PATTERN OF BIOPSY PROVEN RENAL DISEASE IN A SINGLE CENTER OF KURDISTAN REGION-IRAQ: 7 YEAR RETROSPECTIVE STUDY

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ABSTRACT

Background

Several registries and centers have reported the result of renal biopsies from different parts of the world. Since there are no studies being conducted in Kurdistan region-Iraq, this raises the necessity of performing studies on renal biopsies to establish the pattern and trends of renal diseases

Objectives

To identify the pattern of renal pathology among renal biopsy specimens.

Materials and Methods

A total of 2779 renal biopsies performed during 7 year period, between January 2010 and December 2016 in (Shorsh General Hospital) were retrospectively analyzed after exclusion of the reports with insufficient records and those from transplanted subjects.

Results

Among 1914 native biopsy cases 51.6% were males and 48.4% were females, the mean patient age was 31±17 years. The most frequent clinical presentations prior to renal biopsy were; proteinuria, renal impairment and hypertension. Majority of the biopsies showed some form of Glomerular diseases (81.5%) either Primary glomerular disease (63.17%) or Secondary glomerular disease (18.29%) followed by Miscellaneous and Tubulointersitial nephropathies. The most common Primary glomerular disease was Focal and segmental (41.7%) followed by Minimal change disease (23.8%), Membranous nephropathy (16.7%) and Immunoglobulin A nephropathy (6.1%). Among the Secondary glomerular disease, Hypertensive nephrosclerosis formed the commonest diagnosis (42.8%), followed by Lupus nephritis (34.6%), Amyloidosis (15.1%) and Diabetic nephropathy (7.4%).

Conclusion

Primary glomerular disease was the most prevalent with Focal and segmental glomerulosclerosis and minimal change disease being the most frequent diagnosis. Among the Secondary glomerular disease Hypertensive nephrosclerosis was the commonest followed by Lupus nephritis.

Keywords: *Glomerular disease; Renal biopsy; Glomerulonephritis.*

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INTRODUCTION

Glomerular disease is a common cause of end-stage renal disease (ESRD) in both developing and developed countries [1]. The breadth of diseases affecting the glomerulus is expansive because the glomerular capillaries can be injured in a variety of ways, producing many different lesions. There are many forms of glomerular disease with pathogenesis variably linked to the presence of genetic mutations, infection, toxin exposure, autoimmunity, atherosclerosis, hypertension, emboli, thrombosis, or diabetes mellitus. Even after careful study, however, the cause often remains unknown, and the lesion is called idiopathic [2].

Renal biopsy is generally required to establish the type of glomerular disease, reflect the level of disease activity and to guide treatment decisions, although not always able to fulfill these criteria, the renal biopsy remains a valuable clinical tool. In general the common clinical situations where biopsy is needed are (Nephrotic syndrome, Acute kidney injury, Systemic disease with Renal dysfunction, Non-nephrotic proteinuria, Isolated microscopic hematuria, Unexplained chronic kidney disease, Familial renal disease and Renal transplant dysfunction). However, Contraindications that should be taken in consideration are (Multiple cysts, Solitary kidney, Acute pyelonephritis, Perinephric abscess, Renal neoplasm, Uncontrolled bleeding diathesis, Uncontrolled blood pressure, Uremia, Obesity and Uncooperative patient). The full assessment of a renal biopsy requires light microscopy, electron microscopy, and examination for deposits of complement and immunoglobulin by immunofluorescence (IF) or immune-peroxidase (IP) techniques [3].

The prevalence of glomerular disease is different in various regions of the world, according to race, age, geographical, etiological, cultural and economic differences [4]. Knowledge about the incidence and prevalence of GN and its regional trends are mandatory for nephrologists to adopt measures for preventing patients with glomerular disease from progression to ESKD. But at the same time, the prevalence of glomerular diseases in the general population is hard to evaluate because optimal conditions for performing epidemiologic surveys are difficult to find. Moreover, a glomerular disease registry does not exist in most states [5].

