Section: Pathology

Original Research Article

CLINICOPATHOLOGICAL GAMUT OF RENAL DISEASES AT A TERTIARY CARE CENTRE IN SOUTH INDIA

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ABSTRACT

Background: Renal diseases constitute a major global health burden and are associated with significant morbidity and mortality. Renal biopsy remains the gold standard for diagnosing glomerular diseases. This study aimed to evaluate the clinicopathological spectrum of renal diseases diagnosed by histopathology and immunofluorescence in a tertiary care centre in South India. **Materials and Methods:** A retrospective study was conducted between October 2020 and October 2022 at Mahatma Gandhi Memorial Government Hospital, Tiruchirappalli. 43 renal biopsy specimens were received from patients with chronic kidney disease. Renal transplant biopsies were excluded. One biopsy core was processed for immunofluorescence using IgG, IgA, IgM, C3c, C1q, Kappa, Lambda, and Fibrinogen antibodies. The second core underwent routine histopathological processing and was stained with Hematoxylin and Eosin, Periodic Acid-Schiff, Periodic Acid Methenamine Silver, and Masson's Trichrome stains. **Results:** Among the 43 patients, 24 (55.8%) were males, and 19 (44.2%) were females, with ages ranging from 13 to 68 years. Nephrotic syndrome was the commonest clinical presentation. Primary glomerular diseases constituted 72.1% of cases, while secondary glomerular diseases accounted for 27.9%. Membranoproliferative glomerulonephritis (13.9%) was the most frequent primary glomerular disease, whereas lupus nephritis (11.6%) was the leading secondary glomerular pathology. Hypertension was the commonest comorbidity (72%). Proteinuria was present in 90.3% of patients, an elevated protein-creatinine ratio in 97.6%, and hematuria in 18.6%. **Conclusion:** Renal biopsy with immunofluorescence remains indispensable for precise disease classification, facilitates appropriate therapeutic decisions, and reduces empirical treatment. Continued strengthening of renal pathology services is essential for improving patient outcomes.

INTRODUCTION

Renal diseases are steadily increasing amongst the population by the day, regardless of age or gender. The reason for the sudden rise of this condition might be attributed to better access to diagnostic modalities and an increasing awareness of one's health amongst the general public. From 1990 to 2016, the global incidence of kidney diseases has seen a humongous rise at a rate of an alarming 89%,[1] highlighting its growing healthcare significance. This startling figure should raise alarm bells and emphasise the need to screen people and diagnose renal diseases with alacrity.

Renal diseases comprise a heterogeneous group of disorders involving the glomeruli, tubules, interstitium, and blood vessels. Clinical diagnosis such as nephrotic syndrome, nephritic syndrome, acute kidney injury, and chronic kidney disease often have overlapping symptoms, making definitive diagnosis challenging.

Although laboratory investigations and radiological imaging provide valuable clinical information, they cannot reliably establish the underlying etiology of most renal diseases. Consequently, renal biopsy remains the gold standard diagnostic tool. Histopathological examination, together with immunofluorescence, enables accurate identification of immune complex deposition patterns and precise

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classification of glomerular diseases, thereby guiding prognosis and treatment.

There is also a necessity to increase the availability of diagnostic modalities all over the world. Investigations should not be localised to major cities and must be slowly be made available and affordable in a widespread manner.

The spectrum of glomerular diseases varies considerably across different geographical regions because of genetic, environmental, socioeconomic, and infectious factors. Therefore, regional epidemiological data are essential for understanding disease distribution and improving clinical management.

In this study, we attempted to diagnose patients with renal diseases who came to a tertiary care centre in South India. A pioneer study to pave the way for future research to be conducted.

MATERIALS AND METHODS

Study Design: This retrospective observational study was conducted in the Department of Pathology, Mahatma Gandhi Memorial Government Hospital, Tiruchirappalli, over a period of two years from October 2020 to October 2022.

Study Population: A total of 43 native renal biopsy specimens were included.

Inclusion Criteria

- Patients with chronic kidney disease who underwent native renal biopsy.

