

Original Research Article

CLINICO HISTOPATHOLOGICAL STUDY OF RENAL BIOPSY IN ELDERLY PATIENTS: A SINGLE CENTRE STUDY

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ABSTRACT

Background: Elderly patients have higher incidence of renal diseases; renal biopsy plays vital role in the diagnosis. The aim is to study the clinical profile and the spectrum of histopathological findings in the elderly patients undergoing renal biopsy.

Materials and Methods: This retrospective study includes all patients (age ≥ 60 years) undergoing native renal biopsies from January 2022 to June 2023. The clinical profile, laboratory parameters & renal biopsy findings were recorded from the Departmental Data.

Results: Out of 763 renal biopsies, 72 (9.43%) were performed on the elderly patients. Mean age was 65.8 ± 4.5 years, Male: Female Ratio was 1.5:1. The commonest indication for biopsy was nephrotic syndrome (NS) (49%) followed by rapidly progressive renal failure (RPRF) (25%) and acute kidney injury (AKI) (14%).

On histopathology, 54% patients had primary glomerulonephritis (GN), 22% secondary GN, 17% tubulo-interstitial and 7% had vascular disease. Membranous nephropathy (MN) (25.4%) was the commonest findings in primary GN followed by Focal segmental glomerulosclerosis (10.9%), IgA nephropathy (10.9%) and Membranoproliferative glomerulonephritis (9.09%). Amyloidosis (12.7%), Anti GBM disease (9.09%), Diabetic Nephropathy (5.4%) followed by Lupus nephritis (1.81%) were the commonest secondary GN. MN and Crescentic GN were most common findings of NS and RPRF respectively.

Conclusion: The commonest indication for renal biopsy in elderly was nephrotic syndrome. Primary glomerular disease was more common than secondary glomerular disease. Membranous nephropathy was the commonest histopathological diagnosis in glomerular diseases.

Keywords: Elderly, Nephrotic Syndrome, Renal Biopsy.

INTRODUCTION

Elderly population has been increasing tremendously all over the world.^[1] As per the United

Nations, the elderly population is growing faster than the total population all over the world, in India elderly population is increasing from 8.6 % in 2011, to 10.1% in 2021 and expected to increase up to

13.1% in 2031.^[2,3] There is a progressive loss of renal mass and renal function in human beings as the age advances.^[4] In elderly secondary renal diseases are more common as compared to primary renal disorders and account for up to 25% cases of renal diseases.^[5]

Kidney biopsy is considered to be a safe procedure even in elderly and yields valuable information which help the patient management and prognosis.^[7] Limited literature is available with respect to renal diseases in elderly. The aim of this study is to study the clinical profile and the spectrum of histopathological findings in the elderly patients undergoing renal biopsy.

MATERIALS AND METHODS

All patients (age ≥ 60 years) undergoing native renal biopsies from January 2022 to June 2023 were included in this retrospective study conducted at institute of kidney diseases and research centre & institute of transplantation sciences, Ahmedabad. Patients with inadequate renal biopsy for interpretation were excluded. The demographic data like age, sex, clinical diagnosis, indication for biopsy, laboratory parameter and renal biopsy findings were obtained from electronic records and case files.

The patients were grouped based on their clinical presentation and laboratory results into

1. **Nephrotic syndrome (NS)** was defined as proteinuria >3.5 g/day and hypoalbuminemia (<30 g/L) with clinical evidence of generalized edema.
2. **Nephritic syndrome** was defined as patients having hypertension and edema along with hematuria, proteinuria, and dysmorphic red blood cells/red blood cell casts;
3. **Rapidly progressive renal failure (RPRF)**, was defined as doubling of serum creatinine or a 50% decrease in glomerular filtration rate (GFR) over few weeks.
4. **Chronic kidney disease (CKD)** was defined according to the KDIGO 2012 guidelines.
5. **Acute kidney injury (AKI)** was defined according to the KDIGO 2012 guidelines. The Histopathological diagnosis was classified into primary glomerular diseases, secondary glomerular diseases, tubulo-interstitial disease and vascular diseases. The data were expressed in terms of mean $\pm$ standard deviation wherever required. The data were analysed on Statistical Package for Social Sciences (SPSS) version 20.0.

RESULTS

During study period, total 763 native renal biopsies were performed, out of which 72 renal biopsies (9.43%) were performed on the elderly. The mean age of the study population was 65.8 ± 4.5 years

(range: 60–80 years). Males accounted for 59.7 % (n = 43) of the study population. Among the study population, 05 (7.1 %) had diabetes, 14 (19.5%) had hypertension.