Studies about the patterns and prevalence of glomerular diseases in Kurdistan are still scarce and there is no published data regarding the frequency of different Glomerulonephritis in Kurdistan.

This study was performed to provide a comprehensive report of the relative frequencies of kidney diseases among both children and adults, and to better understand the natural history of renal diseases in this region. This study was performed based on renal biopsies obtained from the histopathology center in Sulaimani Governorate-Iraq. The results are compared with similar reports from other countries.

MATERIALS AND METHODS

This is a retrospective study of renal biopsies performed over a period of 7 years from January 2010 to December 2016, at Shorsh hospital in Sulaimani Governorate which provides the renal histopathological service for the entire population of North-Iraq (Kurdistan Region) in a single center. Collectively a total number of 2779 renal biopsies were performed of which 191 cases were excluded from the study because of either having insufficient samples or not having proper clinical data, and another 674 cases were excluded since they were taken from transplanted subjects. After exclusion a total number of 1914 renal biopsies were analyzed. There were 988 males and 926 females with age ranging from six days to eighty-three years. The indications for renal biopsy included (proteinuria, unexplained microscopic or macroscopic hematuria, systemic disease with evidence of renal involvement and unexplained renal impairment). The following data were recorded for each patient: name, age, sex, source of referral, indication for renal biopsy, histopathological diagnosis and laboratory investigations such as serum creatinine, 24-hour urinary protein, urine microscopy, virology (HBs-Ag, anti-HCV, HIV) and serology (anti-dsDNA antibody, antinuclear antibody ANA, C3, C4).

All samples were obtained by percutaneous method using a tru-cut needle under ultrasound guidance. A (16 G×16 cm) size instrument was used for adults (≥18 years) and a smaller (18 G×16 cm) instrument was used for those (<18 years) of age. Specimens obtained were prepared as per the standard protocol and examined by the same group of pathologists and technicians of our hospital. Analysis included Light microscopy (LM) and immunofluorescence (IF). For LM, Sections were made from formalin fixed paraffin embedded tissue and three sections were stained with Hematoxylin and Eosin, one with periodic acid Schiff, and one with Masson's

trichrome. Special stains were used when warranted.

IF (Immunofluorescence microscopy) panel included staining for IgG, IgM, IgA, C3, C1q, and kappa and lambda light chains. During 2010 IF analysis was not available, but afterwards it was performed in majority of the biopsies.

Histological categories were classified as follows:

- Primary glomerulonephritis (PGN): Focal segmental glomerulo-sclerosis (FSGS), Membranous nephropathy (MN), Minimal change disease (MCD), Membranoproliferative glomerulonephritis (MPGN), Post-infectious glomerulonephritis (PIGN), Immunoglobulin A nephropathy (IgAN), Crescentic glomerulonephritis (CresGN) and Mesangioproliferative glomerulonephritis (MesPGN).
- Secondary glomerulonephritis (SGN): Lupus nephritis (LN), Diabetic nephropathy (DN), Hypertensive nephrosclerosis (Hypertensive NS), and Amyloidosis (AM).
- Tubulo-interstitial nephropathies (TIN): Tubulointerstitial nephritis either acute TIN or chronic TIN and Acute tubular necrosis (ATN).
- Miscellaneous: (Nephrocalcinosis, Thrombotic microangiopathy, Cast nephropathy, Burkitt lymphoma, Pyelonephritis and Cystic kidney).
- Normal kidney biopsy

Data analysis

Collected data were treated statistically using Statistical Package for the Social Sciences (SPSS) version 21 for the data analysis and Microsoft Excel 2010 was used for data entry as well as for designing of the graphs. Data are expressed as means ± standard deviations. Descriptive statistics were generated on all variable, chi square tests were used to investigate the associations present. P value less than 0.05 was considered significant.