Exclusion Criteria

- Renal transplant biopsies.

Biopsy Processing

Each renal biopsy specimen consisted of two cores. One core was transported in normal saline for immunofluorescence studies. Frozen sections measuring 5 µm thickness were prepared using a cryostat and stained with the following antibodies:

- IgG
- IgA
- IgM
- C3c
- C1q
- Kappa
- Lambda
- Fibrinogen

The second biopsy core was fixed in 10% neutral buffered formalin and processed routinely for paraffin embedding.

Sections were stained using:

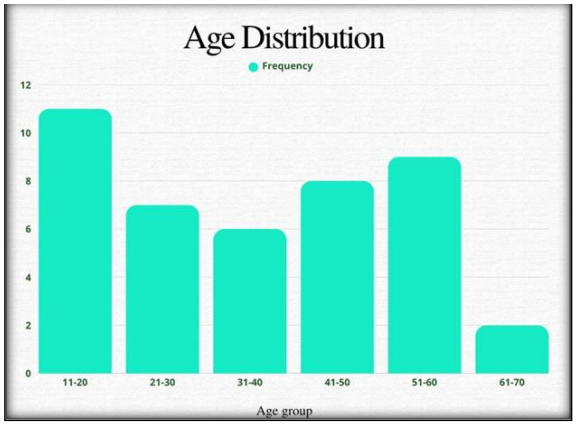
- Hematoxylin and Eosin (H&E)
- Periodic Acid-Schiff (PAS)
- Periodic Acid Methenamine Silver (PAMS)
- Masson's Trichrome

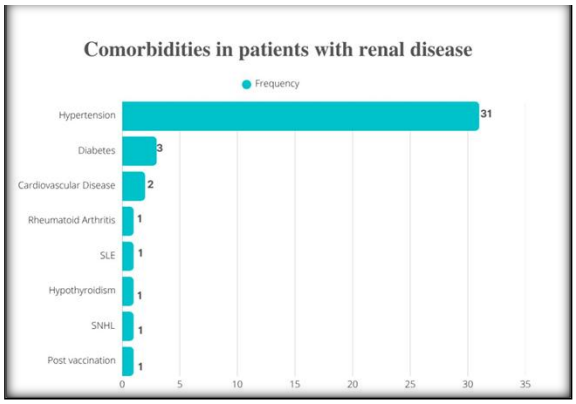
Staining procedures were standarised using guidelines,[2,3] and performed with appropriate controls.

Histopathological findings were correlated with immunofluorescence findings4,5,6 and clinical parameters to establish the final diagnosis.

Statistical Analysis

Clinical presentation, demographic, laboratory, and histopathological data were entered into Microsoft Excel and analyzed using descriptive statistics. Continuous variables were expressed as mean ± standard deviation, whereas categorical variables were expressed as frequencies and percentages.





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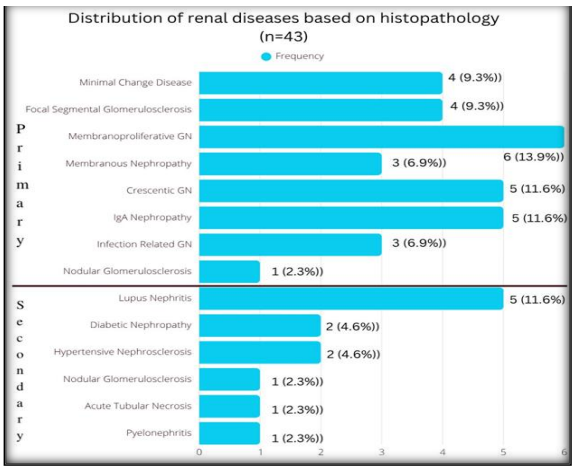

RESULTS

A total of 43 renal biopsy specimens were analyzed.

Demographic Profile

Among the study population, 24 patients (55.8%) were males and 19 (44.2%) were females.

The age ranged from 13 to 68 years.