The commonest indication for renal biopsy was Nephrotic syndrome (n = 35, 49%) followed by Rapidly progressive renal failure (n = 18, 25%), Acute Kidney Injury (n = 10, 14%), Nephritic Syndrome (n = 07, 9%) and chronic kidney disease (n = 02, 3%).

Among the patients with Nephrotic syndrome presentation the mean 24 h urine protein level was 3.7 ± 3.3 gm. Membranous nephropathy(MN) was the most common histopathological diagnosis accounting for (n = 14,40%) cases followed by Amyloidosis (n=7,20%), Focal segmental glomerulosclerosis(FSGS) (n=5,14.2%), IgA nephropathy (n=3,8.6%) Diabetic nephropathy(DN) (n=2,5.7%), C3 glomerulopathy(C3 GN)(n=2,5.7%), Lupus nephritis(LN) (n=1,2.9%) and Hypertensive nephropathy(HTN) (n=1,2.9%) were other causes of nephrotic range proteinuria. In MN out of 14 cases 8 cases were Anti PLA2R positive and 6 cases were Anti PLA2R negative. In amyloidosis out of 7 cases 6 cases were of Amyloid A [AA] positive and 1 case of lambda light chain positive primary amyloidosis.

Among the patients presenting with RPRF, the mean serum creatinine level was 5.2 ± 3.7 mg/dl. Crescentic glomerulonephritis (CrGN) (n=10,55.6%) was the most common histopathological diagnosis followed by Acute interstitial nephritis (AIN) (n=3,16.7%), cast nephropathy (n=2,11.2%), Membranoproliferative glomerulonephritis (MPGN) (n=1,5.5%), Thrombotic microangiopathy (TMA) (n=1,5.5%) and C3 GN (n=1,5.5%). Majority of case was P – ANCA positive (n=9,90%) and one case (n=1,10%) shows both P – ANCA & C- ANCA positive.

Acute interstitial nephritis (n=6,60%) followed by TMA (n=2,20%), cast nephropathy (n=1,10%) and FSGS (n=1,10%) were the commonest histopathological diagnosis in the patients who underwent renal biopsy for AKI. The commonest cause of nephritic syndrome was MPGN (n=4,57%) followed by Ig A nephropathy (n=3,43%). Hypertensive nephropathy (n=1,50%) and Diabetic nephropathy (n=1,50%) were the commonest histopathological diagnosis in CKD patients.

The commonest histopathological findings were glomerular diseases (n=55,76%) followed by tubulointerstitial diseases (n=12,17%) and vascular diseases (n=5,7%). Among glomerular diseases Primary glomerular diseases (n=39,54%) were more common than secondary glomerular diseases (n=16,22%).

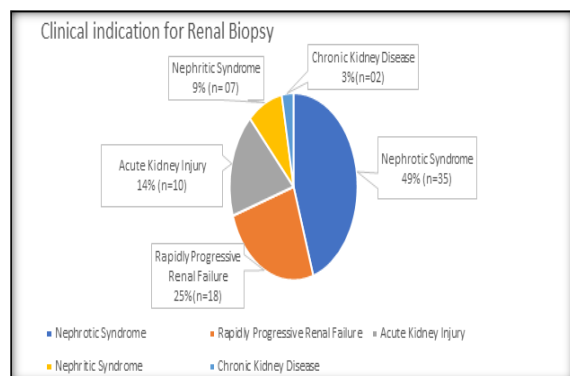
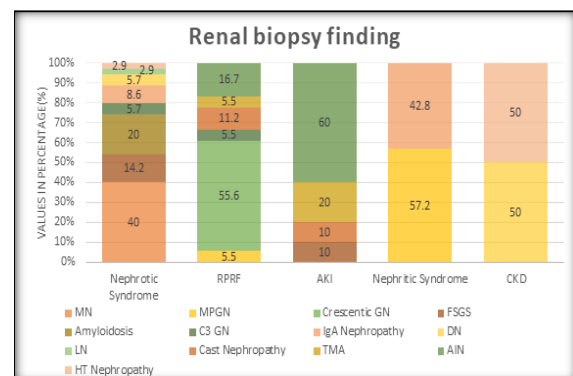
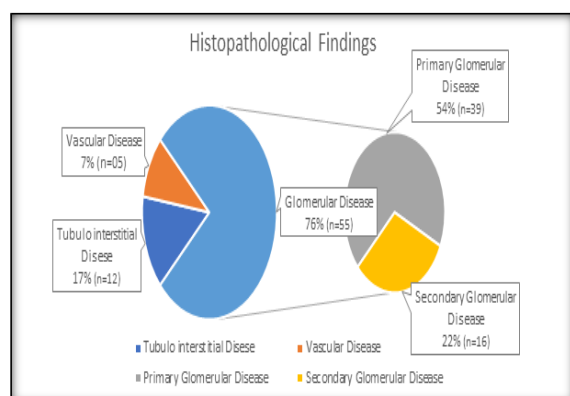
Most common histopathological findings were MN followed by Crescentic GN, AIN, Amyloidosis, FSGS, Ig A Nephropathy, MPGN, C3 GN, TMA, Diabetic nephropathy, Cast nephropathy, HT nephropathy.