RESULTS

Data of 1914 patients who underwent renal biopsy between January 2010 and December 2016 were retrospectively analyzed after exclusion of the renal biopsies from renal graft and those with insufficient records. The mean age was 31±17 ranged from six days to eighty three years and regarding the age distribution the adult group (18-59) years comprised majority of the biopsies 1279 cases, followed by (0-17) years age group 462 cases and the older group (≥60 years) included 173 cases. Among 1914 cases, 988 were males (51.6%) while 926 were females (48.4%). Highest number of biopsies was taken during 2013 and variation was observed in each type of renal disease according to time periods. Immuno-flurcence test was not available in 2010 then afterwards it was performed for most of the biopsies. The total number of biopsies performed per-year together with IF analysis performance rate is shown in Figure 1. Also distribution of various types of renal disease in each year is shown in Table 1.

Table 2 shows clinical presentations of the total number of patients 1914 recorded before renal biopsies, including (Proteinuria, Unexplained microscopic or macroscopic hematuria, systemic disease such as hypertension and diabetes with evidence of renal involvement and uexplained renal impairment). Majority of the patients 1450 cases (75.8%) presented with proteinuria followed by renal impairment 566 cases (29.6%) and hypertension 521 cases (30.1%). In addition 485cases (25.3%) presented with hematuria and minority of the patients 56 cases (2.9 %) had diabetes.

The overall frequencies of different renal diseases in native renal biopsies according to age and sex are shown in Table 3. Majority of the biopsies showed some form of Glomerular diseases constituting 1559 (81.5%) of all cases, either PGN 1209 (63.17%) or SGN 350 (18.29%). TIN 90 cases (4.7%) and Miscellaneous group 148 cases (7.7%) including (Nephrocalcinosis, Thrombotic microangiopathy, Cast nephropathy, Burkitt lymphoma, Pyelonephritis and Cystic kidney) were seen less frequently seen and 117 (6.1%) of the cases reported normal biopsy results.

There were 1209 cases of PGN comprising (63.2%) of renal diseases. FSGS was the most common type of PGN observed 504 cases (41.7%), followed by MCD 288 cases (23.8%) and MN 202 cases (16.7%). IgA N was found in 74 cases (6.1%), Cres GN in 63 cases (5.2%), MPGN in 37 cases (3.1%), PIGN in 22 cases (1.8%) and MesPGN in 19 cases (1.6%). The distribution of primary glomerulonephritis is shown in Figure 2.

The SGDs were 350 cases constituting (18.2%) of the total biopsies, Hypertensive NS was the most frequently diagnosed disease 150 cases (42.8%) of SGDs, followed by the second most common diagnosis LN 121 cases (34.6%). AM was found in 53 cases

(15.1%) and DM was encountered in minority of the patients (26 cases, 7.4%). The distribution of Secondary glomerulonephritis is shown in Figure 3.

The spectrum of glomerular disease shows different variation according to sex and age. Primary glomerular diseases are more prevalent in males than in females. Among the males, FSGS was the most common Primary glomerular pathology encountered 278 cases (40.8%), followed by MCD 160 cases (23.5%), MN 115 cases (16.9%), IgA N 51 cases (7.5%), and Cres GN 32 cases (4.7%). Also in females the most common Primary glomerular pathology was FSGS 226 cases (42.9%) followed by MCD 128 cases (24.3%), MN 87 cases (16.5%), Cres GN 31 cases (5.9%) and IgA N 23 cases (4.4%). Whereas Secondary glomerular diseases are more frequently seen in female 211 cases (60.3%) compared to males 139 cases (39.7%), this was particularly evident with LN 104 cases (49.3%) in females and 17 cases (12.2%) in males. Males were more frequently affected with AM 30 cases (21.6%) Vs. 23 cases (10.9%) in females and DN 17 cases (12.2%) in males Vs. 9 cases (4.3%) in females. Hypertensive NS was found to be equivalent in both males and females 75 cases in both males and females. The mean age for PGN was (28.6±17.2 years) whereas the mean age for SGN was (39.8±16.1 years). The age and sex distribution of PGN and SGN is shown in Table 4.

