL DISEASES IN BAHAWAL VICTORIA HOSPITAL, BAHAWALPUR: A CROSS-SECTIONAL STUDY

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Abstract

Background and Objectives: Renal diseases are a significant cause of morbidity and mortality worldwide, with glomerulonephritis (GN) being a leading contributor to chronic kidney disease (CKD) and end-stage renal disease (ESRD). This study aims to identify the histopathological patterns of renal diseases in patients undergoing renal biopsy at Bahawal Victoria Hospital, Bahawalpur, to better understand the local epidemiology and guide clinical practice.

Material & Methods: This is a descriptive, cross-sectional study that was conducted at the Bahawal Victoria Hospital, Bahawalpur, from December 2022 to January 2024. The renal biopsies were done on patients with clinical indications like nephrotic syndrome, nephritic syndrome, RPGN, acute unexplained renal failure, and significant non-nephrotic proteinuria totaling 180. Samples for renal biopsy were processed for examination using light microscopy and immunofluorescence. Data were collected on patient demographics, clinical presentations, and histopathological diagnoses. Descriptive statistics were used to summarize the data, and associations between clinical presentations and histopathological findings were analyzed using chi-square tests.

Results: The mean age of the patients was 40.8 ± 7.5 years, with a male predominance (55.6%). Focal Segmental Glomerulosclerosis (FSGS) was the most common histopathological diagnosis, found in 26.7% of cases, followed by Membranous Nephropathy (MN) in 16.7% and Minimal Change Disease (MCD) in 12.2%. Nephrotic syndrome was the leading clinical indication for renal biopsy, accounting for 47.2% of cases. Statistically significant associations were found between nephrotic syndrome and both FSGS and MN ($p < 0.05$).

Conclusion: In Bahawalpur, FSGS is the dominant form of primary glomerular disease. The study was reflective of the global trends and has brought out a crucial role for renal biopsy in diagnosing the disease, thus itself underlining the need for continued surveillance monitoring of changing disease

patterns across this region. The knowledge of disease patterns, then, will help tailor treatment strategies and improve patient outcomes in Bahawalpur.

Keywords: Glomerulonephritis (GN), Chronic Kidney Disease (CKD), End-stage Renal Disease (ESRD)

Introduction

Glomerulonephritis (GN) is an umbrella term for a variety of kidney diseases that involve inflammation in the glomeruli, the complex networks of small blood vessels tasked with the filtering of waste from the blood to form urine [1]. The inflammation has the potential to interfere with the kidneys' vital functions, leading to chronic kidney disease (CKD) or progressing to end-stage renal disease (ESRD) if left unmanaged. The significance of GN transcends clinical descriptions; they have dramatic effects on patients' lives, impacting their physical health, emotional status, and overall quality of life [2,3]

Clinically, GN presents with a variety of symptoms based on its underlying causes and the individual characteristics of each patient. For instance, nephritic syndrome may manifest with hematuria (the presence of blood in the urine), hypertension (high blood pressure), and declining renal function. Conversely, nephrotic syndrome is typically marked by significant proteinuria (excess protein in urine), hypoalbuminemia (low albumin levels in the blood), hyperlipidemia (elevated lipids), and edema (swelling due to fluid retention) [3,4]. The overlapping nature of these clinical presentations can pose challenges in diagnosis and management, emphasizing the necessity for a comprehensive understanding of kidney health among both patients and healthcare providers.

The etiology of GN is heterogeneous, representing a wide variety of factors that may cause glomerular inflammation. Clinicians tend to categorize these diseases according to histopathological characteristics seen under microscopic analysis. Non-proliferative types of GN—defined by the absence of increased cellularity in glomeruli—tend to cause nephrotic syndrome, with conditions commonly diagnosed being Minimal Change Disease (MCD), Focal Segmental Glomerulosclerosis (FSGS), and Membranous Nephropathy (MN) [5,6]. Proliferative GN, on the other hand, which is defined by an increase in cellularity, tends to present with nephritic syndrome and encompasses diseases like IgA Nephropathy, Post-Infectious GN, and rapidly progressive glomerulonephritis (RPGN) [7].

