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Original Article

Glomerulonephritis pattern based on renal biopsy at the tertiary center of King Abdulaziz University Hospital, Saudi Arabia

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ABSTRACT

Aim: To investigate the glomerulonephritis pattern based on renal biopsies obtained from patients who attended King Abdulaziz University (KAU) hospital.

Methods: This retrospective analysis was conducted at King Abdulaziz University (KAU) hospital. Data were retrieved from the pathology registry of renal biopsies performed at KAU hospital between 2010-2018. Demographics, background data, and the result of the biopsy Data were entered and analyzed using SPSS 23. Continuous data were expressed using mean ± SD. A P-value of <0.05 (two-tailed) was determined to establish statistical significance. A Chi-square test was utilized to evaluate the association between categorical variables. In addition, a one-way ANOVA test was utilized when appropriate.

Results: Among the 55 cases Focal segmental glomerulosclerosis (FSGS) is the most common cause of primary glomerulonephritis (56%). Whereas lupus nephritis was the most prevalent pathology in the case of secondary glomerulonephritis (60%) with a female predominance, followed by anti-neutrophilic cytoplasmic autoantibody vasculitis (16.7%) and diabetic nephropathy (13.3%). While IgA nephropathy represents (12%) of all the cases.

Conclusion: Lupus nephritis is the prevalent cause of ESRD based on histopathology results. Lupus nephritis was the commonest cause of glomerulonephritis diseases with a female predominance. It is recommended that a nationwide multicenter study should be conducted to determine the current status, and ensure early intervention which will guide better planning and management of glomerulonephritis. This report should be considered an as urgent call to establish a national registry for glomerulonephritis renal biopsies.

Keywords: Renal Biopsy; Glomerulonephritis; Lupus nephritis; Neuropathy.

INTRODUCTION

Glomerulonephritis (GN) is considered a glomerular disease characterized by inflammation of the glomeruli leading to injury.[1] GN is characterized by edema, protein urea, hematuria, and hypertension. GN is classified into different types based on histopathology and clinical presentation.[2] Anti-GBM antibody disease, immune complex disease, pauci-immune disease, and idiopathic glomerulonephritis are four reported subtypes of RPGN.[3] The clinical manifestations include hematuria, proteinuria, oliguria, and edema that appears suddenly.[4]

Laboratory testing and a renal biopsy is used to diagnose the crescentic formation in Bowman's capsule.[5] The majority of cases have also reported an increase in plasma creatinine at the stage of diagnosis.[6]

The estimated global incidence is between 0.2 and 2.5 per 100,000 people per year.[3] The prevalence of Glomerulonephritis (GN) varies worldwide based on the genetic background and environmental surroundings.[7-9] There is an exclusion in the geographical regions of Arabia and Asia, where in Arabia an incidence rate of 7.2-11.6/100,000 per year and 6.2-15.6/100,000 per year in Asia was reported and among children, this incidence was lower.[10] Rapidly progressive glomerulonephritis (RPGN), is reported as rare but severe in children. RPGN is characterized by a rapid decline in renal function that can lead to ESRD.[11] Glomerulonephritis (GN) is a major public health problem worldwide including in the Arab world. GN is one of the main causes of ESRD (End Stage Renal Disease) in spite that the incidence rate of RPGN in the United States is estimated to be 7 cases per million per year.[12] In 2010 study by a group of scientists in Saudi Arabia found a 3.2 percent incidence of crescentic GN in 233 patients aged 17 to 43 years in which renal biopsies were performed.[13] In India an epidemiological study of 36 children with RPGN found that 19.6 percent (7 patients) recovered completely, while those who progressed to chronic kidney disease (CKD) were 30.6 percent (10 patients).[14]