Table 1: Sex distribution of patients undergoing renal biopsy (n=43)

Sex	Number of patients	Percentage
Male	24	55.8
Female	19	44.2

Table 2: Age distribution of patients undergoing renal biopsy (n=43)

Age group (years)	Number of patients	Percentage
≤10	0	0
11-20	11	25.5
21-30	7	16.2
31-40	6	13.9
41-50	8	18.6
51-60	9	20.9
61-70	2	4.6
>70	0	0

(Minimum age- 13, Maximum-68, Mean age ± SD- 37.19± 16.0).

Clinical Presentation

Patients were clinically categorized into:

- Nephrotic syndrome
- Nephritic syndrome
- Chronic kidney disease
- Acute kidney injury
- Rapidly progressive glomerulonephritis

Nephrotic syndrome constituted the most frequent clinical presentation.

Table 3: Clinical presentation of various renal disease (n=43)

Renal disease	Number	NiS	NoS	CKD	AKI	RPGN
Minimal Change Disease	4	-	4	-	-	-
Focal Segmental Glomerulosclerosis	4	1	3	-	-	-
Membranoproliferative GN	6	1	5	-	-	-
Membranous Nephropathy	3	-	3	-	-	-
Mesangioproliferative Glomerulonephritis	10	1	8	1	-	-
Proliferative GN	1	1	-	-	-	-
Crescentic GN	5	1	1	1	-	2
Nodular Glomerulosclerosis	2	-	2	-	-	-
Diabetic Nephropathy	2	-	2	-	-	-
Infection Related GN	2	-	2	-	-	-
Hypertensive Nephrosclerosis	2	1	-	-	1	-
Acute tubular necrosis	1	-	-	-	1	-
Pyelonephritis	1	-	1	-	-	-

NiS- Nephritic syndrome, NoS-Nephrotic syndrome, CKD-Chronic kidney disease, AKI-Acute kidney injury, RPGN- Rapidly Progressive Glomerulonephritis

Histopathological Spectrum

Histopathological examination with immunofluorescence established the following diagnoses:

- Minimal Change Disease
- Focal Segmental Glomerulosclerosis
- Membranous Nephropathy
- Membranoproliferative Glomerulonephritis
- Mesangioproliferative Glomerulonephritis
- IgA Nephropathy
- Lupus Nephritis
- Diabetic Nephropathy
- Proliferative Glomerulonephritis
- Crescentic Glomerulonephritis
- Nodular Glomerulosclerosis
- Infection-related Glomerulonephritis

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- Hypertensive Nephrosclerosis
- Acute Tubular Necrosis
- Pyelonephritis

Associated Comorbidities

Hypertension was the commonest associated comorbidity, observed in 31 patients (72%).

Other comorbidities included:

- Diabetes mellitus – 3 patients (6.9%)
- Cardiovascular disease – 2 patients (4.6%)
- Rheumatoid arthritis
- Systemic lupus erythematosus
- Sensorineural hearing loss
- Hypothyroidism
- Post-Covishield vaccination

Laboratory Findings

Female patients demonstrated comparatively lower serum creatinine levels than males.

Among **females**:

- 11 had normal serum creatinine
- 8 had elevated serum creatinine
- Mean serum creatinine: 1.16 ± 0.42 mg/dL

Among males:

- 9 had normal serum creatinine
- 15 had elevated serum creatinine
- Mean serum creatinine: 3.86 ± 3.36 mg/dL

Protein-creatinine ratio was elevated (>0.2) in 42 patients (97.6%).

Proteinuria was present in 39 patients (90.3%).

Hematuria was observed in 8 patients (18.6%).

Distribution of Renal Diseases

Primary glomerular diseases constituted 31 cases (72.1%).

Secondary glomerular diseases accounted for 12 cases (27.9%).

