Original Article

Iraqi National Journal of Medicine. July 2024, Volume 6, Issue 2

Histopathological spectrum of glomerular diseases over two years in a single center

Ali Jasim Al Saedi [1], Saad J. Hamza [2], Dalia Mahmood [3]

[1] College of medicine, university of Baghdad, nephrology and renal transplantation center. [2] Consultant physician and nephrologist, Imam Al Sadeq hospital, Hilla, Iraq. [3] Pediatric nephrologist, child welfare teaching hospital, medical city, Baghdad, Iraq.

ABSTRACT

Background: Glomerular diseases are the leading causes of end-stage renal disease globally. Recognizing the glomerular disease pattern in a specific geographical area is crucial for understanding the region's pathobiology as well as the incidence and progression of the disorder. **Aim**: To determine the overall spectrum of glomerular diseases based on renal biopsy and compare the results with studies from other countries. **Methods**: This study was conducted at the Nephrology and Renal Transplant Center, Medical City, Baghdad, Iraq from January 2016 to December 2017. The cohort comprised 849 patients aged 3–65 years who were referred to the center for management. Parameters recorded for each patient included name, age, gender, and clinical and laboratory findings. All biopsy specimens were reported by the same pathologist using light and immunofluorescence microscopy. Two pieces from the left kidney were obtained using a gunshot needle (16 or 18 gauge) and placed in 2 mL formalin for histopathologic examination. **Results**: The mean age was 24.67 ± 15.902 years, with females comprising 53% of the sample. FSGS was the most predominant condition observed in 229 (27.1%) patients, followed by MCD in 215 (25.5%), LN in 189 (22.5%), and MN in 118 (14%) patients. MCD, MN, and IgA glomerulonephritis were more common in males than females, while LN, vasculitis, FSGS, and MPGN were more prevalent in females. **Conclusions**: The histopathological study of renal biopsies reflects a spectrum of glomerular diseases that show both similarities and differences compared to other countries.

Keywords: Renal biopsy, histopathology

Corresponding author: Ali Jasim Al Saedi. E-mail: alsaedinephrology@gmail.com
Disclaimer: The authors have no conflict of interest.

DOI: https://doi.org/10.37319/iqnjm.6.2.7
Received: 6 MAR 2024 Accepted: 27 JUN 2024 Published online: 20 JUL 2024

INTRODUCTION

Glomerulonephritis is a type of kidney disease characterized by inflammation of the glomeruli, the tiny filters that remove excess waste and fluids from the blood. It may be acute or chronic and can occur on its own (primary) or be caused by another condition (secondary).[1,2]

Deranged structure and function of glomeruli form the pathophysiologic basis of glomerular disorders, which continue to be the leading cause of end-stage renal disease globally. Recognizing the glomerular disease pattern in a specific geographical area is crucial for understanding the region's pathobiology and the incidence and progression of the disorder. The prevalence of glomerular disease varies globally,

influenced by race, age, geographical, etiological, cultural, and economic factors.[3,4] Glomerulonephritis (GN) is the third most common cause of end-stage renal failure. Therefore, it is crucial to recognize the pattern of the disease in any given geographical area.[4,5] The glomeruli can be injured by various external factors, systemic diseases, and hereditary conditions.[5-7] All glomerular diseases present with a variable range of proteinuria, hematuria, hypertension, and impaired renal function.[8,9] The structural changes due to the deposition of immune complexes alter the electrical charge of the glomerular basement membrane and modify its permeability to proteins.[10,11] Typically, an inflammatory proliferative response is detected within the injured glomerulus involving the endothelial, mesangial, or epithelial cells.[12,13] Renal biopsy plays a fundamental role in evaluating the patterns of glomerular disorders. [14,15]In some patients, renal biopsy is essential for determining an accurate diagnosis, prognosis, and appropriate treatment. [16,17] The present study aimed to determine the overall spectrum of glomerular diseases based on renal biopsy and compare the results with studies from other countries. [18-20]

MATERIALS AND METHODS

This cross-sectional study was conducted at the Nephrology and Renal Transplant Center, Medical City, Baghdad, Iraq from January 2016 to December 2017. The study group comprised 849 patients aged 3–65 years. The following variables were recorded: name, age, gender, and clinical and laboratory findings, such as proteinuria, hematuria, and chronic diseases like hypertension, diabetes, and systemic lupus erythematosus (SLE).

Exclusion criteria:

Patients with bleeding problems, uncontrolled hypertension, a single kidney for the percutaneous method, morbid obesity, uncooperative candidates, and graft biopsy were excluded.

Investigation:

The clotting profile, including platelet count, bleeding time, clotting time, and prothrombin time, was conducted.