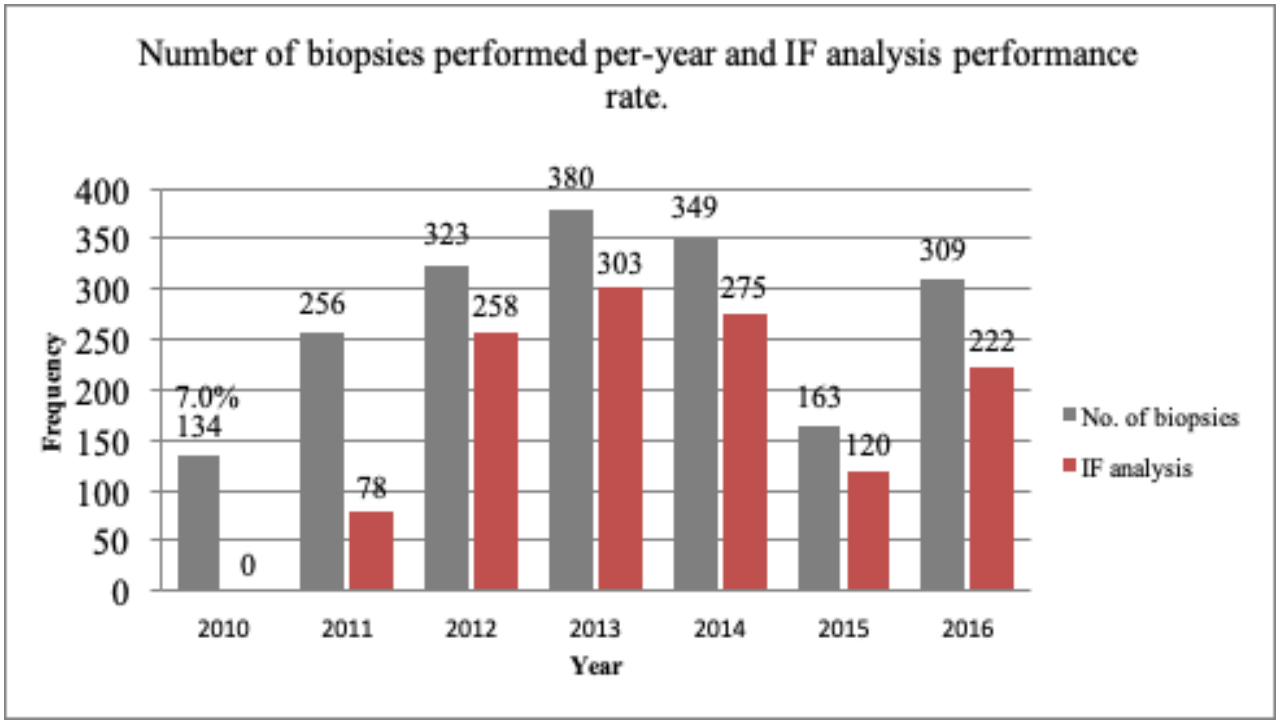

Figure 1. The Total number of biopsies performed per-year with IF analysis performance rate.

Table 1. The distribution of different types of renal disease in each year.

Major categories	Year							Total
	2010	2011	2012	2013	2014	2015	2016	
FSGS	36	68	85	89	96	38	92	504
MN	3	21	36	36	48	23	35	202
MCD	21	39	44	67	58	22	37	288
MPGN	7	3	3	9	8	3	4	37
DN	1	2	1	4	7	3	8	26
Hypertensive NS	13	16	18	37	34	12	20	150
LN	9	22	20	24	22	8	16	121
PIGN	0	4	6	4	3	4	1	22
IgA N	1	9	14	13	11	9	17	74
TIN	8	4	11	15	3	4	9	54
ATN	3	6	7	5	3	3	9	36
Cres GN	5	10	12	13	12	5	6	63
AM	2	8	12	10	8	7	6	53
Mes PGN	1	3	2	4	4	1	4	19
Miscellaneous	10	23	35	33	8	13	26	148
Normal renal biopsy	14	18	17	17	24	8	19	117
Total	**134**	**256**	**323**	**380**	**349**	**163**	**309**	**1914**