Among primary glomerular diseases:

- Membranoproliferative Glomerulonephritis – 13.9%
- Crescentic Glomerulonephritis – 11.6%
- IgA Nephropathy – 11.6%

Among secondary glomerular diseases:

- Lupus Nephritis – 11.6%
- Diabetic Nephropathy – 4.6%
- Hypertensive Nephrosclerosis – 4.6%

Table 4: Distribution of renal disease based on histopathology diagnosis undergoing renal biopsy during the study period (n=43)

Major category	Renal disease	Number of patients	Percentage
Primary (31 cases)	Cresecentic GN	5	11.6
	Focal Segmental Glomerulosclerosis	4	9.3
	Membranoproliferative GN	6	13.9
	Membranous Nephropathy	3	6.9
	IgA Nephropathy	5	11.6
	Nodular Glomerulosclerosis	1	2.3
	Minimal change disease	4	9.3
	Infection Related Glomerulonephritis	3	6.9
Secondary (12 cases)	Lupus Nephritis	5	11.6
	Diabetic Nephropathy	2	4.6
	Hypertensive Nephrosclerosis	2	4.6
	Nodular Glomerulosclerosis	1	2.3
	Acute tubular necrosis	1	2.3
	Pyelonephritis	1	2.3

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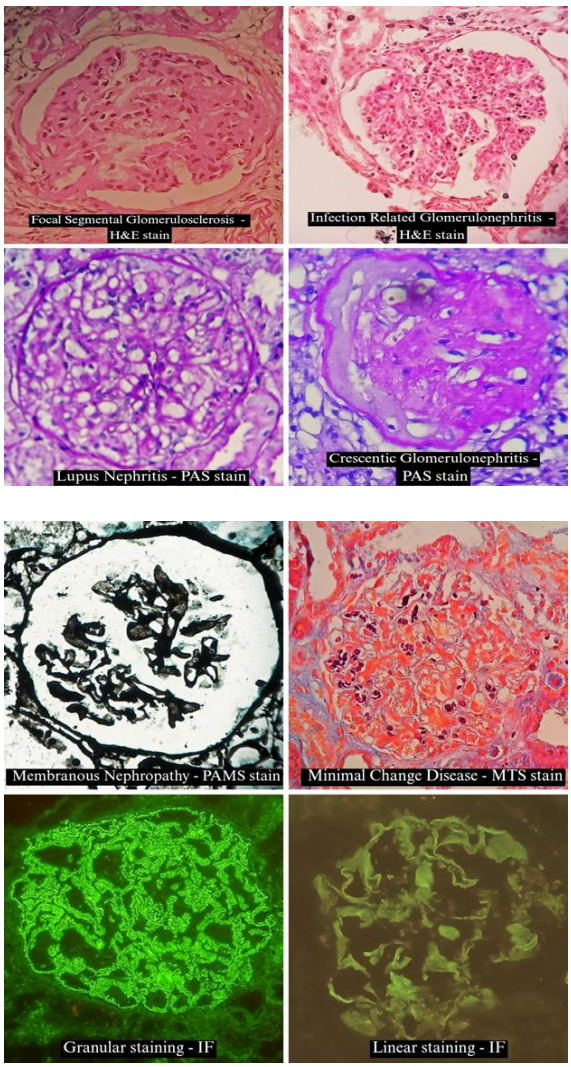

DISCUSSION

Renal pathology is not easy to diagnose when compared to other conditions. A simple urine analysis and renal function test can detect the decline of renal function but it can never pinpoint the cause of the disease. Radiological studies can only go so far when it comes to identifying the root cause of the disease. Only a renal biopsy remains as the gold standard diagnostic modality used to determine the exact cause of the infirmity. Unfortunately, it is an invasive procedure that possesses a significant amount of morbidity for the patient. Despite the inherent risks of the procedure, a patient must undergo a renal biopsy as there are no other non-invasive procedures to diagnose the various conditions at the present moment. While the possibilities of non-invasive diagnostic routes is not far from being a reality, a Pathologist must aid in the apt diagnosis with the method currently available. This makes it imperative that all Pathologists and not only Nephropathologists must have a basic understanding of renal disorders and must diagnose the disease with a fair degree of accuracy when the diagnostic modalities are available.

Nephrotic syndrome is most often the commonest presentation of renal disorders.[12,13,14] Certain conditions tend to be more prevalent in certain parts of the country.

