

Original Research

Analysis of Biopsy Proven Renal Disease Pattern at a Tertiary Care Hospital

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Abstract

Background: The conventional method of diagnosing the majority of kidney disorders remains the renal biopsy, considered the benchmark. Hence, this study was conducted to analyse biopsy proven pattern of renal diseases.

Materials & Methods: Data of a total of 200 was analysed in the present study. Complete demographic and clinical details of all the cases were recorded. A performa was made and indication for renal biopsy along with their final histopathological diagnosis was also recorded. All the results were recorded in Microsoft excel sheet followed by statistical analysis using SPSS Software.

Results: Analysis of a total of 200 renal biopsy cases was done. Primary glomerulonephritis was the diagnosis in 60.5 percent of the patients while secondary glomerulonephritis was the diagnosis in 19.5 percent of the patients. Tubulointerstitial nephritis was the diagnosis in 15 percent of the patients. Among primary glomerulonephritis, Minimal change disease, Focal segmental glomerulonephritis and Membranous nephropathy were present in 24 percent, 20 percent and 14.5 percent of the patients respectively.

Conclusion: There is a notable diversity in the primary glomerular diseases, encompassing various major histological groups.

Keywords: Biopsy Proven Renal Disease, Pattern.

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INTRODUCTION

The worldwide incidence of renal disease diagnosed by kidney biopsy differs by region, race, age, sex and clinical practice pattern. Although glomerular disease ranks third among causes of chronic kidney disease following diabetic nephropathy and hypertensive nephrosclerosis,^{1,2} it is clinically important because it can be reversed and often cured when detected and treated at an early stage. A kidney biopsy is an essential diagnostic tool for accurate diagnosis of renal disease. It is not only useful for diagnosis but necessary for making effective treatment decisions and ascertaining the degree of active and chronic histologic change.³ The degree of active or chronic change helps determine the prognosis and likelihood of response to treatment. Additionally, a kidney biopsy can be used to assess genetic diseases. The prevalence of glomerular disease varies by geography. For example, Asia, Australia, and southern Europe have a high prevalence of immunoglobulin A nephropathy (IgAN) (20% to 40%), whereas the United States (US) and United Kingdom

(UK), as well as Canada, South America, and Africa, have a low prevalence (2% to 10%) of IgAN.⁴ According to the United States Renal Data System report, Taiwan is leading in terms of both incidence (493 per million population) and prevalence (3392 per million population) of treated end-stage kidney disease (ESKD).⁵ The commonest cause of treated ESKD is diabetes (45.4%). In 2017, 6969 (58.6%) of 11,887 patients who had dialysis were older than 65 years old.⁶ The National Development Council reported that the natural increase in the population is approaching zero, even with restricted international migration due to coronavirus disease 2019; the change in Taiwan's population is expected to be negative beginning in 2020.⁷ In 2020, 16% of the people in Taiwan were > 65 years old. Now, the aging population is an important health care burden in Taiwan and even around the world. A serious concern is that Taiwan's accelerated rate of aging even exceeds that of Western countries.⁸ In the elderly population, kidney health, including epidemiology and pathophysiology of chronic

kidney disease, has been gaining research attention for treatment and management of the clinical manifestation of kidney disease.^{9,10} The risk of renal dysfunction is higher in geriatric patients than in young patients. The risk factors for renal dysfunction include conditions inherent with aging, such as gross structural and cellular changes, deterioration in physiological function, and lowered vascular compensatory reserve, and their worsening through exposure to nephrotoxic medications and diagnostic tests.^{10,11} Without renal biopsy, diagnosis and decision-making for elderly people are difficult in terms of the management of their primary and secondary glomerular diseases or other pathological entities.¹² Renal biopsy is unparalleled in diagnosing most kidney disease patients due to the pronounced activity and constancy of the kidney injury. A patient's age is no more considered a contraindication to performing a renal biopsy, immunosuppressive therapy, renal transplant, and renal replacement. Renal biopsy plays a pivotal role in diagnosing and treating renal disorders in aged patients.¹³ Hence, this study was conducted to analyse biopsy proven pattern of renal diseases.