FSGS = Focal segmental glomerulosclerosis; MN = Membranous nephropathy; MCD = Minimal change disease; MPGN = Membranoproliferative glomerulonephritis; PIGN = Post-infectious glomerulonephritis; IgAN = Immunoglobulin A nephropathy; CresGN = Crescentic glomerulonephritis; MesPGN = Mesangioproliferative glomerulonephritis; LN = Lupus nephritis; DN = Diabetic nephropathy; HNS = Hypertensive nephrosclerosis; AM = Amyloidosis; TIN = Tubulointerstitial nephropathies; ATN = Acute tubular necrosis; Miscellaneous includes (Nephrocalcinosis, Thrombotic microangiopathy, Cast nephropathy, Burkitt lymphoma, Pyelonephritis and Cystic kidney disease).

Table 2. Clinical presentation of patients prior to renal biopsy.

Clinical presentation(N=1914)	No. of biopsies	(%)
Proteinuria	1450	75.8
Renal impairment	566	29.6
Hypertension	521	27.2
Hematuria	485	25.3
Diabetes	56	2.9

Table 3. The overall frequencies of different renal diseases in native renal biopsies according to age and sex.

Major categories	No. Of cases (%)	Age years (Mean ±1 SD)	Male (%)	Female (%)
Glomerular disease: • **PGN (1209 cases, 63.17%)** • **SGN (350 cases, 18.29%)**	1559 (81.5%)	31.2±17.6	821 (52.7%)	738 (47.3%)
TIN	90 (4.7%)	35.8±16.4	50 (55.6%)	40 (44.4%)
Miscellaneous	148 (7.7%)	30.9±18.6	71 (48.0%)	77(52.0%)
Normal renal biopsy	117 (6.1%)	27.4±13.6	46 (39.3%)	71 (60.7%)
P value		0.008	0.02	
Total	1914 (100%)	31.2 ±17.4	988 (51.6%)	926 (48.4%)

PGN = Primary glomerulonephritis; SGN = Secondary glomerulonephritis; TIN = Tubulointerstitial nephropathies.

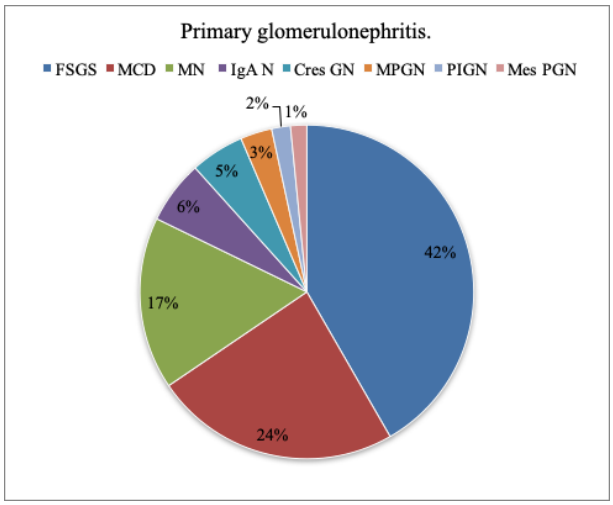

Figure 2. The distribution of primary glomerulonephritis.