Most Arab countries do not keep a national registry for renal biopsies. Also, the available data on glomerulonephritis epidemiology in Middle East countries is limited.[15-17] There is currently a lack of agreement about the appropriate indications and clinical worth of conducting a renal biopsy.[18] However, still, it remains the cornerstone for diagnosis, therapeutics and prognosis in glomerulonephritis disease patients.[19-21] Saudi Arabia's western province particularly, showed insufficient evaluation of the renal disease outcome of RPGN in pediatric patients. Regarding the current situation in KSA, few studies were published describing the etiology of glomerulonephritis, and many of them were not based on renal biopsy.[22] There is variability in the histopathological pattern of glomerulonephritis among different geographical areas.[23-25] To understand the etiology and causes of progression to ESRD; it is essential to identify the glomerulonephritis pattern and incidence in any particular geographic area. The study evaluated the epidemiology and etiology among glomerulonephritis patients based on renal biopsy. It is crucial to plan preventive programs as well as protocols of management. This study looks into the causes and fate of RPGN in the pediatric group at King Abdulaziz University Hospital (KAUH) in Jeddah, Saudi Arabia.

MATERIALS AND METHODS

After Ethical approval by the Institutional Review Board (IRB) of KAUH following the Helsinki Declarations a retrospective study was carried out on 55 pediatric patients diagnosed with RPGN. The renal biopsy of these patients was done in the nephrology department of King Abdulaziz University Hospital, between 2010-2018. The total coverage technique was utilized to collect the samples. All patients >18 years old with complete pathology reports and sufficient clinical and laboratory data justifying the positive crescentic formation less or equal to 50% of glomeruli were enrolled in the study. Patients below 18 years of age and patients' files with insufficient data were excluded from the study. Computer-based search for renal biopsy records of KAU hospital was carried out and the data was summarized using the characteristics of age, gender, history, duration of symptoms, and clinical manifestations in addition to renal biopsy pathology reports, socio-demographic data, laboratory results, and imaging studies. All laboratory investigations were collected both at the admission and the last follow-up.

Data was entered and analyzed by SPSS 23. Continuous data were expressed using mean ± SD. A P-value of <0.05 was determined to establish statistical significance. The Chi-square test was used to test the association between categorical variables.

RESULTS

Demographic data from Fifty-five cases were analyzed. Concerning nationalities, Saudi nationality was slightly predominant at 31%, while non-Saudi 29% had a mean age of 38.7±14.62. The rest of the cases are unidentified nationality. Females were predominant at 65.5% in our results. Lupus nephritis was the most common pathology noted. While the most cause of primary GN is FSGS (Focal segmental glomerulosclerosis). Lupus nephritis was the leading cause of GN among females and the second cause among males after FSGN (table 1 & 2). Neither gender nor age has a significant impact on the causes of GN (figure 1).

Table 1: Classification of GD; Gender-based

		Gender				
		Female		Male		
		N	(%)	N	(%)	Total
Primary GN	Focal segmental glomerulosclerosis	7	(50)	7	(50)	14
	Membranous glomerulonephritis	2	(66.7)	1	(33.3)	3
	IgA nephropathy	2	(66.7)	1	(33.3)	3
	Minimal change disease	2	(100)	0	(0)	2
	IgM nephropathy	0	(0)	1	(100)	1
	Mesangial proliferative GN	0	(0)	1	(100)	1
	C1q nephropathy	1	(100)	0	(0)	1
Secondary GN	Lupus nephritis	14	(77.8)	4	(22.2)	18
	ANCA vasculitis	4	(80)	1	(20)	5
	Diabetic nephropathy	4	(100)	0	(0)	4
	Post-streptococcus GN	0	(0)	1	(100)	1
	Monoclonal disease	0	(0)	1	(100)	1
	Light chain disease	0	(0)	1	(100)	1

