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Original Research Article.

Clinical and Histopathological Analysis of Kidney Biopsies at Tertiary Care Hospital

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ABSTRACT

Introduction: Kidney biopsy is valuable test with diagnostic & prognostic value and plays an important role in planning definitive management.

Methods: All biopsies were examined with Light Microscopy and Immunofluroscene & EM was performed as and when indicated. We recorded name, age, sex, indication for renal biopsy, histopathological diagnosis and laboratory investigations. Total of 117 biopsies were done during period of January 2016 to October 2017. 87 of 117 biopsies analysed, others were excluded (Allograft biopsies and incomplete records).

Results: Mean age was 30.80±13.68 years with 44 (50.57%) males and 43 (49.43%) females. Most common indication was nephrotic syndrome in 32 (36.78%), followed by Systemic lupus erythematosus with lupus nephritis in 20 (22.98%), 13 (14.94%) with Acute kidney injury, 10 (11.49%) Rapidly Progressive Renal Failure, 4 (4.59%) patients were clinically chronic kidney disease with normal size kidneys. Most common primary glomerular disease (PGD) seen in males and females was membranous nephropathy (20.45% and 16.27% respectively). Most common secondary glomerular disease (SGD) in males was amyloidosis (9.09%), while in females most common was Lupus Nephritis (44.18%).Most common PGD seen in age < 20 years was MCD (27.27%), in 21 -40 years was membranous nephropathy (19.14%), in 41 – 60 years was membranous (33.33%) and > 60 years was MPGN (33.33%). Most common SGD in age < 20 years was lupus nephritis (22.72%). Majority of males 18 (20.69%) presented as nephrotic syndrome (p=0.0001). Most patients 9 (10.34%) were hypertensive with mean creatinine value 7.06±6.17 mg/dl was seen in Rapidly Progressive Renal Failure (p=0.0001).

Conclusion: A wide variation of major histological groups in the PGD has been observed. The most common PGD is MN while most common SGD documented is LN. The changing incidence & pattern is contributed by an increased referral due to increased awareness & use of IF & EM.

Key Words: Kidney Biopsy, Primary Glomerular Diseases, Secondary Glomerular Diseases.

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INTRODUCTION

Renal biopsy is a definitive diagnostic test in patients with renal parenchymal disease. Indications of renal biopsy vary from center to center.[1] Renal biopsy is useful for identifying the specific diagnosis, assessing the level of disease activity, and for allowing specific decisions about treatment to be made. Renal biopsy data analysis is essential to study the prevalence of biopsy-proven renal disease (BPRD) and its variation and distribution as per geographic areas, socioeconomic conditions, race, age and

indication for renal biopsy, to understand the regional epidemiology of glomerular disease in a particular geographical region. It also improves the understanding of the utility of renal biopsy and acts as a framework for future research into renal parenchymal disease.

According to the recently published report of Indian National CKD registry, glomerulonephritis is the second most common cause leading to CKD.[2] Thus early diagnosis of glomerular disease involvement with renal biopsy and accurate treatment of the glomerular disease can help reduce burden of CKD secondary to glomerulonephritis. Unfortunately, we do not have a central biopsy registry in India. Studies on the prevalence of glomerular renal disease in India are limited.

Glomerular diseases can present with vast difference in epidemiology, aetiology and natural history; and their prevalence also varies according to socio-economic conditions, race, age and indications for renal biopsy.[3] Over the last few years, studies have shown a changing pattern of these diseases. Previous studies from India, done at same institute by Jagasia BN et al.[4] have shown Minimal Change Disease [MCD] as the most common BPRD diagnosis followed by mesangioproliferative glomerulonephritis [GN]. Previous studies from United States and Europe showed that membranous nephropathy (MN) was the most common cause of adult nephrotic syndrome.[5] However, more recent studies have shown that the focal segmental glomerulosclerosis (FSGS) is increasing significantly and it has become the most common glomerular disease in African-Americans and Hispanic populations.[5,6] Some studies from India have shown declining incidence of membranoproliferative glomerulonephritis (MPGN) along with an increase in FSGS, though there are others which have not confirmed this trend. [7]There are a limited number ofstudies from India and most of them are from Southernand Northern Indian centers.[8-11] Thus evidences from different published articles across the world indicates a change in pattern of glomerular disease over the last few decades.[12-15] This may be attributed to increase social awareness, improved standardization of biopsy reporting, wide availability of IF and EM studies at many centres.

In the light of above knowledge, this study is conducted at tertiary care referral centre in Western India, catering to a large number of patients. The present study was conducted to ascertain the histologic spectrum of biopsy proven renal diseases in adults, at our institute during a period of 22 months from Janurary 2016 to October 2017 and to report the spectrum of glomerular diseases.

MATERIALS AND METHODS

It is a retrospective analytical study.