MATERIALS & METHODS

The present study was conducted in Department of Nephrology, Patna Medical College, Patna, Bihar (India) to analyse biopsy proven pattern of renal

diseases. Data of a total of 200 was analysed in the present study. Complete demographic and clinical details of all the cases were recorded. A Performa was made and indication for renal biopsy along with their final histopathological diagnosis was also recorded. All the results were recorded on a Microsoft excel sheet followed by statistical analysis using SPSS Software.

RESULTS

Analysis of a total of 200 renal biopsy cases was done. Primary glomerulonephritis was the diagnosis in 60.5 percent of the patients while secondary glomerulonephritis was the diagnosis in 19.5 percent of the patients. Tubulointerstitial nephritis was the diagnosis in 15 percent of the patients. Among primary glomerulonephritis, Minimal change disease, Focal segmental glomerulonephritis and Membranous nephropathy were present in 24 percent, 20 percent and 14.5 percent of the patients respectively. Among Secondary glomerulonephritis, Lupus nephritis, Amyloidosis and Diabetic nephropathy were present in 10 percent, 7 percent and 2.5 percent of the patients respectively. Among tubulointerstitial nephritis cases, Acute tubular necrosis, Acute Tubulointerstitial nephritis and chronic Tubulointerstitial nephritis were present in 6 percent, 5 percent and 4 percent of the patients respectively.

Table 1: Data of all renal diseases

Variable		Number	Percentage
Primary glomerulonephritis	Minimal change disease	48	24
	Focal segmental glomerulonephritis	40	20
	Membranous nephropathy	29	14.5
	Others	14	7
	Total	131	60.5
Secondary glomerulonephritis	Lupus nephritis	20	10
	Amyloidosis	14	7
	Diabetic nephropathy	5	2.5
	Total	39	19.5
Tubulointerstitial nephritis	Acute tubular necrosis	12	6
	Acute Tubulointerstitial nephritis	10	5
	Chronic Tubulointerstitial nephritis	8	4
	Total	30	15
Total		200	100

Table 2: Frequency of histological diagnosis on the basis of clinical presentation of nephropathy

Renal disease	NS	ARF	CRF	ANS	AUA	others	Total
Primary glomerulonephritis	90	15	12	6	5	3	131
Secondary glomerulonephritis	22	5	5	2	1	4	39
Tubulointerstitial nephritis	20	4	2	1	1	2	30
Total	132	24	19	9	7	9	200

NS: Nephrotic syndrome, ARF: Acute renal failure, CRF: Chronic renal failure, ANS: Acute nephritic syndrome, AUA: Asymptomatic urinary abnormalities

DISCUSSION

Renal biopsy is still the gold standard for diagnosis, treatment approach, and predicting outcome in patients with kidney diseases.¹⁴ There is a scarcity of large-scale data about the prevalence of biopsy-proven kidney diseases in Iran. The distribution pattern and incidence of kidney diseases, especially glomerulonephritis have changed over time.¹⁵ Hence, this study was conducted to analyse biopsy proven pattern of renal diseases. In the present study, Analysis of a total of 200 renal biopsy cases was done. Primary glomerulonephritis was the diagnosis in 60.5 percent of the patients while secondary glomerulonephritis was the diagnosis in 19.5 percent of the patients. Tubulointerstitial nephritis was the diagnosis in 15 percent of the patients. Among primary glomerulonephritis, Minimal change disease, Focal segmental glomerulonephritis and Membranous nephropathy were present in 24 percent, 20 percent and 14.5 percent of the patients respectively. A study by Das U et al, analyzed the distribution of biopsy-proven renal disease (BPRD) and its changing pattern over a period of 19 years from a tertiary care hospital in south India. All the renal biopsies performed from 1990 to 2008 were reviewed retrospectively. Biopsies were evaluated by light microscopy and immunofluorescence microscopy and also special stains when warranted. A total of 1849 biopsies were analyzed. The mean patient age was 32.27 ± 18.38 (range 10-80) years. The male:female ratio was 1.4:1. The most common indications of renal biopsy were nephrotic syndrome (49%), followed by chronic renal failure (13.6%) and rapidly progressive renal failure (12%). Primary glomerulonephritis (PGN) comprised 1278 (69.1%) of the total patients. Among the PGN cases, the most common one was minimal change disease (21.8%), followed by focal segmental glomerulosclerosis [FSGS (15.3%)], membranous glomerulonephritis (10%), chronic glomerulonephritis (9.7%), postinfectious glomerulonephritis (8.1%), mesangioproliferative glomerulonephritis (7.5%), diffuse proliferative glomerulonephritis (6.7%), crescentic glomerulonephritis (6.5%), IgA nephropathy [IgAN (6.3%)], membranoproliferative glomerulonephritis (5.7%), focal proliferative glomerulonephritis (1.6%) and IgM nephropathy (0.5). Secondary glomerular disease (SGN) accounted for 337 (18.2%) of the cases. The most common SGN was lupus nephritis (80.1%), followed by amyloidosis (8%) and diabetic nephropathy (6.5%). Tubulointerstitial disease [124 (6.7%)] and vascular disease [60 (3.2%)] were less common. End-stage changes and miscellaneous disease were found in 37 (2%) and 13 (0.7%) cases, respectively. The incidence of FSGS and IgAN has been increasing since 1999. This study provides descriptive biopsy data and highlights the changing incidence of renal disease which is probably contributed by an increase referral