Correct classification of GN is crucial in directing treatment decisions and prognostic evaluation. The clinical overlap between the various types of GN often makes diagnosis difficult, and therefore a complete analysis must involve meticulous patient histories, comprehensive clinical examination, and a battery of laboratory investigations for illuminating the pathology [8]. The important diagnostic techniques are urine examination for visualizing hematuria and proteinuria, blood examinations for measuring renal function, and serological tests suggestive of autoimmune disease. But definitive diagnosis usually rests on renal biopsy, which gives histopathological evidence to differentiate among the various types of GN [6,8].

The utility of renal biopsies also applies to their ability to create epidemiological information that follows disease patterns longitudinally. This is especially important in regions with variability, like Bahawalpur, where environmental, genetic, or socioeconomic etiologies can dictate the pattern and prevalence of renal diseases found. Knowledge of these trends not only helps healthcare providers develop focused public health policy but also helps them maximize patient care through intervention customization, eventually resulting in better outcomes [8,9].

In this context, comprehending the dynamics of glomerulonephritis means appreciating the human experiences that come with every diagnosis. Every patient experience is different, influenced by specific health issues, emotional reactions, and expectations of recovery. As the healthcare community continues to demystify the intricacies of GN, creating a culture of empathy and open communication takes center stage. By placing patient-centred practices at the forefront and stressing the value of early diagnosis and effective treatment, healthcare professionals can empower patients with GN and improve their overall experience along the healthcare continuum.

Materials and Methods

This was a descriptive, cross-sectional study conducted in the Bahawal Victoria Hospital, Bahawalpur, Pakistan. The study was conducted over a period of 14 months from December 2022 to January 2024. The research was aimed at assessing the histopathological patterns of renal diseases in patients who underwent renal biopsy over this period.

Patients presenting with clinical indications which required a renal biopsy were included in the study. Some of the common indications for the biopsy include nephrotic syndrome, nephritic syndrome, rapidly progressive glomerulonephritis (RPGN), acute unexplained renal failure, and significant non-nephrotic range proteinuria greater than 1 g/24 hours coupled with or without renal failure. Patients with uncontrolled hypertension, solitary kidney, peri-nephric collection, abnormal coagulation profile, and those refusing to give informed consent were excluded from the study.

All protocols in the study were reviewed and approved by the Institutional Review Board (IRB) of Bahawal Victoria Hospital, Bahawalpur. Before participation, informed consent was obtained from all patients involved.

A total of 180 renal biopsies were received during the study period. The sample size was determined based on the estimated prevalence of various glomerular diseases and the need for a statistically significant sample to allow for meaningful analysis of histopathological patterns.

Ultrasound-guided renal biopsies were performed. The patient lay prone on an abdomen, positioned under support of a pillow placed under the abdomen to push the kidneys up toward the posterior abdominal wall, during which procedure, both kidneys are visualized under ultrasound to establish two kidneys and ascertain the best biopsy site.

Local anesthesia (2% lidocaine) was administered to the skin and renal capsule. Under continuous ultrasound guidance, a renal biopsy needle was used to obtain tissue samples from the kidney. The biopsy needle was advanced into the kidney tissue with caution, and once the position was confirmed, the biopsy gun was fired to obtain the renal tissue sample.

The biopsy samples were immediately preserved in 10% buffered formalin for light microscopy and immunofluorescence. The samples were processed and examined at the pathology laboratory affiliated with Bahawal Victoria Hospital. Histopathological examination included light microscopy, immunofluorescence, and, where necessary, special staining techniques were performed to evaluate glomerular, tubular, interstitial, and vascular changes.

The information was collected on the structured proforma, which had been pre-designed. It had the patient's demographics (age and gender), clinical presentation, laboratory findings including serum creatinine, proteinuria, hematuria, and histopathological diagnosis. A descriptive statistical analysis was done by using SPSS version 21.0. The continuous variables are expressed as a mean ± SD. The categorical variables are presented in frequencies and percentages.

The main result of the study is the frequency of different patterns of histopathology with renal diseases. For continuous variables, mean, median, and standard deviation have been calculated. For categorical, frequencies and percentages have been used. Chi-square tests have been used to check the association between categorical variables. A p-value less than 0.05 is considered statistically significant.