Inclusion Criteria

1. All patients who underwent native kidney biopsy from January 2016 to October 2017.
2. Adequacy of biopsy sample [minimum of 8 glomeruli]

Exclusion Criteria

1. All patients with incomplete data regarding clinical profile and/or histopathological reports were excluded from study.
2. All patients who underwent transplant kidney biopsies were excluded from study.
3. Inadequate biopsy sample

The following data was recorded for each patient: name, age, sex, indication for renal biopsy, histopathological diagnosis and laboratory investigations such as serum creatinine, 24-hour urinary protein, urine microscopy, virology (HBsAg, anti-HCV, HIV) and serology [anti-dsDNA antibody, antinuclear antibody (ANA), C3, C4]. Complete blood count, international normalized ratio/prothrombin time, activated partial thromboplastin time, serum creatinine were obtained prior to biopsy. Medications were reviewed for agents that may increase bleeding risk (anticoagulants, antiplatelet agents, and nonsteroidal anti–inflammatory drugs), and were discontinued for 5 days prior to procedure. Two units of Packed Cell Volume were reserved in all cases.

After ultrasound localization of the kidneys, the overlying skin was prepped and draped in a sterile fashion, and a local anesthetic was infiltrated to the depth of the kidney. All biopsies were performed under real-time USG guidance using the Bard® Max-Core® Disposable Core Biopsy Instrument (Bard Biopsy Systems, USA). A 18 G × 16 cm instrument was used. At least two cores were obtained and samples sent for light microscopy (LM) and immunofluorescence (IF) microscopy in all cases and for electron microscopy (EM) in select cases or where it could be afforded by the patient.

Simple descriptive statistics such as median and mean ± SD were used for variables such as age, clinical and laboratory features. Percentage was used for categorical data. Graphs were generated with Microsoft Excel 2010.Statistical analysis was done by using descriptive and inferential statistics using chi square test and one way ANOVA and software used in the analysis were SPSS 24.0 version and GraphPad Prism 6.0 version and $p<0.05$ is considered as level of significance($p<0.05$).

Table 1: Age wise distribution of patients

Age Group(years)	No of patients	Percentage (%)
≤20 yrs	22	25.29
21-40 yrs	47	54.02
41-60 yrs	15	17.24
>60 yrs	3	3.45
Total	87	100
Mean±SD	30.80±13.68(12-68 years)	Median Age=27 years

Table 2: Distribution of patients according to indications

Indications	No of patients (n=87)	Percentage (%)
NS	32	36.78
SLE With Lupus Nephritis	20	22.98
AKI	13	14.94
Rapidly progressive renal failure	10	11.49
AGN	8	9.19
Clinically CKD with normal size kidney	4	4.59

NS=Nephrotic syndrome; AGN=Acute Glomerulonephritis; AKI=Acute Kidney Injury; SLE=Systemic lupus erythmatosus;

Table 3: Baseline characteristics of patients in each clinical syndrome

	NS (n=32)	AGN (n=8)	RPGN (n=10)	AKI (n=13)	Clinically CKD with normal size kidneys (n=4)	SLE with lupus Nephritis (n=20)	p-value
Age (years)	29.05±13.67	28.62±12.11	33.50±10.78	39.23±20.30	39.75±12.31	25.85±6.81	0.060,**NS**
Male	18(20.69%)	4(4.60%)	8(9.20%)	10(11.49%)	3(3.45%)	1(1.15%)	0.0001,S
Female	14(16.09%)	4(4.60%)	2(2.30%)	3(3.45%)	1(1.15%)	19(21.84%)	0.0001,S
Hypertension	6(6.90%)	7(8.05%)	9(10.34%)	7(8.05%)	1(1.15%)	5(5.75%)	0.0001,S
Sr.creatinine (mg/dl)	1.44±2.44	2.24±1.74	7.06±6.17	3.46±2.12	2.29±0.61	1.75±2.01	0.0001,S
Sr.albumin (mg/dl)	2.60±0.82	3.26±0.65	3.53±0.74	3±0.84	2.95±0.90	3.37±0.71	0.06,NS
24 hour urine protein(g/day)	6.56±4.23	4.83±2.93	4.05±4.08	7.86±5.09	6.35±3.93	3.88±2.40	0.042,S

NS=Nephrotic syndrome; AGN=Acute Glomerulonephritis; RPGN = Rapidly progressive glomerulonephritis; AKI=Acute Kidney Injury; SLE=Systemic lupus erythmatosus

Table 4: Spectrum of various glomerular histologies in each clinical syndrome.