due to increased awareness together with increased manpower and infrastructure.¹⁶ In the present study, Among Secondary glomerulonephritis, Lupus nephritis, Amyloidosis and Diabetic nephropathy were present in 10 percent, 7 percent and 2.5 percent of the patients respectively. Among tubulointerstitial nephritis cases, Acute tubular necrosis, Acute Tubulointerstitial nephritis and chronic Tubulointerstitial nephritis were present in 6 percent, 5 percent and 4 percent of the patients respectively. Another study by Yim T et al, investigated renal disease patterns by analyzing data from kidney biopsies performed over 13 years in a university-based teaching hospital in Korea. Among 2,053 kidney biopsies performed from 2001 to 2013 at Kyungpook National University Hospital, 1,924 were retrospectively analyzed for histopathologic, demographic, and clinical data as well as laboratory results. Among the 1,924 studied kidney biopsies, 1,078 were males (56.0%) and the mean age was 37.7 ± 16.5 years. Asymptomatic urinary abnormalities were the most common clinical manifestation (62.5%). Immunoglobulin A nephropathy (IgAN) was the most common primary glomerular disease (37.4%), followed by minimal change disease (MCD), membranous nephropathy (MN), focal segmental glomerulonephritis and crescentic glomerulonephritis. Secondary glomerular diseases accounted for 10.3% of the total biopsies, with lupus nephritis being the most common (4.6%) followed by Henoch-Schönlein purpura nephritis and diabetic nephropathy. The most common cause of nephrotic syndrome was MCD (42.1%) followed by MN. Among patients seropositive for hepatitis B or C, IgAN (28.3% and 21.4%, respectively) was the most common cause. IgAN and lupus nephritis were the most common primary and secondary glomerular diseases, respectively. Race, region, and practice patterns may affect renal disease patterns in different cohorts.¹⁷ Huang YC et al, compared biopsy-based renal disease patterns between elderly and nonelderly patients. They performed a single-center, retrospective study (1992–2008) on biopsy-proven renal diseases to compare results between geriatric patients (age ≥ 65 years; n = 254) and nongeriatric patients (18 \leq age < 65 years; n = 2592). Renal pathology was interpreted by pathologists based on light microscopy, immunofluorescence, and electron microscopy. The ages of the geriatric and nongeriatric groups were 71.8 ± 4.5 (65.1–87.3) and 39.7 ± 17.6 (18–64.9) years, respectively, and 74% and 41% of them, respectively, were men. In the geriatric group, the most frequent diagnosis was membranous nephropathy (46.1%), followed by minimal change disease/focal segmental glomerulosclerosis (16.9%), diabetic nephropathy (8.3%), hypertensive nephrosclerosis (7.5%), and IgA nephropathy (5.9%). The geriatric group had more membranous nephropathy and less lupus nephritis and