This study was limited by its single-center design, which may affect the generalizability of the findings to other regions. The study did not use electron microscopy because it was not available, which could have provided further insights into specific renal pathologies.

Results

A total of 180 renal biopsies were conducted from December 2022 to January 2024. The patients' age range was between 15 and 70 years with an average of 40.8 ± 7.5 years. Of the total numbers of patients, 100 (55.6%) were males, while 80 (44.4%) were females, and the prevalence was slightly higher in the male gender.

The most frequent clinical indication of renal biopsy included nephrotic syndrome (85, or 47.2%), which was followed by nephritic syndrome in 40 (22.2%), and rapidly progressive

glomerulonephritis, which was in 25 patients (13.9%), acute unexplained renal failure in 20 patients (11.1%) and the remainder of 10 (5.6%) that presented with great proteinuria at a non-nephrotic range without accompanying renal failure. The distribution of indication for renal biopsy is shown in Table 1. Figure 1 also shows the visual distribution of the indications for renal biopsy. It can be observed that Nephrotic syndrome was the leading indication, accounting for nearly half of the cases. RPGN and nephritic syndrome were also common indications.

Table 1: Indications for Renal Biopsy (n=180)

Indication	Number of Patients
Nephrotic Syndrome	85
Nephritic Syndrome	40
Rapidly Progressive Glomerulonephritis (RPGN)	25
Acute Unexplained Renal Failure	20
Significant Non-Nephrotic Proteinuria	10

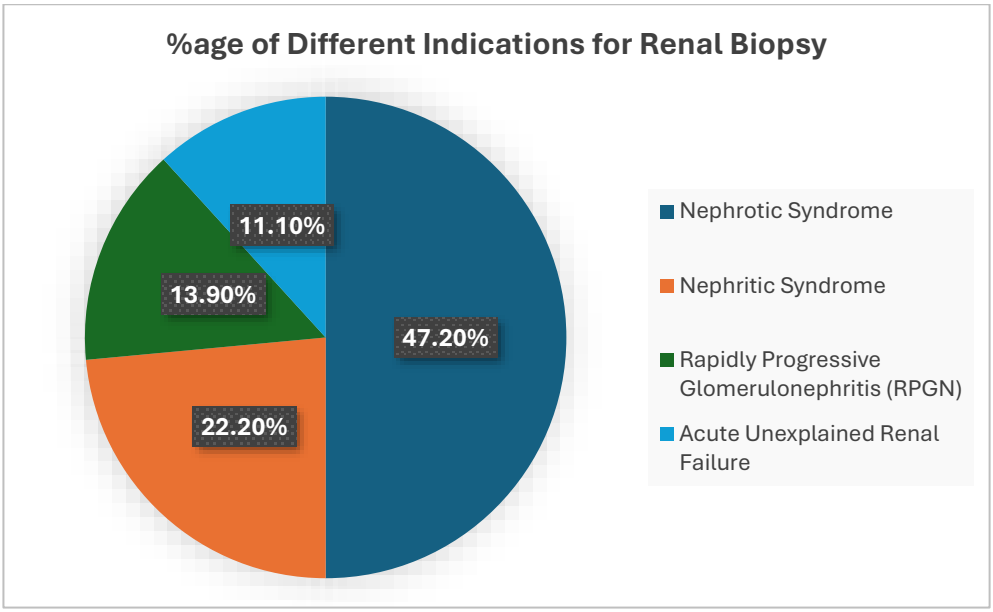

Figure 1: %age of Different Indications for Renal Biopsy

The histopathological examination of the renal biopsy samples revealed a variety of glomerular diseases. The most common histopathological diagnosis was Focal Segmental Glomerulosclerosis (FSGS), found in 48 (26.7%) patients, followed by Membranous Nephropathy (MN) in 30 (16.7%) patients, and Minimal Change Disease (MCD) in 22 (12.2%) patients. Membranoproliferative Glomerulonephritis (MPGN) was identified in 18 (10%) patients, while Lupus Nephritis (LN) was diagnosed in 12 (6.7%) patients.