	NS (n=32)	AGN (n=8)	RPGN (n=10)	AKI (n=13)	Clinically CKD with normal size kidneys (n=4)	SLE with lupus Nephritis (n=20)
PRIMARY GLOMERULAR DISEASES						
Minimal Change disease	11(34.37%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
Membranous nephropathy	13(40.62%)	0(0%)	1(10%)	2(15.38%)	0(0%)	0(0%)
Focal Segmental Glomerulosclero-sis	3(9.37%)	1(12.5%)	3(30%)	3(23.07%)	1(25%)	0(0%)
Membranoproliferative glomerulonephrit-is	2(6.25%)	2(25%)	3(30%)	4(30.76%)	1(25%)	0(0%)
IgA Nephropathy	1(3.12%)	3(37.5%)	0(0%)	0(0%)	0(0%)	0(0%)
Postinfectious glomerulonephritis	1(3.12%)	1(12.5%)	0(0%)	0(0%)	0(0%)	0(0%)
C3 Glomerulopathy	0(0%)	1(12.5%)	0(0%)	0(0%)	0(0%)	0(0%)
SECONDARY GLOMERULAR DISEASES						
Lupus Nephritis	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	20(100%)
Amylodosis	1(3.12%)	0(0%)	0(0%)	2(15.38%)	1(25%)	0(0%)
TUBULOINTERSTITIAL DISEASES						
Acute Tubular Necrosis	0(0%)	0(0%)	0(0%)	1(7.69%)	0(0%)	0(0%)
Acute interstitial Nephritis	0(0%)	0(0%)	0(0%)	1(7.69%)	0(0%)	0(0%)
VASCULAR NEPHROPATHIES						
Hypertensive Nephropathy	0(0%)	0(0%)	3(30%)	0(0%)	1(25%)	0(0%)
TOTAL	32 (100%)	8 (100%)	10 (100%)	13(100%)	4 (100%)	20(100%)

NS=Nephrotic syndrome; AGN=Acute Glomerulonephritis; RPGN=Rapidly progressive glomerulon-ephritis; AKI=Acute Kidney Injury; SLE=Systemic lupus erythmatosus;

RESULTS

Mean age of presentation was 30.80±13.68 years [Table 1]. Minimum age of presentation in this study was 12 years and maximum was 68 years. There were 22 (25.29%) patients below age of 20 years, 47 (54.02%) patients were in age between 21 to 40 years. 15 (17.24%) patients were in age group of 41- 60 years and 3 (3.45%) patients were more than 60 years of age.

Most common indication for biopsy was nephrotic syndrome in 32 (36.78%) of patients, followed by SLE with lupus nephritis in 20 (22.98%) of patients [Table 2].13 (14.94%) patients had AKI as a presenting indication for biopsy while 10 (11.49%) patients presented with Rapidly Progressive Renal Failure.4 (4.59%) patients were clinically CKD with normal size kidneys requiring biopsy for further evaluation.

Table 3 represents baseline characteristics in each group with respect to age, gender, hypertension, serum creatinine values, serum albumin values and 24 hour urinary protein.

In patients presenting with NS, mean age was 29.05±13.67 years. 18 (20.69%) patients were males while 14 (16.09%) were females. 6 (6.90%) of patients were found to be hypertensive with mean serum creatinine value of 1.44±2.44 mg/dl and mean serum albumin value of 2.60±0.82 mg/dl. Mean 24 hour urine proteinuria in this group was 6.56±4.23 g/day.

In patients presenting with AGN, mean age was 28.62±12.11years. 4 (4.60%) patients were males and 4 (4.60%) were females. 7 (8.08%) of patients were found to be hypertensive with mean serum creatinine value of 2.24±1.74mg/dl and mean serum albumin value of 3.26±0.65mg/dl. Mean 24 hour urine proteinuria in this group was 4.83±2.93 g/day.

In patients presenting with RPRF, mean age was 33.50±10.78 years. 8 (9.20%) patients were males and 2 (2.30%) were females. 9 (10.34%) patients were found to be hypertensive with mean serum creatinine value of 7.06±6.17 mg/dl and mean serum albumin value of 3.53±0.74 mg/dl. Mean 24 hour urine proteinuria in this group was 4.05±4.08 g/day. In patients presenting with AKI, mean age was 39.23 ± 20.30 years. 10 (11.49%) patients were males and 3 (3.45%) were females. 7 (8.05%) patients were found to be hypertensive with mean serum creatinine value of 3.46±2.12mg/dl and mean serum albumin value of 3±0.84 mg/dl. Mean 24 hour urine proteinuria in this group was 7.86±5.09 g/day.

In patients presenting with clinically CKD with normal size kidneys, mean age was 39.75±12.31 years. 3 (3.45%) patients were males and 1 (1.15%) were females. 1 (1.15%) patient was found to be hypertensive with mean serum creatinine value of 2.29±0.61mg/dl and mean serum albumin value of 2.95±0.90 mg/dl. Mean 24 hour urine proteinuria in this group was 6.35±3.93 g/day.

In patients having SLE presenting as Lupus nephritis, mean age was 25.85±6.81 years. 1 (1.15%) patient was males and 19 (21.84%) were females. 5 (5.75%) patients were found to be hypertensive with mean serum creatinine value of 1.75±2.01mg/dl and mean serum albumin value of 3.37±0.71 mg/dl. Mean 24 hour urine proteinuria in this group was 3.88±2.40 g/day.

Majority of males 18 (20.69%) presented as nephrotic syndrome which is statistically significant (p=0.0001) when compared with other presentation groups. Patients presenting with Lupus nephritis has majority of females 19 (21.84%) which is statistically significant (p=0.0001) when compared with other presenting groups.

Most patients 9 (10.34%) were hypertensive with maximum mean creatinine value 7.06±6.17 mg/dl was seen in RPRF group, and is statistically significant (p=0.0001) when compared with other groups.

Patients presenting as NS, has lowest mean serum albumin values 2.60±0.82 mg/dl, which is statistically significant (p=0.0001).