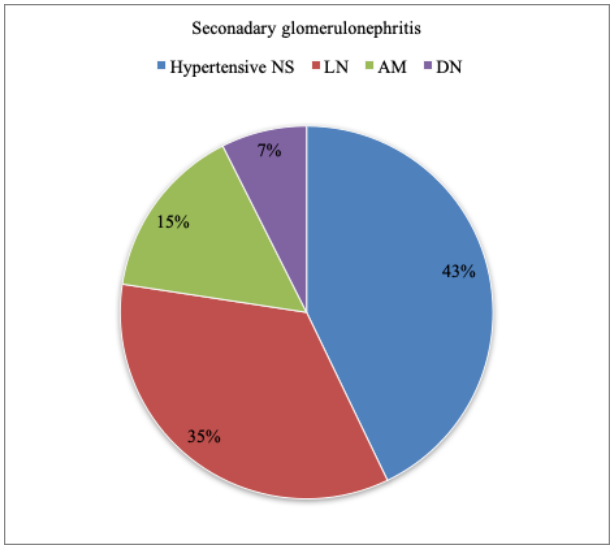

Figure 3. The distribution of Secondary glomerulonephritis.

Table 4. The age and sex distribution of Primary glomerulonephritis and Secondary glomerulonephritis.

Type	No. of biopsies (%)	Mean Age Mean±1SD	Male (%)	Female (%)
PGN	1209 (63.2%)	28.6±17.2	682 (56.4)	527 (43.6%)
FSGS	504(41.7%)	29.0±16.8	278(55.2%)	226(44.8%)
MN	202(16.7%)	37.9±14.6	115(56.9%)	87(43.1%)
MCD	288(23.8%)	19.3±14.3	160(55.6%)	128(44.4%)
MPGN	37(3.1%)	33.8±18.6	23(62.2%)	14(37.8%)
PIGN	22(1.8%)	18.4±15.5	14(63.6%)	8(36.4%)
IgA N	74(6.1%)	29.6±15.2	51(68.9%)	23(31.1%)
Cres GN	63(5.2%)	38.7±18.8	32(50.8%)	31(49.2%)
Mes PGN	19(1.6%)	26.3±13.0	9(47.4%)	10(52.6%)
P value		<0.001	0.375	
SGN	350 (18.2%)	39.8±16.1	139(39.7%)	211(60.3%)
DN	26(7.4%)	47.4±9.7	17(65.4%)	9(34.6%)
Hypertensive NS	150(42.8%)	46.6±14.2	75(50.0%)	75(50.0%)
LN	121(34.6%)	28.2±10.7	17(14.0%)	104(86.0%)
AM	53(15.1%)	43.4±19.3	30(56.6%)	23(43.4%)
P value		<0.001	<0.001	

FSGS = Focal segmental glomerulosclerosis; MN = Membranous nephropathy; MCD = Minimal change disease; MPGN = Membranoproliferative glomerulonephritis; PIGN = Post-infectious glomerulonephritis; IgAN = Immunoglobulin A nephropathy; CresGN = Crescentic glomerulonephritis; MesPGN = Mesangioproliferative glomerulonephritis; LN = Lupus nephritis; DN = Diabetic nephropathy; HNS = Hypertensive nephrosclerosis; AM = Amyloidosis.

DISCUSSION

This study is a seven year experience of a single-center in Kurdistan Region-Iraq, as mentioned previously there are no published data on the pattern of renal disease in Kurdistan region and only few studies are being conducted in overall Iraq all of which had small sample size. The uniqueness of our study is that it provides the latest comprehensive information about the demographics, clinical presentations and pattern of kidney diseases diagnosed by renal biopsy for the first time in Kurdistan Region.

Notable outcomes have been identified in this review included the male predominance of biopsy proven glomerulonephritis for all histopathological categories with the exception of secondary glomerular disease, in which females were more frequently affected and this reflects the increased prevalence of Lupus nephritis in the female population. This is comparable with a number of studies conducted in Australia, Brazil, China and Korea [6-9].

In our study proteinuria was the most frequent clinical presentation at all age groups, accounting for 75.8% of all cases. This is similar to that published in many studies from Italy, Senegal, Morocco, India and South Korea [10-13]. On the other hand studies from South Korea and Cyprus obtained a higher frequency of asymptomatic urinary abnormality [14, 15].