Other histopathological diagnoses included Crescentic Glomerulonephritis in 10 (5.6%) patients, Renal Amyloidosis in 10 (5.6%) patients, and Tubulointerstitial Nephritis (TIN) in 8 (4.4%) patients. Less common diagnoses included IgA Nephropathy in 6 (3.3%) patients, IgM Nephropathy in 4 (2.2%) patients, and Hereditary Nephritis in 2 (1.1%) patients. The frequency of histological diagnosis of renal diseases is shown in Table 2 and Figure 2.

The distribution of histopathological diagnoses by gender is shown in Table 3. FSGS was more common in males (28%) compared to females (24%), while Lupus Nephritis was more prevalent in females (10%) than in males (4%).

Table 2: Histological Diagnosis of Renal Diseases (n=180)

Histological Diagnosis	Number of Patients
Focal Segmental Glomerulosclerosis (FSGS)	48
Membranous Nephropathy (MN)	30
Minimal Change Disease (MCD)	22
Membranoproliferative Glomerulonephritis (MPGN)	18
Lupus Nephritis (LN)	12
Crescentic Glomerulonephritis	10
Renal Amyloidosis	10
Tubulointerstitial Nephritis (TIN)	8
IgA Nephropathy	6
IgM Nephropathy	4
Hereditary Nephritis	2
Diabetic Nephropathy	2
Acute Tubular Necrosis (ATN)	2
Endocapillary Proliferative GN	1
Hemolytic Uremic Syndrome (HUS)	1