There was no statistical difference seen with respect to age and mean 24 hour urine protein levels. The most common PGD presenting as NS was membranous (40.26%) and the other common ones being MCD (34.37%), FSGS (9.37%),IgAN (3.12%), and PIGN (3.12%) while most common SGD presenting as NS was amyloidosis (3.12%) [Table 4]

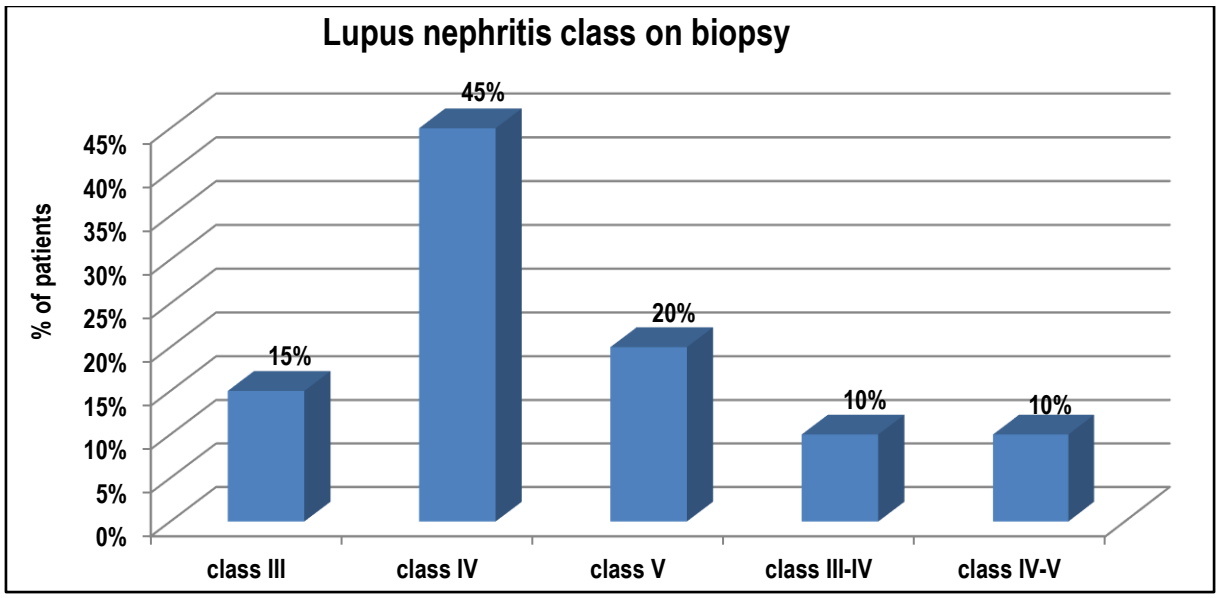

Figure 1: Showing histopathological class of lupus nephritis on biopsy (ISN/RPS classification).

[ISN/RPS: International Society of Nephrology/ Renal Pathology Society]

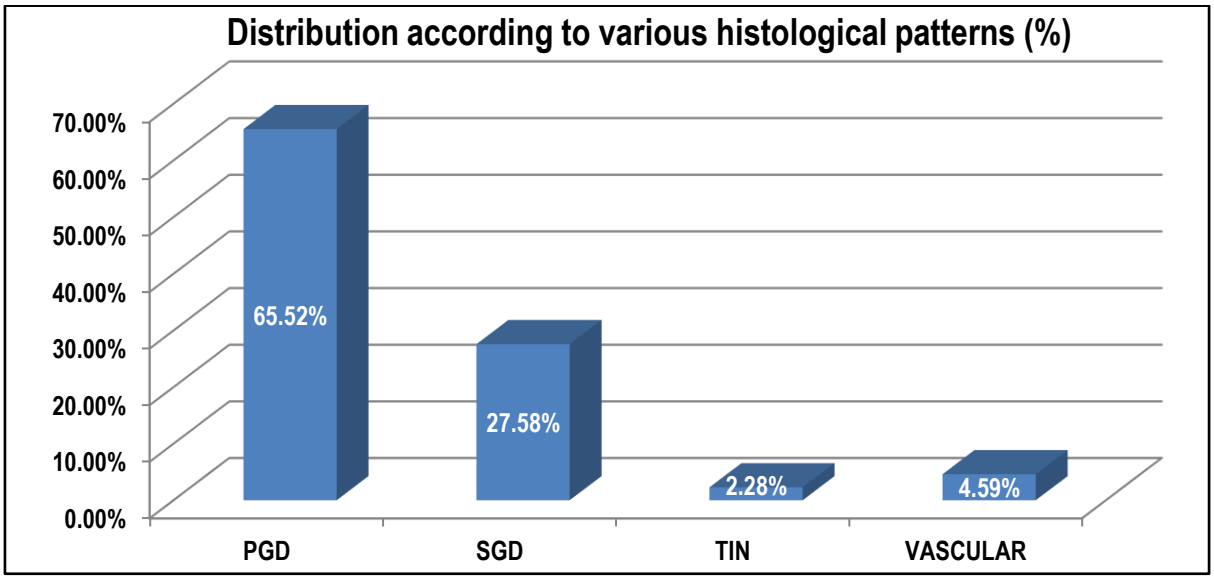

Figure 2: Distribution of patients according to various histological patterns

PGD: Primary glomerular disease, SGD: Secondary glomerular disease, TIN: Tubuli-interstitial diseases