In our study, the most common Primary Glomerular Disease turned out to be Membranoproliferative Glomerulonephritis. When we compare this to studies from other parts of India, it was found out that Membranous Nephropathy was more common in South India,[14] IgA Nephropathy in Central India,[12] and Membranous Nephropathy in Northern India.[13]

The most common secondary cause of Glomerular disease was Lupus Nephritis which was seen in a similar study conducted in South India.[14] Central India and North Indian studies,[12,13] reported Diabetic Nephropathy as the most common secondary cause of Glomerular pathology.[15]

CONCLUSION

Clarity in diagnosis removes ambiguity and empirical treatment strategies. Treatment protocols vary based on the type of disease the patient has. The trial and error system of approach can be removed entirely from the field of Nephrology if diagnostic modalities are strengthened. More research can be conducted which provides a ton information to open up a whole new world of possibilities and ideas to treat renal disorders. This study helps to highlight that there's more that meets the eye than a mere clinical diagnosis of Nephrotic or Nephritic syndrome and that more importance should be given to the field of Nephropathology in our country.

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This original research article is in compliance with Ethics Guidelines.

REFERENCES

1. Xie Y, Bowe B, Mokdad AH, Xian H, Yan Y, Li T, Maddukuri G, Tsai CY, Floyd T, Al-Aly Z. Analysis of the Global Burden of Disease study highlights the global, regional, and national trends of chronic kidney disease epidemiology from 1990 to 2016. Kidney Int. 2018 Sep;94(3):567-581. doi: 10.1016/j.kint.2018.04.011. Epub 2018 Aug 3. PMID: 30078514.
2. Suvarna SK, Layton C, Bancroft J D. Bancroft's theory and practice of histological techniques. 8th ed. Oxford: Elsevier; 2019.
3. Ramadas Nayak. Histopathology techniques and its management. New Delhi: Jaypee Brothers; 2018.
4. Cotran RS, Kumar V, Robbins SL. Robbins and cotran pathologic basis of disease. 10th ed. Philadelphia, Pa: Elsevier; 2020.
5. Lager DJ, Abrahams NA. Practical Renal Pathology. Saunders; 2013.
6. Colvin RB. Diagnostic pathology. Kidney diseases. Philadelphia, Pa: Elsevier; 2019.
7. Longacre TA, Greenson JK, Hornick JL, Reuter VE, Mills SE, Sternberg SS. Mills&Sternberg's Diagnostic Surgical Pathology. Philadelphia: Wolters Kluwer; 2022.
8. Rosai J, Ackerman LV, Goldblum JR, Lamps LW, McKenney JK, Myers JL. Rosai and Ackerman's Surgical Pathology. Philadelphia: Elsevier; 2018.
9. Pfeifer JD, Dehner LP, Humphrey PA. Washington Manual of Surgical Pathology. Philadelphia: Wolters Kluwer; 2020.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

10. HOWIE ALEXANDERJ. Handbook of Renal Biopsy Pathology. S.l.: SPRINGER; 2021.
11. Anila Korula. Renal Biopsy Interpretation. Jaypee Brothers Medical Publishers; 2019.
12. Balwani M, Pasari A, Patel M. Mon-041 renal biopsy profile from central part of India. Kidney International Reports. 2019;4(7).
13. Kumar S, Kumari A, Agrawal SC. Pattern of kidney diseases in northern India: An overview through histopathological findings in biopsy-proven cases. The Egyptian Journal of Internal Medicine. 2020;32(1).
14. Dhanapalan A, Govindasamy N, Lamech Moses T, Arumugam V, Bhagavatula VRH S, Alavudeen Sulthan S, et al. POS-140 spectrum of biopsy proven renal diseases in South india- a single center experience. Kidney International Reports. 2021;6(4).
15. Kidney International Supplement to Kdigo 2021 Clinical Practice Guideline for the Management of Glomerular Diseases. In [cited 2026 July 23]. Available from: https://kdigo.org/wp-content/uploads/2024/05/KDIGO-2021-Glomerular-Diseases-Guideline_English_2024-Chapter-Updates.pdf.

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