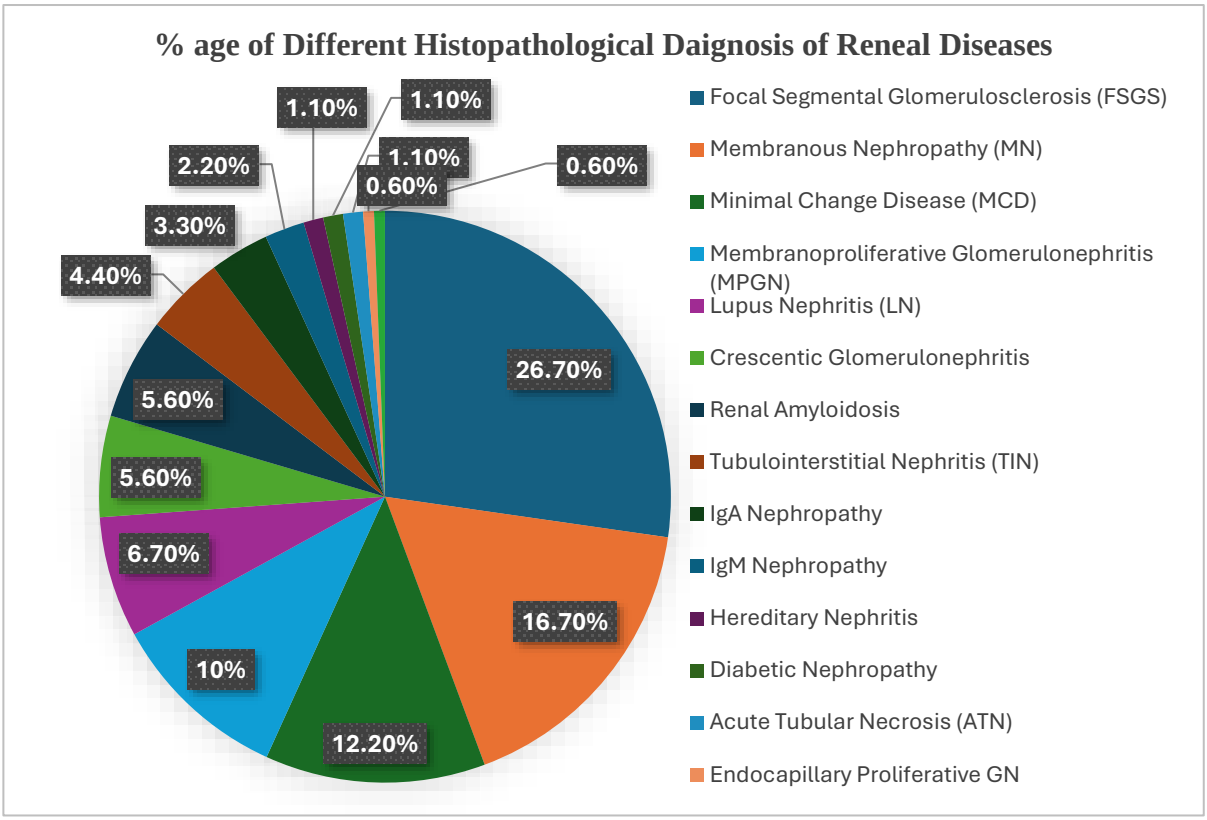

Figure 2: age of Different Indications for Renal Biopsy

Table 3: Gender Distribution of Histopathological Diagnoses

Histological Diagnosis	Males (n=100)	Females (n=80)
Focal Segmental Glomerulosclerosis (FSGS)	28 (28%)	20 (25%)
Membranous Nephropathy (MN)	15 (15%)	15 (18.7%)
Minimal Change Disease (MCD)	10 (10%)	12 (15%)
Membranoproliferative GN (MPGN)	12 (12%)	6 (7.5%)
Lupus Nephritis (LN)	4 (4%)	8 (10%)
Others	31 (31%)	19 (23.8%)

The statistical analysis showed significant associations between certain histopathological diagnoses and clinical presentations. For instance, nephrotic syndrome was significantly associated with FSGS and MN ($p < 0.05$), while RPGN was more commonly associated with Crescentic GN ($p < 0.05$).

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Discussion

This research throws significant light upon the histopathological patterns of renal diseases across Bahawalpur, both similarity and difference patterns compared with those observed in Pakistan and the international world. The most frequent histopathological disease pattern was Focal Segmental Glomerulosclerosis (FSGS); 26.7% in all cases. This pattern aligns with the global scenario in which FSGS is gaining prevalence as a primary cause of primary glomerular diseases and predominantly occurs in regions like the South Asia and South Africa [8,10]. The high prevalence of FSGS in this study reflects a similar trend observed in other studies conducted in Pakistan, where FSGS is becoming more prevalent, potentially due to a combination of genetic, environmental, and socioeconomic factors [6,11].

The second most frequent diagnosis in this study is Membranous Nephropathy, 16.7%, which also matches the findings with regional and international studies. MN has been described as a common cause of nephrotic syndrome, especially in adults, and often associated with secondary causes such as infections, malignancies, and autoimmune conditions [7,12]. Prevalence of MN in our study was consistent with the reports of other parts of Pakistan [6,11] and even in neighboring countries where it was reported as the leading cause of glomerular disease [13,14].

The third most prevalent histopathological pattern noted was Minimal Change Disease (MCD), accounting for 12.2% of the cases. MCD is an old established cause of nephrotic syndrome predominantly in children but also in adults. The prevalence of MCD in this study is compatible with that reported in Indian studies and other regions [2,15]. However, the prevalence of MCD in our study is a little lesser than that which some other researches reported in other areas may be due to older age group of distribution in our research or different prevailing patterns in some regions and locations [16,17].

Membranoproliferative Glomerulonephritis (MPGN) was identified in 10% of the cases, which is slightly lesser than historical data from other parts of region, where MPGN was earlier identified as one of the most common causes of glomerular disease [18]. Reduction in MPGN cases may reflect changes in environmental factors, access to healthcare, or public health interventions being effective to reduce the impact of underlying causes, like infections.

LN comprised 6.7% of the cases and occurred more frequently in females, in accordance with established epidemiology for systemic lupus erythematosus (SLE) [19]. The incidence of LN in this series is similar to that reported in other regional studies and should be taken into consideration when the differential diagnosis for nephritis involves SLE, especially in young women [13,14].

Histopathological diagnoses indicated FSGS occurred more commonly in males and that LN predominantly presented in females. These are compatible with worldwide epidemiological reports indicating FSGS is generally seen more in men, potentially as a result of greater genetic predispositions and exposures [20]. A higher frequency of LN has long been observed among females and has a basis on the autoimmune etiology of SLE, where the prevalence is also noted to be far more prevalent in women [18].