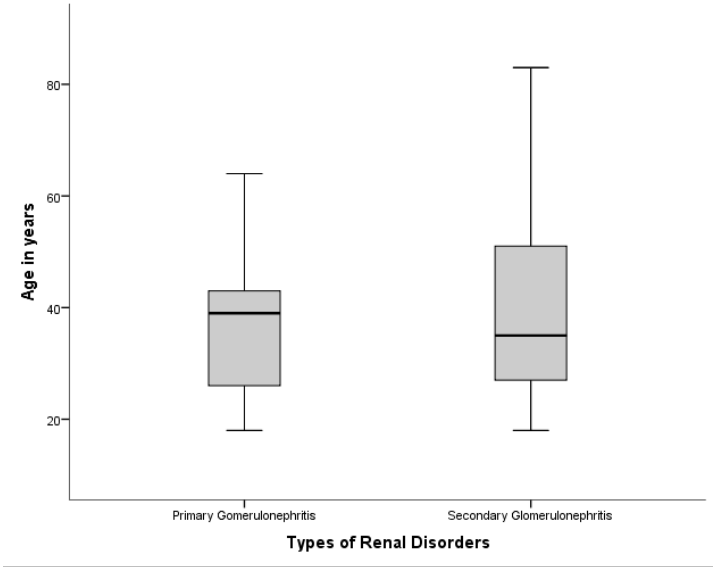
Abbreviations: GN: Glomerulonephritis, ANCA: Anti-neutrophilic cytoplasmic autoantibody

Table 2: Relation between types of glomerulonephritis and gender

			Types of renal disorders	
			Primary glomerulonephritis	Secondary glomerulonephritis
Gender	Female	Count	14	22
		% Within types of renal disorders	56.0%	73.3%
	Male	Count	11	8
		% Within types of renal disorders	44.0%	26.7%
Total		Count	25	30
		% Within types of renal disorders	100.0%	100.0%

P-value: 0.178

Figure 1: Relation between age and type of glomerulonephritis among the study group (P value = 0.802)



DISCUSSION

Histopathological patterns of renal diseases among the adult population at KAUH were evaluated and their correlation with patients, age, and gender were investigated between 2010 and 2018. Investigations of the glomerulonephritis pattern with its epidemiological and etiological aspects were carried out regularly to guide towards improving disease management. The current study described the patterns of GN among patients at KAU Hospital. Lupus nephritis was prevalent among female patients. Previous studies from Middle East, such as Kingdom of Bahrain,[26] Oman,[27] Saudi Arabia[28-30] as well as other regions[31] are consistent with our reported results.

Focal segmental glomerulosclerosis (FSGS) was the most common primary GD reported in our results. Our results are consistent with data obtained from North American countries[32] and Brazil.[33] This is also consistent with the reports from Oman.[27] In Saudi Arabia, FSGS was the most prevalent cause of primary GN, based on studies conducted in central and eastern regions,[23,34,35] On the other hand the Western region of Saudi Arabia report revealed that membranous glomerulonephritis (MGN) is the most common primary GN in adults while FSGS comes in second place.[25] Results with high MGN frequency as a cause of primary GN were published in an earlier Iranian report.[36]

There are only three cases of IgA nephropathy in this study. Reports from Saudi Arabia,[28-30] Bahrain,[26] and Iran[36] revealed less frequency as a cause of the primary GN in comparison to the data from Europe[37] and the far east[38,39] where IgA is the principal cause of GD. This variance could be attributed to genetic and environmental factors.

Histopathological Diagnosis is the gold standard being evaluated from our results. Whereas the small sample size was one of the main limitations of our single-center tertiary hospital study. Our results shed light on the alarming situation of young age patients in Saudi Arabia and highlighted the leading cause of GN which is lupus nephritis.

CONCLUSION

This study highlighted that among renal biopsies, lupus nephritis was the most prevalent Glomerulonephritis among secondary causes while Focal segmental glomerulosclerosis was the commonest primary glomerulonephritis.