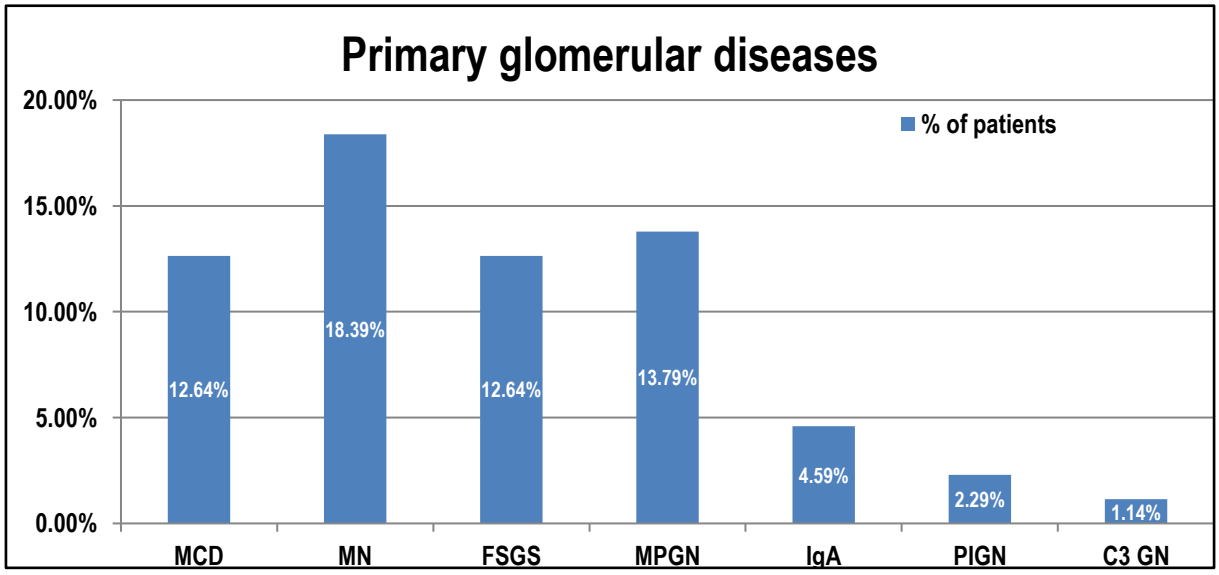

Figure 3: distribution of patients according to primary glomerular diseases

[MCD: Minimal Change Disease, MN: Membranous Nephropathy, FSGS: Focal Segmental Glomerulosclerosis, MPGN: Membrano-Proliferative Glomerulosclerosis, IgA: Immunoglobulin A, PIGN: Post infective Glomerulonephritis, C3GN: C3 Glomerulonephritis]

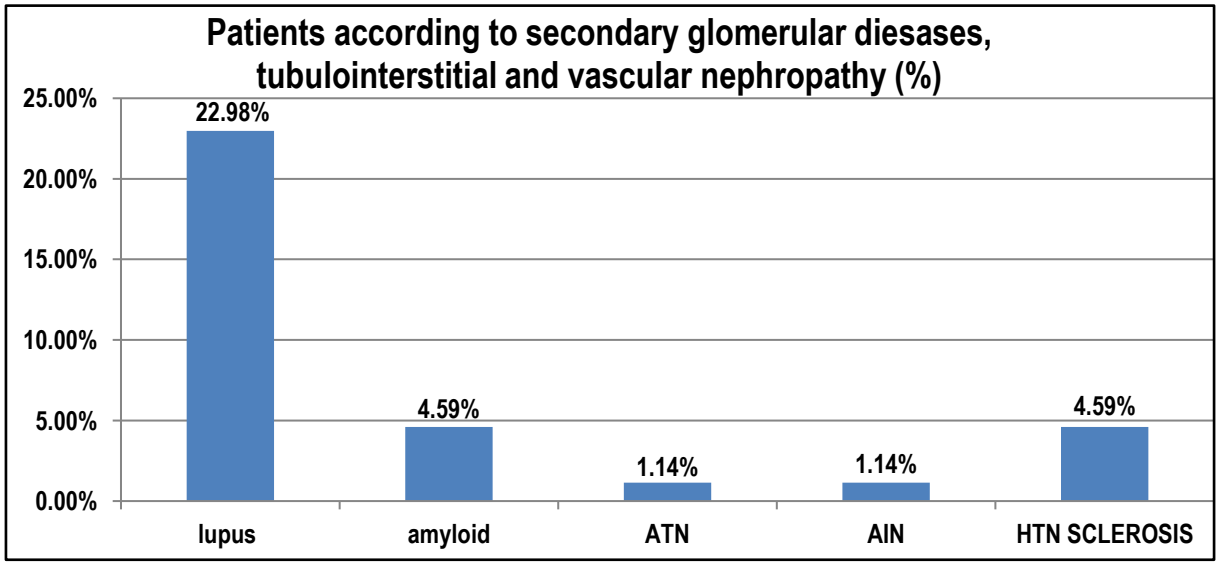

Figure 4: distribution of patients according to secondary glomerular diesases, tubulointerstitial and vascular nephropathy