The strong association of nephrotic syndrome with the diagnoses of FSGS and MN emphasizes the importance of these conditions in the differential diagnosis of nephrotic syndrome in the Bahawalpur region. This association is supported by the literature, where both FSGS and MN are leading causes of nephrotic syndrome worldwide [5,9]. Rapidly Progressive Glomerulonephritis (RPGN), which in our study was the most common association with Crescentic Glomerulonephritis, is a critical diagnosis since it rapidly progresses to end-stage renal disease (ESRD) unless promptly treated [7].

Several limitations exist with this study. The design was a single-centre-based study, which may not generalise well to the broader scheme of other regions. It also lacked electron microscopy, which could not be accessed at our centre. This may have resulted in the failure to diagnose some of the glomerular disease conditions more precisely, like the Alport syndrome and thin basement membrane

disease. Future studies should be multicentre and include more advanced diagnostic modalities to provide a more comprehensive understanding of renal disease patterns.

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Conclusion

The findings of the present study show a comprehensive histopathological pattern of renal diseases among patients undergoing renal biopsy at Bahawal Victoria Hospital, Bahawalpur. Focal Segmental Glomerulosclerosis (FSGS) emerges as the leading diagnosis, closely followed by Membranous Nephropathy (MN) and Minimal Change Disease (MCD). The result thus emphasizes the importance of renal biopsy in accurate diagnosis of glomerular disorders. It is particularly crucial in countries where health facilities are scarce, and excellent management strategies depend very much on the valid diagnosis.

The mean age of the patient population was 40.8 ± 7.5 years, and males were predominant, accounting for 55.6% of the patients. The correlation between nephrotic syndrome and the incidence of FSGS and MN ($p < 0.05$) highlights the need for specific diagnostic approaches in elucidating the pathogenic mechanisms underlying these conditions.

Notably, the data here are both in line with recent national and international trends but also give a unique flavor that can be determined by either genetic, environmental, or socioeconomic factors that pertain to this Bahawalpur zone. The higher prevalence of LN in females calls for gender-centric diagnosis and treatment, so the healthcare practices must counter specifically risks to different demographics.

In conclusion, this study calls for persistent research and monitoring patterns of renal disease in Bahawalpur for the early diagnosis for optimizing treatment protocols, thus relieving the chronic kidney burden. Future research studies should use additional advanced diagnostic techniques and extend multiple centre validation studies for using these findings and generalizing them to various populations with a better understanding of different renal health levels.

References

1. McGrogan A, Franssen CFM, de Vries CS. The incidence of primary glomerulonephritis worldwide: a systematic review of the literature. Nephrology Dialysis Transplantation [Internet]. 2011 Feb 1 [cited 2025 Jan 26];26(2):414–30. Available from: https://doi.org/10.1093/ndt/gfq665
2. Pesce F, Schena FP. Worldwide distribution of glomerular diseases: the role of renal biopsy registries. Nephrology Dialysis Transplantation [Internet]. 2010 Feb 1 [cited 2025 Jan 26];25(2):334–6. Available from: https://doi.org/10.1093/ndt/gfp620
3. Kazi AM, Hashmi MF. Glomerulonephritis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Jan 26]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK560644/
4. Kimmel M. Infections-associated Glomerulonephritis. Dtsch Med Wochenschr. 2020 Feb;145(4):240–7.
5. Wetmore JB, Guo H, Liu J, Collins AJ, Gilbertson DT. The incidence, prevalence, and outcomes of glomerulonephritis derived from a large retrospective analysis. Kidney International [Internet]. 2016 Oct 1 [cited 2025 Jan 26];90(4):853–60. Available from: https://www.sciencedirect.com/science/article/pii/S0085253816302113
6. Samiullah, Saeed M, Fahad S, Rehman Z ur, Rashid A ur, Haq A ul. Common Types of Glomerulonephritis among Patients Presenting to Nephrology Ward. Journal of Saidu Medical College [Internet]. 2024 Jul 24 [cited 2025 Jan 26];14(3):243–8. Available from: https://jsmc.pk/index.php/jsmc/article/view/859
7. Sharma M, Mazumder MA, Mahanta PJ, Doley PK, Pegu G, Alam S, et al. Histological patterns of renal diseases in children: A 12-year experience from a single Tertiary Care Center in North-East India. Saudi J Kidney Dis Transpl. 2021;32(2):364–70.
8. Das U, Dakshinamurty KV, Prayaga A. Pattern of biopsy-proven renal disease in a single center of south India: 19 years experience. Indian Journal of Nephrology [Internet]. 2011 Dec [cited