Procedure:

The biopsy site was located directly under ultrasound guidance. A special biopsy needle was used to obtain the kidney biopsy sample while the patient held their breath. Two pieces of kidney tissue were obtained and sent to a single histopathology laboratory for examination by the same pathologist. All slides were examined by light microscopy. For immunohistochemistry, the slides were stained with hematoxylin and eosin, periodic acid-Schiff (PAS), trichrome, and silver impregnation; if amyloidosis was suspected, Congo red stain was used.

The histological classification of renal diseases was based on the World Health Organization (WHO) recommendations.

Statistical analysis: All statistical analyses were performed using (SPSS) Statistical Package for Social Sciences for Windows version 18. Descriptive analysis was used for demographic data, and cross-tabulation was used to determine the relationship between different variables. *p*-value < 0.05 was considered statistically significant.

RESULTS

The study included 849 patients aged 3–65 (mean, 24.67 ± 15.902) years; females comprised 53% and males constituted 47% of the cohort.

Table 1: Demographic Characteristics

Total number	Age Mean ± SD	Gender	
		Males	Females
849	24.67 ± 15.902	401 (47%)	448 (53%)

Table 2: Spectrum of Histologic Diagnosis of Glomerulonephritis

Type	No. (%)
FSGS	229 (27.1)
MCD	215 (25.5)
LN	189 (22.5)
MN	118 (14)
IgA	51 (6)
MPGN	12 (1.4)
Amyloidosis	12 (1.4)
DN	6 (0.7)
Others	17 (2)
Total	849 (100)

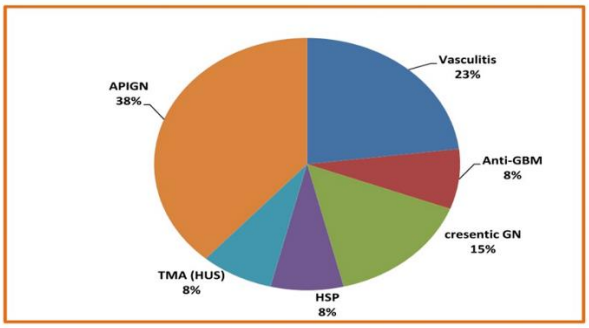

Figure 1: Percentages of Other Types of Glomerulonephritis.

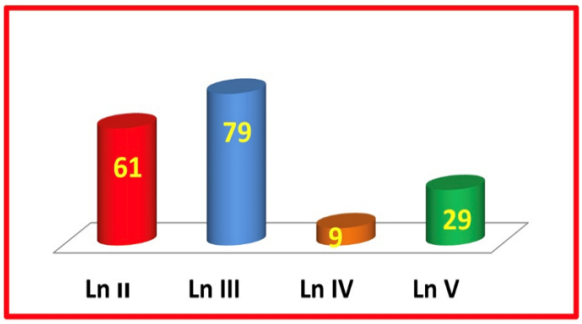

Figure 2: Frequencies of Classification of Lupus Nephritis as Numbers.

Table 3: Distribution of Glomerulonephritis Types According to Gender

Type	Gender		Total	*p*-value
	Male	Female		
MCD	133	82	215	p < 0.001
MN	67	51	118	
LN	35	155	189	
FSGS	113	116	229	
MPGN	5	7	12	
IgA	29	22	51	
Amyloidosis	8	4	12	
DN	4	2	6	
Other types	7	10	17	
Total	401	448	849	

Table 4: Relationship Between Age Group and Types of Glomerulonephritis

Type	Age Group (Years)				Total	*p*-value
	3–11	12–18	19–60	61–65		
MCD	133	46	35	1	215	p < 0.001
MN	4	5	99	10	118	
LN	23	45	120	1	189	
FSGS	42	42	139	7	229	
MPGN	4	2	5	1	12	
IgA	0	0	5	0	6	
Amyloidosis	15	15	21	0	51	
DN	0	0	7	5	12	
Other types	6	5	6	0	17	
Total	227	160	437	25	849	

DISCUSSION

Renal biopsy is a fundamental tool in diagnosing glomerular diseases.[21,22]

The study showed that the most common histological diagnosis was (FSGS)) focal segmental glomerular sclerosis, followed by (MCD)minimal change diseases and lupus nephritis (LN). These results differ from a study by Muthu et al. (2018)[3] and Arrayed et al.,[5] wherein MCD was predominant, followed by FSGS.

Furthermore, our study showed a low frequency of the other types of glomerulonephritis in patients. The phenomenon can be explained by the absence of electron microscopy on the biopsy specimens, which might have led to under-diagnosis. Also, incomplete immunofluorescence staining, and lack of genetic studies could have contributed to the varied results. In a study by Muthu et al. (2018),[3] electron microscopy modified the diagnosis in 6% of cases and aided the diagnosis of MCD in 21% of cases.