[ATN: Acute tubular necrosis, AIN: Acute interstitial Nephritis, HTN Sclerosis: Hypertensive Nephrosclerosis]

Table 5: Glomerular disease spectrum according to gender

	Male (n=44)		Female (n=43)	
	No	%	No	%
PRIMARY GLOMERULAR DISEASES				
Minimal change disease	7	15.90	4	9.30
Membranous nephropathy	9	20.45	7	16.27
Focal Segmental Glomerulonephritis	8	18.18	3	6.97
Membranoproliferative gomerulonephritis	8	18.18	4	9.30
IgA Nephropathy	1	2.27	3	6.97
Postinfectious Glomerulonephritis	0	0.00	2	4.65
C3 Glomerulopathhy	1	2.27	0	0.00
SECONDARY GLOMERULAR DISEASE				
Lupus Nephritis	1	2.27	19	44.18
Amylodosis	4	9.09	0	0.00
TUBULOINTERSTITIAL				
Acute Tubular necrosis	1	2.27	0	0.00
Acute Interstitial Nephritis	1	2.27	0	0.00
VASCULAR NEPHROPATHIES				
Hypertensive Nephropathy	3	6.81	1	2.32
Total	44	100	43	100

Table 6: Glomerular disease spectrum according to the age of presentation

	< 20 Years (n=22)		21 – 40 Years (n=47)		41 - 60 Years (n=15)		>60 Years (n=3)	
	N	%	N	%	N	%	N	%
PRIMARY GLOMERULAR DISEASES								
Minimal Change disease	6	27.27	4	8.51	1	6.66	0	0.00
Membranous Nephropathy	1	4.54	9	19.14	5	33.33	1	33.33
Focal segmental Glomerulonephriti-s	4	18.18	5	10.63	2	13.33	0	0.00
Membranoproliferative Glomerulonephritis	3	13.63	6	12.76	2	13.33	1	33.33
IgA Nephropathy	1	4.54	2	4.25	1	6.66	0	0.00
Postinfectious Glomerulonephritis	2	9.09	0	0.00	0	0.00	0	0.00
C3 Glomerulopathy	0	0.00	0	0.00	1	6.66	0	0.00
SECONDARY GLOMERULAR DISEASES								
Lupus Nephritis	5	22.72	15	31.91	0	0.00	0	0.00
Amyloidosis	0	0.00	1	2.12	3	20	0	0.00
TUBULOINTERSTITIAL								
Acute Tubular Necrosis	0	0.00	1	2.12	0	0.00	0	0.00
Acute Interstitial Nephritis	0	0.00	0	0.00	0	0.00	1	33.33
VASCULAR NEPHROPATHY								
Hypertensive Nephropathy	0	0.00	4	8.51	0	0.00	0	0.00
Total	22	100	47	100	15	100	3	100

Most common PGD presenting as AGN was IgA (37.5%), followed by MPGN (25%), and PIGN, C3 glomerulopathy and FSGS each constituting 12.5%.

The most common PGD presenting as RPRF was RPGN (30%), and FSGS (30%), followed by membranous in 10%. While vascular nephropathy i.e Hypertensive nephrosclerosis (30%) presented as RPRF

Most common PGD presenting as AKI was MPGN (30.76%), followed by FSGS (23.07%), membranous and while most common SGD was amyloidosis (15.38%). Acute tubular necrosis (ATN) was found in 1 patient (7.69%) while acute interstial nephritis (AIN) was found in one patient (7.69%) presenting as AKI. Primary Glomerular disease commonly presenting as clinically CKD with normal size kidneys were FSGS (25%), MPGN (25%), while secondary glomerular disease was amyloidosis (25%). 1 patient with Hypertensive nephrosclerosis (25%) presented as clinically CKD with normal size kidneys.

LN was seen in 22.98% (n = 20). Biopsy of SLE patients with lupus nephritis showed that majority of patients were of class IV (n=9; 45%), followed by class V (n= 4; 20%), class III (n=3; 15%), and 2 (10%) patients were in class III-IV and class IV-V each according to ISN/RPS classification.[Figure 1]

In this study, most common primary glomerular disease [Table 5] seen in males was membranous nephropathy (20.45%), followed by FSGS (18.18%) and MPGN (18.18%), while in females most common primary glomerular disease seen was membranous

nephropathy (16.27%), followed by MPGN (9.30%), IgA (6.97%) and FSGS (6.97%) .

Most common secondary glomerular disease in males was amyloidosis (9.09%), while in females most common was lupus nephritis (44.18%).

In tubulointerstitial diseases, acute tubular necrosis was seen in one male patient (2.27%), while acute interstitial nephritis was seen in one male patient (2.27%).