Table 1: Demography of patient

Variables	Value -Mean ± SD
Age (Years)	65.8 ± 4.5 (66, 60-80)
Males (%)	43(59.7%)
Male: Female Ratio	1.5:1
Hypertension	14(19.5%)
Diabetes	05(7.1%)
Serum Creatinine (mg/dl)	5.2 ± 3.7 mg/dl
24 hr urinary protein (gm)	3.7 ± 3.3 gm

Table 2: Histopathological Findings

Renal Disease		No of case (n = 72)
Primary Glomerular Disease		
1	Membranous Nephropathy	14
2	Membranoproliferative Glomerulonephritis	5
3	Focal segmental glomerulosclerosis	6
4	IgA nephropathy	6
5	C3 Glomerulonephritis	3
6	Pauci-immune Crescentic Glomerulonephritis	5
Total		39
Secondary Glomerular Disease		
1	Amyloidosis	7
2	Diabetes Nephropathy	3
3	Anti GBM GN	5
5	Lupus Nephritis	1
Total		16
Tubulo- interstitial Disease		
1	Acute Interstitial Nephritis	9
2	Cast Nephropathy	3
Total		12
Vascular Disease		
1	Thrombotic Microangiopathy	3
2	Malignant Nephrosclerosis	1
3	Benign Nephrosclerosis	1
Total		5

**Figure 1: Clinical indication of renal biopsy****Figure 3: Renal biopsy findings in various clinical syndrome****Figure 2: Number of patients in different broad histological group**

DISCUSSION

A kidney biopsy is considered the gold standard for establishing the diagnosis of renal parenchymal diseases.^[15,16] There is paucity of data on overall spectrum of renal diseases in the elderly population, reason could be increased risk of complication in these group of patients.^[17] Many cases of primary glomerular diseases can be missed clinically as similar symptoms can be attributed to systemic disorders such as diabetes and hypertension.^[6] Cases of plasma cell proliferative disorders like amyloidosis and myeloma first pick up by renal biopsy. Clinical presentation in elderly patients and

histological diagnosis does not correlate frequently.^[18] So, kidney biopsy is required for correct diagnosis and planning for appropriate patient management.

In present study, total 9.43% elderly patients underwent renal biopsy. This is lower than the studies from south India,^[7] (30%), Europe (23%) & USA (25%).^[10,11] and higher than studies done in north India.^[8,9] The reason could be a relative increase in the elderly population in the developed world. The male: female ratio was 1.5:1, which is comparable to various Indian studies,^[2,6,9,10] and some international study.^[2]

Nephrotic syndrome (49%) was the most common indication for renal biopsy followed by RPRF (25%), AKI (14%), Nephritic syndrome (9%) and CKD (3%) a finding consistent with study done by Beniwal et al.^[2] In contrast study done by Kohli et al,^[6] show AKI/RPRF was the most common indication for renal biopsy followed by nephrotic syndrome. Among patients who presented with NS, the most common histological diagnosis observed were MN (40%), amyloidosis (20%), and FSGS (14.2%). Findings comparable with other Indian studies,^[2,6,7,9,17] and few international studies.^[12] Study done by Gupta et al,^[8] and Harmankaya et al,^[19] show amyloidosis was the most common cause of Nephrotic syndrome. The majority of these patients had secondary amyloidosis (78%), secondary to chronic diseases like tuberculosis and bronchiectasis. This is in contrast to the developed world where primary amyloidosis is more common. RPRF was the second most common indication of renal biopsy. Crescentic GN, similar to other studies from northern India,^[2,8] was the most common cause. In contrast study from south India,^[23] show a low incidence of crescentic GN. This could be due to regional variations in the presentation of disease in the elderly.^[2] In present study, MPGN was the most common cause of nephritic syndrome in elderly population followed by IgA nephropathy as compared to study by Harmankaya et al,^[19] in which crescentic glomerulonephritis was the most common cause. Other Indian studies also show MPGN was the most common cause of nephritic syndrome in elderly population.^[2,8] IgA nephropathy is a common cause of nephritic syndrome in young patients and the elderly Asian population of Japan and China,^[19-21] was less common in our population.