In another study done by Yahya TM et al [23] electron microscopy contributed 31% of the cases . Electron microscopy can resolve diagnostic dilemmas, thus improving the diagnosis. Acute post infectious glomerular nephritis (APIGN) was the most predominant type of the other types of glomerulonephritis followed by vasculitis, whereas LN was the most frequent secondary glomerulonephritis, with a female predominance, similar to the studies from Thailand,[24] Korea,[25] and Arab countries.[26]

Regarding classification, LN III was the most predominant, while LN IV was the least common. This finding disagrees with a study by Satish et al.[27] Regarding the distribution of histological types of renal biopsy, MCD, MN, IgA, and amyloidosis were more common in males than females, while LN, FSGS, MPGN, and other types showed female predominance. This result was in line with a study by Donadio and Grande[28] but disagrees with the findings by Aatif et al.[11]

Regarding the distribution of glomerulonephritis according to age groups, the study showed that MCD was more predominant in the 3–11 age group, whereas MN, LN, FSGS, MPGN, DMN, IgA, and amyloidosis were more common in the 19–60 age group, and the rare types were equally distributed between the two age groups. This phenomenon was similar to the findings by Golay et al.,[29] Wagrowska-Danilewicz et al.,[30] and Dragovic et al.[31]

CONCLUSIONS

This histopathological study of renal biopsies reflects the spectrum of glomerular diseases, with regard to both differences and similarities to results from other countries.

Recommendations:

1. Establish a central registry for glomerular disease in Iraq.
2. Implement processing for immunofluorescence and electron microscopy, along with genetic studies, to improve patient care and follow-up for those with glomerular disease.
3. Development of treatment plans by the Ministry of Health based on the study results.

REFERENCES

1. William G. Couser WG., Johnson RJ., The etiology of glomerulonephritis: roles of infection and autoimmunity. Kidney International (2014) 86, 905–914.
2. Eknoyan G., Lameire N., KDIGO Clinical Practice Guideline for Glomerulonephritis. Kidney International Supplements (2012) 2, http://www.kidney-international.org
3. Muthu V, Ramachandran R, Nada R, Kumar V, Rathi M, Kohli HS, Jha V, Gupta KL, Sakhuja V. Clinicopathological spectrum of glomerular diseases in adolescents: a single-center experience over 4 years. Indian J Nephrol. 2018 Jan-Feb; 28(1):15–20.
4. Shaker IK, Al-Saedi AJ, Al-Salam S, Saleem MS, Al-Shamma IA. Spectrum of glomerular disease in Iraqi patients from a single center. Saudi J Kidney Dis Transpl. 2002 October-December; 13(4):515–9.
5. Al Arrayed A, George SM, Malik AK, Al Rayed S, Rajagopalan S, Al Arrayed A, Sharqawia SE, Ratnakar KS, Fareed E, Al Sabag F. The spectrum of glomerular diseases in the Kingdom of Bahrain: an epidemiological study based on renal biopsy interpretation. Transplantation Proceedings. 2004 July–August; 36(6):1792-1795.
6. Al Riyami D, Al Shaaili K, Al Bulushi Y, Al Dhahli A, Date A. The spectrum of glomerular diseases on renal biopsy: data from a single tertiary center in Oman. Oman Med J. 2013 May; 28(3):213–215.
7. Said R, Hamzeh Y, Tarawneh M. The spectrum of glomerulopathy in Jordan. Saudi J Kidney Dis Transpl. 2000 Jul-Sep; 11(3):430–433.
8. Yahya TM, Pingle A, Boobes Y, Pingle S. Analysis of 490 kidney biopsies: data from the United Arab Emirates Renal Diseases Registry. J of Nephrol. May 1998; 11(3):148–150.
9. Richard A, Preston MD, Craig L, Stemmer MD, Barry J, Materson MD, Eliseo Perez-Stable MD, Victoriano Pardo MD. Renal biopsy in patients 65 years of age or older: an analysis of the results of 334 biopsies. June 1990; 38(6):669–674.
10. Mitwalli AH, Al Wakeel JS, Al Mohaya SS, Malik HG, Abu-Aisha H, Hassan OS, Akhtar M. Pattern of glomerular disease in Saudi Arabia. Am J Kidney Dis. 1996 Jun; 27(6):797–802.
11. Aatif T, Maoujoud O, Montasser DI, Benyahia M, Oualim Z. Glomerular diseases in the military hospital of Morocco: review of a single centre renal biopsy database on adults. Indian J Nephrol. 2012 Jul-Aug; 22(4):257–263.
12. Arias LF, Henao J, Giraldo RD, Carvajal N, Rodelo J, Arbeláez M. Glomerular diseases in a Hispanic population: review of a regional renal biopsy database. Sao Paulo Med J. 2009; 127:140–4.
13. Mubarak M, Kazi JI, Naqvi R, Ahmed E, Akhter F, Naqvi SA, et al. Pattern of renal diseases observed in native renal biopsies in adults in a single centre in Pakistan. Nephrology (Carlton) 2011; 16:87–92.
14. Chang JH, Kim DK, Kim HW, Park SY, Yoo TH, Kim BS, et al. Changing prevalence of glomerular diseases in Korean adults: a review of 20 years of experience. Nephrol Dial Transplant. 2009; 24:2406–10.
15. Garyal, Kafle RK. Histopathological spectrum of glomerular disease in Nepal: a seven-year retrospective study. Nepal Med Coll J. 2008; 10:126–8.
16. Heaf J, Lokkegaard H, Larsen S. The epidemiology and prognosis of glomerulonephritis in Denmark 1985-1997. Nephrol Dial Transplant. 1999; 14:1889–97.
17. Huraib S, Al Khader A, Shaheen FA, Abu Aisha H, Souqiyyeh MZ, Al Mohana F, et al. The spectrum of glomerulonephritis in Saudi Arabia: the results of the Saudi registry. Saudi J Kidney Dis Transpl. 2000; 11:434–441.
18. Rychlík I, Jancová E, Tesar V, Kolsky A, Lácha J, Stejskal J, et al. The Czech Registry of Renal Biopsies. Occurrence of renal diseases in 1994-2000. Nephrol Dial Transplant. 2004; 19:3040–9.
19. Covic A, Schiller A, Volovat C, Gluhovschi G, Gusbeth-Tatomir P, Petrica L, et al. Epidemiology of renal disease in Romania: a 10-year review of two regional biopsy databases. Nephrol Dial Transplant. 2006; 21:419–424.
20. Naini AE, Harandi AA, Ossareh S, Ghods A, Bastani B. Prevalence and clinical findings of biopsy-proven glomerulonephritis in Iran. Saudi J Kidney Dis Transpl. 2007; 18:556–564.
21. Abdou N, Boucar D, El Hadj Fary KA, Mouhamadou M, Abdoulaye L, Mamadou Mourtala KA, et al. Histopathological profiles of nephropathies in Senegal. Saudi J Kidney Dis Transpl. 2003; 14:212–214.
22. Narasimhan B, Chacko B, John GT, Korula A, Kirubakaran MG, Jacob CK. Characterization of kidney lesions in Indian adults: towards a renal biopsy registry. J Nephrol. 2006; 19:205–10.