Hypertensive nephrosclerosis was seen in 3 male patients (6.81%), while it was seen in one female patient (2.32%)

Most common primary glomerular disease seen in age < 20 years was MCD (27.27%), [Table 6] while in age 21 -40 years was membranous nephropathy (19.14%), in age group 41 – 60 years was membranous (33.33%) and > 60 years was MPGN (33.33%).

Most common secondary glomerular disease in age < 20 years was lupus nephritis (22.72%), while amyloidosis was seen in 20% of patients with age 21 – 40 years.

In tubulointerstitial group, ATN was seen in 2.12% in age 21 – 40 years while AIN was seen in 33.33% in > 60 years of age group.

Hypertensive nephrosclerosis (8.51%) was seen commonly in age 21 – 40 years

In this study, 57 (65.52%) of patients had primary glomerular disease [Figure 2]. Most common primary glomerular disease was membranous nephropathy (MN)(18.39%), followed by MPGN (13.79%), MCD (12.64%), FSGS (12.64%). [Figure 3]

While total 27 (27.58%) patients had secondary glomerular disease. Lupus nephritis (22.98%) was most common cause for secondary glomerular diseases followed by amyloidosis (4.59%). Lupus was seen in majority of females while amyloidosis was seen in males.[Figure 4]

Tubulointerstitial disease constitute of 2.28% with one patient (1.14%) having acute tubular necrosis and one patient (1.14%) with acute interstitial nephritis.

Hypertensive nephroslerosis was seen in 4 patients (4.59%)

Table 7: Comparison of our study with biopsy-proven glomerular disease spectrum seen in other centers in India and neighboring countries.

Vaiables	Present Study	Eastern Indian[16]	NIMS Hyderabad[9]	CMC (vellore) [10]	Pakistan [17]	Nepal [18]
Duration	2016- 2017	2010-2012	990-2008	1990-2001	1995−2008	2001−2007
Multi/ Single Centric	Single	single	single	single	Single	Single
No.of biopsy	87	666	1615	3703	1536	537
Mean age	30.80±13.68	28+14.62	32.27+18.38	>15	32.9±12.8	30.6± 32.9
M:F	1.02:1					
PRIMARY GLOMERULAR DISEASES						
Minimal Change Disease	12.64%	20.12%	17.28%	11.80%	6.77	10.2
Focal Segmental Glomerulonephritis	12.64%	18.02%	12.07%	18.28%	24.74	8
Membranous Nephropathy	18.39%	12.01%	7.99%	10.37%	20.05	42.5
IgA Nephropathy	4.59%	8.1%	5.02%	9.13%	1.76	2.9
Membranoproliferative Glomerulonephritis	13.79%	5.25%	4.52%	3.12%	1.3	21.9
Postinfectious Glomerulonephritis	2.29%	4.65%	5.33%	14.66%	4.56	2.9
SECONDARY GLOMERULAR DISEASES						
Lupus Nephritis	22.98%	15.32%	16.72%	7.53%	5.66	1.5
Amyloid	4.59%	1.2%	1.67%	1.11%	5.4	1.5
TUBULOINTERSTITIAL						
Acute Tubulointerstitial nephritis	2.28%	-	-	3.6%	-	-
HYPERTENSIVE NEPHROPATHY						
Hypertensive nephropathy	4.59%	1.5%	0.3%	2.1%	-	-

NIMS=Nizam's Institute of Medical Sciences; ATN : Acute tubular necrosis; AIN : Acute interstitial nephritis

DISCUSSION

This study provides comprehensive information about the demographics, clinical syndromes and pattern of kidney diseases diagnosed by renal biopsy during a period of 22 months in a single tertiary care referral institute in Western India. There are several biases regarding demographical, geographical and racial characteristics, differences in indications for renal biopsy, the analysed clinical syndromes and variations in pathological classification. Hence, comparison with different data and drawing accurate conclusions is difficult. A comparison of the basic data and some common diseases in our series with those of other published studies from the same region and neighboring countries is given in Table 7. It shows comparison of indications of biopsies with other studies. It is obvious from this table that the distribution pattern of major histology of renal disease in our study did correspond with varying degree to other series.[9,10,16-18]

Our data show that NS was the most frequent clinical presentation at all age groups, accounting for 36.78% of all cases. This is similar to that reported in many studies around the world, including India and Pakistan.[9,10,16-18] Conversely, studies from Japan and Italy reported a higher frequency of asymptomatic urinary abnormalities (AUA), which is quite different from ours.[19,20]

We also observed a male predominance, although not statistically significant (p=1.02), in the overall cases except in SGN where females predominated with lupus nephritis. This reflects the increased prevalence of LN in the female population. All recently published studies worldwide showed a similar pattern.[21-26]

PGN (65.51%) was the most predominant renal disease in our study as well as in all recent studies, followed by SGN, vascular nephropathy and TIN [27,28]. The hereditary were also less frequent in almost all studies. From the data and analysis, we did not

observe any hereditary GN which may be due to the unavailability of EM or lack of genetic testing.