IgA nephropathy than the nongeriatric group. Furthermore, the 5-year survival rate of the geriatric group was significantly low. The results demonstrated the different distributions of renal biopsy patterns in geriatric patients diagnosed with acute or chronic progressive kidney injury and proteinuria through renal biopsy.¹⁸ SJ et al, studied to explore the histopathological spectrum of native renal biopsies leading to CKD in elderly patients in a tertiary care hospital. Among the list of patients who had undergone renal biopsy at our institute from January 2015 to March 2020, elderly patients aged ≥ 60 years were chosen for the study. Their demographic details, lab investigations and histopathological reports were collected. The sex distribution and prevalence of different renal diseases was calculated. The subjects were classified into four broad diagnostic groups - primary glomerular disease, diabetic nephropathy, hypertensive nephropathy, and tubulointerstitial disease. The estimated glomerular filtration rate (eGFR) values were calculated and used to stage chronic kidney disease in these patients. Statistical analysis was carried out to find a correlation between diagnostic groups and CKD presence and between serum C3 values and immunofluorescence for the same on biopsy. One hundred thirty-two patients formed the study sample with a male to female ratio of 1.28:1, showing a slight male predominance. The most common diagnostic group was primary glomerular disease (46%), among which focal segmental glomerulosclerosis (FSGS) was the most common entity (12%). 47.7% and 66.6% of patients in the study sample showed elevated serum blood urea nitrogen (BUN) and creatinine values, respectively. 86% of our study sample had low eGFR values, and the majority (35%) of the patients were classified under CKD stage 3. CKD incidence was high among patients with primary glomerular diseases, but no significant statistical correlation was found. 43.5% of all IF positive cases showed low serum C3 values and established a positive correlation between IF and serum C3 values. There is no statistically significant correlation of the four diagnostic groups to the CKD. CKD in the elderly may be multifactorial, and a collaborative study across the nations may be needed to further evaluate the etiology.¹⁹ Farahani E et al, conducted to analyze the prevalence of biopsy-proven kidney diseases in a referral center in Iran. The reports of kidney biopsy samples from 2006 to 2018 referred to a pathology center, affiliated with Tehran University of Medical Sciences were reviewed. The prevalence of different disorders was assessed based on the clinical presentation in 3 age categories, including childhood, adulthood, and elderly. Among 3455 samples, 2975 were analyzed after excluding transplant-related specimens, suboptimal specimens, and those with uncertain diagnoses. Nephrotic syndrome (NS) (39%)

was the most common cause of biopsy followed by subnephrotic proteinuria (18%), hematuria in association with proteinuria (15%), renal failure (9%), isolated hematuria (6%), lupus (4%) and the other non-specific manifestations such as hypertension or malaise (each one less than 2%). The most common diagnoses included membranous nephropathy (MGN) (17.9%), focal segmental glomerulosclerosis (FSGS) (15.9%), lupus nephritis (LN) (13.7%), minimal histopathological findings (unsampled FSGS versus Minimal Change Disease, 12.1%), Immunoglobulin-A (IgA) nephropathy (6.5%) and Alport syndrome (6.1%). MGN was the most frequent disease before 2013, but FSGS became more frequent after that. NS and proteinuria were the most indications for kidney biopsy. Although MGN was the most common disease, the prevalence of FSGS has been increasing in recent years and making it the most common disease after 2013. LN and IgA nephropathy are the most common causes of secondary and primary GN presenting with proteinuria and hematuria, respectively.²⁰ Despite the development of non-invasive diagnostic methods for kidney diseases, OMICS analyses, renal biopsy, and pathology assessment are still considered the gold standard methods for diagnosing kidney diseases.²¹ The most frequent indications for kidney biopsy were nephrotic syndrome, subnephrotic range of proteinuria, hematuria, proteinuria, isolated hematuria, lupus, and renal failure, respectively. These findings were in line with the findings of many other previous studies.^{22,23}

CONCLUSION

There is a notable diversity in the primary glomerular diseases, encompassing various major histological groups. The fluctuating incidence of biopsy-proven renal diseases (BPRD) is likely influenced by heightened awareness, augmented referrals, and improved manpower and infrastructure.

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