23. Yahya TM, Pingle A, Boobes Y, Pingle S. Analysis of 490 kidney biopsies: data from the United Arab Emirates Renal Diseases Registry. J Nephrol. 1998; 11:148–50.
24. Huraib SO, Abu-Aisha H, Mitwalli A, Mhmoud K, Memon NA, Sulimani F. The spectrum of renal disease found by kidney biopsies at King Khalid University Hospital. Saudi Kidney Dis Transpl Bull. 1990; 1:15–9.
25. Carvalho E, do Sameiro Faria M, Nunes JP, Sampaio S, Valbuena C. Renal diseases: a 27-year renal biopsy study. J Nephrol. 2006; 19:500–7.
26. Haas M, Meehan SM, Karrison TG, Spargo BH. Changing etiologies of unexplained adult nephrotic syndrome: a comparison of renal biopsy findings from 1976-1979 and 1995-1997. Am J Kidney Dis. 1997; 30:621–31.
27. Satish S, Deka P, Shetty MS. A clinico-pathological study of lupus nephritis based on the International Society of Nephrology-Renal Pathology Society 2003 classification system. J Lab Physicians. 2017 Jul-Sep; 9(3):149–155.
28. Donadio JV, Grande JP. IgA nephropathy. N Engl J Med. 2002; 347:738-748.
29. Golay V, Trivedi M, Abraham A. The spectrum of glomerular disease in a single center: a clinicopathological correlation. Indian J Nephrology. 2013; 23(3):168–175.
30. Wagrowska-Danilewicz M, Danilewicz M. Current position of electron microscopy in the diagnosis of glomerular diseases. Pol J Pathol. 2007; 58:87–92.
31. Dragovic D, Rosenstock JL, Wahl SJ, Panagopoulos G, Michelis MF. Increasing incidence of focal segmental glomerulosclerosis and an examination of demographic patterns. Clin Nephrol. 2005; 63:1–7.