The underlying etiology of NS is variable across the world. In our study, the most common cause was MN (18.39%), followed by MPGN (13.79%), MCD (12.64%), and FSGS (12.64%), which is in agreement with other previous studies from CZECH registery[29] and Serbia[24], where MN was most common PGD. However, results from various studies and from other countries have shown MCD to be the most common PGD. In study done by Das U et all [9] have shown the most common cause was MCD, followed by FSGS, MN, and MPGN. Studies from western world have shown diverse presentation based on ethnical and cultural backgrounds. In Korea and other northeast Asian countries like Japan, the most common cause of NS was MCD, followed by MN and IgAN.[12,19] Our results are not consistent with the results of these studies to some extent. On the other hand, Serbia reported MN as the most common cause[24] and in Brazil, FSGS was the most common cause of NS, followed by MCD and MN.[30] Our study is not comparable with these series.

MN is the most common PGD in adults as shown by a study done in India by ModugumudiA S N et al[31] and is more common in some regions in Asia, Europe and America.[15,20,24,30] This is consistent with our study.

Although, review of different literatures reveals that most of the studies have shown MN to be the third or fourth common cause of PGD.[10,12,19,21 ,22,27,28]

MPGN was second most common PGD observed in this study. Our study report are consistent with study done by Modugumudi A S N et all[31] in India. However, several studies from different parts of the world reported a decrease in the incidence of MPGN which was explained as due to improved hygienic environments, universal precaution and vaccinations which eventually caused a reduction in infection rate except in Romania, where MPGN is the most common PGD.[22]

MCD has a variable geographic distribution, being more common in some Asian than in the western countries. Previous studies from India, done at same institute by Jagasai BN et al. have shown MCD as the most common BPRD.[4] Several other studies have shown a decline in the relative frequency of MCD.[11,13] This trend has not been observed in our study. In our analysis, however, it is the among common PGD, which is in concordance with other similar studies.[10,12,21,30] Conversely, China reported a very low incidence.[28]. Thus it reflects change in pattern of BPRD in India as well in other countries.

The distribution pattern of FSGS was also variable. There is a worldwide increase in the incidence of FSGS despite racial variation.[32,33] It was the third most common PGD found in the present study. In contrast, FSGS is the most common in some studies reported from our neighboring countries and Brazil.[17,26,30]. Reasons for this observation are unknown.

Ig AN was uncommon in the present series and in other studies from this region of the world.[9–11,17] In contrast, it is the most common primary renal disease in European countries and some Asian countries.[12,13,15,19,,23,27,28] This can be explained by the performance of IF study in each biopsy. Also, in addition to this, the number of biopsies in CRF patients is increasing when the kidneys are of normal size with intact corticomedullary distinction by ultrasonogram. Significant number of these patients turned out to be IgAN.

In our study PIGN was found in 2 (2.29%) of patients. This is comparable with studies from eastern India[16], NIMS[10], and study from china.[3]

CMC Vellore study had shown higher incidence of PIGN (14.67%), which is not consistent with our study. This variation may be because of consideration of biopsies from 1990, in their study. However, there is decreasing trend noted in PIGN due to improved hygiene and immunizations status.

The most common SGN in our study was LN (22.98%) which is comparable with that reported in many studies across the world[10–13,17,24,28], followed by Amyloidosis (4.59%). The data of our hospital are in line with the data from Serbia China and Czech.[24,28,29] The incidence of other categories of SGN was very less. However, UAE and Italy reported a high incidence of amyloidosis.[15,20] Similarly, a study from Pakistan and a few previous published studies from our country had reported a high incidence of amyloidosis due to the high prevalence of tuberculosis and other infectious diseases.[17,22,34] We had performed renal biopsy only on suspected cases of amyloidosis. In suspected cases of amyloidosis with an underlying etiology of tuberculosis, rheumatoid arthritis or other chronic inflammatory conditions, amyloidosis was confirmed by biopsies from other sites such as rectum, gum or abdominal fat.

Hypertensive nephrosclerosis was seen in 4.59% of patients, majority of them were CKD with normal size kidney.

TIN is found to be a relatively less frequent biopsy proven renal disease in many studies[9]. Our study too showed a lesser incidence of TIN (2.28%). We observed lower incidence of ATN (1.12%) and AIN (1.12**%**)**.**

We did not find conditions like Alport Syndrome and thin basement membrane nephropathy, which may reflect geographical variation and different population group presenting to our hospital. This may also be partly contributed because of lack of affordability of some patients to undergo EM studies and genetic testing in our center.

CONCLUSION

Nephrotic syndrome was the most common indication for kidney biopsy. A wide variation of major histological groups in the primary glomerular diseases has been observed. The most common PGD was MN. As almost across the world, the most common secondary glomerular disease documented was LN. The changing incidence and pattern of Biopsy Proven Renal Disease is probably contributed by an increased referral due to increased awareness, together with increased manpower and infrastructure and routine use of immunofluorescence and electron microscopy. It has been also realized that it is essential and necessary to maintain a central renal biopsy registry with an increased participation of many more nephrology centers of India to obtain accurate knowledge about the incidence, spectrum and distribution of the biopsy proven renal disease in our country.

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