2025 Jan 26];21(4):250. Available from: https://journals.lww.com/ijon/fulltext/2011/21040/Pattern_of_biopsy_proven_renal_disease_in_a_single.8.aspx
9. Randeree A, Davies M, Dayal C, Ajayi A, Cassimjee Z, Division of Nephrology, Department of Internal Medicine, School of Clinical Medicine, Faculty of Heath Sciences, University of Witwatersrand. Histological patterns of kidney disease at Helen Joseph Hospital: a 5-year retrospective review of biopsy diagnoses. WJCM [Internet]. 2023 [cited 2025 Jan 26];5(1):11. Available from: https://journals.co.za/doi/abs/10.18772/26180197.2023.v5n1a2
10. Okpechi IG, Ayodele OE, Rayner BL, Swanepoel CR. Kidney disease in elderly South Africans. CN [Internet]. 2013 Apr 1 [cited 2025 Jan 26];79(04):269–76. Available from: http://www.dustri.com/article_response_page.html?artId=10174&doi=10.5414/CN107746&L=0
11. Ali A, Ali MU, Akhtar SZ. Histological pattern of paediatric renal diseases in northern Pakistan. J Pak Med Assoc. 2011 Jul;61(7):653–8.
12. Yim T, Kim SU, Park S, Lim JH, Jung HY, Cho JH, et al. Patterns in renal diseases diagnosed by kidney biopsy: A single-center experience. Kidney Res Clin Pract [Internet]. 2020 Mar 31 [cited 2025 Jan 26];39(1):60–9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7105626/
13. Priyadarshini L, Pradhan SK. Pattern of Renal Histopathological Findings in Children: A Single Center Study. JCDR [Internet]. 2019 [cited 2025 Jan 26]; Available from: https://jcdr.net/article_fulltext.asp?issn=0973-709x&year=2019&volume=13&issue=12&page=SC01&issn=0973-709x&id=13352
14. Mainali N, Acharya B, Lamichhane U, Phulara G. Renal Disease in Nepal, Under Microscope: One Year Study. Nepalese Medical Journal [Internet]. 2024 Dec 9 [cited 2025 Jan 26];6(1):634–8. Available from: https://nepjol.info/index.php/nmj/article/view/71015
15. AlYousef A, AlSahow A, AlHelal B, Alqallaf A, Abdallah E, Abdellatif M, et al. Glomerulonephritis Histopathological Pattern Change. BMC Nephrol [Internet]. 2020 May 18 [cited 2025 Jan 26];21(1):186. Available from: https://doi.org/10.1186/s12882-020-01836-3
16. Rivera F, López-Gómez JM, Pérez-García R. Clinicopathologic correlations of renal pathology in Spain. Kidney International [Internet]. 2004 Sep 1 [cited 2025 Jan 26];66(3):898–904. Available from: https://www.kidney-international.org/article/S0085-2538(15)50134-8/fulltext
17. Arapović A, Vukojević K, Filipović N, Glavina Durdov M, Ljubanović-Galešić D, Saraga-Babić M, et al. Epidemiology of 10-year paediatric renal biopsies in the region of southern Croatia. BMC Nephrol. 2020 Feb 26;21(1):65.
18. Yadav S, Kandalkar B. Epidemiology of Pediatric Renal Diseases and its Histopathological Spectrum - A Single-Center Experience from India. Saudi J Kidney Dis Transpl. 2021;32(6):1744–53.
19. Santangelo L, Netti GS, Giordano P, Carbone V, Martino M, Torres DD, et al. Indications and results of renal biopsy in children: a 36-year experience. World J Pediatr. 2018 Apr;14(2):127–33.
20. Yang Y, Zhang Z, Zhuo L, Chen DP, Li WG. The Spectrum of Biopsy-Proven Glomerular Disease in China: A Systematic Review. Chinese Medical Journal [Internet]. 2018 Mar 20 [cited 2025 Jan 26];131(6):731. Available from: https://journals.lww.com/cmj/fulltext/2018/03200/the_spectrum_of_biopsy_proven_glomerular_disease.15.aspx