The most predominant renal disease in our series was Primary glomerulonephritis making up (63.2%) of all cases, followed by Secondary glomerulonephritis accounting for (18.2%) and Tubulointerstitial nephropathies (4.7%), which is similar with studies in Saudi Arabia and Egypt [16-17]. Among the Primary glomerulonephritis, focal and segmental glomerulosclerosis was the most frequently encountered type of glomerulonephritis (41.7%), Minimal change

disease was the second most common finding (23.8%), followed by Membranous nephropathy (16.7%), IgA nephropathy (6.1%), and lastly comes the least common pathologies like Crescentic glomerulonephritis (5.2%), Membranoproliferative glomerulonephritis (3.1%), Post-infectious glomerulonephritis (1.8%), and Mesangioproliferative glomerulonephritis (1.6%). This appears to be similar to the studies previously performed in Romania, Pakistan, Sudan, Saudi Arabia and Nigeria [18-22]. Conversely studies from France, Korea, Africa, China, Serbia, and Romania [9, 23-27] reported different results regarding the prevalence of various types of Primary glomerulonephritis.

In our study the most common Secondary glomerulonephritis was Hypertensive Nephrosclerosis (42.8%) followed by the second most common diagnosis Lupus nephritis (34.6%) and Amyloidosis (15.1%). Diabetic nephropathy (7.4%) was less frequently encountered this may be due to the practice patterns that diabetes are usually not biopsied unless there is doubt about diabetes being the cause of renal disease. In all other studies Lupus nephritis is the first secondary glomerular pathology. This may reflect the presence of several biases such as; differences in indications for renal biopsy and poor clinical data. But it is obvious the frequency of other secondary glomerular pathologies like; Lupus nephritis, Amyloidosis and Diabetic nephropathy goes with the global trends and it is similar to the reviews reported in India, Saudi Arabia and Colombia [28-30].

We did not find conditions like Alport syndrome and thin basement membrane nephropathy which reflect the lack of electron microscopy in the center. And Tubulointerstitial nephritis was found less frequently that is compatible with many studies done previously.

Table 5 shows a comparison of the basic data and the spectrum of renal disease in this series with other published studies from Iraq. The results are nearly consistent with those from Baghdad but there are some differences when compared to the study from Mosul in which Membranoproliferative glomerulonephritis is the most common primary glomerular disease. And when compared to other nearby countries, the similarity is clearly seen between our results and those from Iran, Bahrain, Oman, and Saudi Arabia as shown in Table 6. Although differences are noticed in the study conducted in Dubai.

Table 5. The prevalence of glomerular disease in different parts of Iraq

Parameter	Present study Kawa H. Amin	Ikdam K. Shaker et al. [31]	Habal MJ, et al. [32]
Period of study	2010-2016	1994-2001	1996-1998
Place of study	Shorsh General Hospital Kurdistan Region	Rasheed Hospital Baghdad	Mosul teaching hospital Mosul-Iraq
No. of biopsies	1914	520	42
Age range	6 Days-83 Year	12-66 Year	18-65 Year
PGN			
FSGS	504(41.7%)	117 (26.3%)	3 (7%)
MN	202(16.7%)	65 (14.6%)	9 (21%)
MCD	288(23.8%)	76 (17.1%)	8 (20%)
MPGN	37(3.1%)	72 (16.2%)	11 (26%)
PIGN	22(1.8%)	….	….
IgA N	74(6.1%)	….	….
CresGN	63(5.2%)	….	….
MesPGN	19(1.6%)	100 (22.5%)	….
SGN			
DN	26(7.4%)	8 (14%)	1 (2%)
Hypertensive N	150(42.8%)	1 (1.8%)	….
LN	121(34.6%)	25 (45.4%)	3 (7.5%)
AM	53(15.1%)	15 (27.3%)	2 (5%)

FSGS = Focal segmental glomerulosclerosis; MN = Membranous nephropathy; MCD = Minimal change disease; MPGN = Membranoproliferative glomerulonephritis; PIGN = Post-infectious glomerulonephritis; IgAN = Immunoglobulin A nephropathy; CresGN = Crescentic glomerulonephritis; MesPGN = Mesangioproliferative glomerulonephritis; LN = Lupus nephritis; DN = Diabetic nephropathy; HNS = Hypertensive nephrosclerosis; AM = Amyloidosis.