Elderly patients are more prone to acute kidney injury (AKI) due to age-related decline in kidney function, increased prevalence of comorbidities, and the effects of polypharmacy, all of which reduce the kidney's ability to handle stress and recover from injury.^[22] AKI was the 3rd most common indication for biopsy in present study accounting for 10 % findings comparable with other Indian studies.^[2,7,9] Most common diagnosis in patients with AKI was acute interstitial nephritis (AIN) finding comparable

with study done by Koshy et al. Various medications, including nonsteroidal anti-inflammatory drugs, antibiotics, and herbal medicines, are still the predominant causes of drug-induced tubulointerstitial nephritis.^[7] Hypertensive nephrosclerosis and diabetic nephropathy were the most common histopathological findings in patients undergoing biopsy for the diagnosis of chronic kidney disease findings comparable with study done by Beniwal et al.^[2]

Primary and secondary glomerular disease were the commonest histopathological diagnosis in present study which is comparable to other Indian,^[13,14] and international studies.^[12] MN (19.4%) is the commonest histopathological finding followed by Crescentic GN (13.8%), AIN (12.5%) and Amyloidosis (9.7%) in present study. In elderly patients, Membranous nephropathy is known to be the most common histological diagnosis according to various Indian,^[2,9] and international studies.^[19,20] Observation is same in present study. In contrast study done by Koshy et al^[7] show diabetic nephropathy was the most common histological diagnosis. Gupta et al^[8] show amyloidosis and Kohli et al^[6] show crescentic GN was the most common histological diagnosis.

Among primary GD, MN was the most common finding followed by FSGS in present study findings comparable with other Indian,^[2,14,24] and international studies.^[19] Amyloidosis was the most common secondary GD in present study. Other Indian,^[14] and Turkish study,^[19] show the same observation. In contrast study done from Iraq,^[25] show Hypertensive nephrosclerosis and one Indian study show diabetic nephropathy was the most common secondary GD.

Among the tubulo-interstitial diseases, Acute interstitial nephritis was the commonest diagnosis, followed by cast nephropathy findings comparable with study done by Sengar et al.^[25] Harmankaya et al,^[19] show chronic interstitial nephritis was the commonest diagnosis. In vascular compartment thrombotic microangiopathy was the most common diagnosis in present study while study done by Sengar et al,^[25] show benign nephrosclerosis was the most common diagnosis.

Hence, this is a retrospective study and being a tertiary care centre, most of the cases are referred primarily by physicians and might not depict the true profile of the renal disease in the elderly. Also, many patients refuse biopsy considering age.

Table 3: Comparison of our study with other studies

Studies	Our Study	Beniwal et al. [2]	Koshy et al. [7]	Gupta et al. [8]	Bagchi et al. [9]	Kohli et al. [6]
Patients (n)	72 (9.43%)	230 (13.8%)	231 (33%)	109 (8.7%)	124 (7.2%)	261 (2.4%)
Age (years) (mean±SD)	65.8 ± 4.5	64.02±7.87	64±6.03	67.7±6.4	64.9±4.9	63.5±3.2
Male: Female Ratio	1.5:1	2.2:1	1.9:1	1.5:1	1.7:1	4.2:1
Common indications for biopsy	NS (49%) RPRF (25%) AKI (14%)	NS (49.6%) RPRF (20.9%) AKI (15.7%)	NS (30.4%) Nephritic Syndrome (19.1%) AKI (15.7%)	NS (37.4%) RPRF Nephritic syndrome	NS (39.5%) AKI/RPGN (32.3%)	AKI/RPRF (73%) NS (27%)
Most common histology overall	MN (19.4%), CrGN (13.8%), AIN, (12.5%), Amyloidosis (9.7%)	MN (15.2%) Amyloidosis (13.9%) AKI (13%)	DN (14.3%) CTIN (11.3%) MN (10.4%)	Amyloidosis (14.2%), CrGN (11%), MN, DN (10.9%)	MGN (22.6%) FSGS (12.9%) MCD (11.3%)	CrGN (16.6%), Amyloidosis, Cast nephropathy (12.5%), CIN (8.3%)

CONCLUSION

The commonest indication for renal biopsy in elderly is nephrotic syndrome. Primary glomerular disease is more common than secondary glomerular disease. Membranous nephropathy is the commonest histopathological diagnosis in glomerular diseases. Renal biopsy is safe in the elderly and provides a wealth of information with regards to the diagnosis and prognosis of renal disorder.

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