Table 6. The relative frequency of glomerular disease in different countries across the world.

Parameter	Present study Kawa H. Amin	Mardanpour K, et al. [33]	Z. Nawaz, et al. [34]	Ahmed Al Arrayed, etal. [35]	Dawood Al Riyami, et al. [36]	Amna K. Alhadari, et al. [37]
Period of study	2010-2016	2007-2012	2005-2009	1990-2002	1992-2010	2005-2014
Place of study	Kurdistan-Iraq	Iran	Saudi Arabia	Bahrain	Oman	Dubai
No. of biopsies	1914	266	348	498	133	258
Age range	6 Days-83 Years	14-78 Years	16-70 Years	2 Days-80 Years	18-90 Years	12-81 Years
PGN						
FSGS	504(41.7%)	33 (17.3)	(27.6%)	53 (23.8%)	30(15.8%)	(8.8%) (12%)
MN	202(16.7%)	15 (7.9)	(9.9%)	30 (13.5%)	13(9.8%)	(13.2%)
MCD	288(23.8%)	81 (43)	(17.7%)	67 (30%)	...	(10.1%)
MPGN	37(3.1%)	...	(13%)	32 (14.3%)	3(2.3%)	...
PIGN	22(1.8%)	13 (6.8)	...	7 (3.1%)	...	...
IgA N	74(6.1%)	25 (13.5)	(11.5%)	1 (0.4%)	4(3.0%)	...
CresGN	63(5.2%)	...	...	6 (2.7%)	2(1.5%)	...
MesPGN	19(1.6%)	9 (4.5)	(12.6%)	13 (5.8%)	6(4.5%)	...
SGN						
DN	26(7.4%)	(19%)	6.8%	36 (31.9%)	5(3.8%)	...
Hypertensive N	150(42.8%)	...	22%	23 (20.4%)	...	...
LN	121(34.6%)	(41.8%)	54.5%	44 (38.9%)	48(36.1%)	(23.4%)
AM	53(15.1%)	...	...	3 (2.7%)	3(2.3%)	...

FSGS = Focal segmental glomerulosclerosis; MN = Membranous nephropathy; MCD = Minimal change disease; MPGN = Membranoproliferative glomerulonephritis; PIGN = Post-infectious glomerulonephritis; IgAN = Immunoglobulin A nephropathy; CresGN = Crescentic glomerulonephritis; MesPGN = Mesangioproliferative glomerulonephritis; LN = Lupus nephritis; DN = Diabetic nephropathy; HNS = Hypertensive nephrosclerosis; AM = Amyloidosis.

In conclusion, that primary glomerular disease constituted majority of the biopsies followed by Secondary glomerular disease. Among the Primary glomerulonephritis focal and segmental glomerulosclerosis and Minimal change disease were the most common findings, and regarding the Secondary Glomerular diseases hypertensive nephrosclerosis was the commonest followed by Lupus nephritis. These data have great importance, since it aids to understand the prevalence of renal diseases in Kurdistan Region-Iraq. Minimal variability is observed in the different categories of primary and secondary glomerular diseases in overall Iraq and even in other countries across the world the reason of which is multifactorial.

Limitations

- We were unable to analyze the data for the period before 2010 due to unavailability of a Histopathological center for renal biopsy in Kurdistan Region.
- After establishment of the center in Sulaimani Governorate, immunofluorescence test was not present for the first year (2010).
- Another shortcoming of our study was unavailability of Electron microscopy, which would have helped in better and more precise diagnosis.
- Inadequate clinical data was another factor.

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