Recommendations

We recommend that comprehensive multiple-center studies from the Middle East with a great sample size of the target population of GN. A national registry for GN should be established to determine the current status and help for better planning and management of glomerulonephritis. Interestingly Lupus nephritis was the leading cause of GN, involvement of nephrologists in the primary care of SLE patients is highly recommended to manage renal involvement.

Abbreviations

KAU: King Abdulaziz University
FSGS: Focal Segmental Glomerulosclerosis
GN: Glomerulonephritis
ESRD: End Stage Renal Disease
MGN: Membranous Glomerulonephritis
SLE: Systematic Lupus Erythematosus

Conflict of Interest

The author declares that there are no conflicts of interest relevant to this article.

REFERENCES

1. Williams E, Papineni P, Bhagani S, Harber M. Infections and the Kidney. Primer on Nephrology: Springer; 2022: 543-64.
2. Tang Y, Zhang W, Zhu M, et al. Lupus nephritis pathology prediction with clinical indices. *Sci Rep*. 2018;8(1):10231.
3. Kantauskaitė M, Laučytė-Cibulskienė A, Miglinas M. Histopathological Classification-A Prognostic Tool for Rapidly Progressive Glomerulonephritis. *Medicina (Kaunas)*. 2018;54(2):17.
4. Vaidya SR, Aeddula NR. Chronic renal failure. Stat Pearls [Internet]: StatPearls Publishing; 2021.
5. Duan T, Zhu X, Zhao Q, et al. Association of Bowman's capsule rupture with prognosis in patients with lupus nephritis. *J Nephrol*. 2022;35(4):1193-1204.
6. Srisawat N, Kellum JA. The Role of Biomarkers in Acute Kidney Injury. *Crit Care Clin*. 2020;36(1):125-140.
7. Berti A, Cornec-Le Gall E, Cornec D, et al. Incidence, prevalence, mortality and chronic renal damage of anti-neutrophil cytoplasmic antibody-associated glomerulonephritis in a 20-year population-based cohort. *Nephrol Dial Transplant*. 2019;34(9):1508-1517.
8. Farah RI. Glomerulonephritis Pattern at a Jordanian Tertiary Care Center. *Int J Nephrol*. 2018;2018:2751372.
9. Arapović A, Vukojević K, Filipović N, et al. Epidemiology of 10-year paediatric renal biopsies in the region of southern Croatia. *BMC Nephrol*. 2020;21(1):65.
10. Ponticelli C, Glassock RJ. A definition, modern classification, and global epidemiology of primary glomerulonephritis. Treatment of Primary Glomerulonephritis 2019: 1.
11. Moorani KN, Aziz M, Amanullah F. Rapidly progressive glomerulonephritis in children. *Pak J Med Sci*. 2022;38(2):417-425.
12. Appel GB, Lau WL. Treatment of Rapidly Progressive Glomerulonephritis in the Elderly. *Blood Purif*. 2018;45(1-3):208-212.
13. Sayyari AA, Rasheed SA, Hejaili F, Shaheen FA. Nephrology in Saudi Arabia. Nephrology Worldwide: Springer; 2021: 387-400.
14. Johnson C. Abstracts - Advances in CKD 2018. *Blood Purif*. 2018;45(1-3):151-153.

15. Alwahaibi NY, Al Issaei HK, Al Dhahli BS. Spectrum of glomerular diseases in Arab countries: A systematic review. *Saudi J Kidney Dis Transpl*. 2018;29(6):1256-1266.
16. AlYousef A, AlSahow A, AlHelal B, et al. Glomerulonephritis Histopathological Pattern Change. *BMC Nephrol*. 2020;21(1):186.
17. Abdulaziz HM, Sayed-Ahmed N, Atwa DAI, Nassar MK. Clinicopathologic Features, Chronic Renal Damage and Short-Term Outcomes of Glomerular Diseases in a Middle East Tertiary Care Center. 2022.
18. Srivastava A, Palsson R, Kaze AD, et al. The Prognostic Value of Histopathologic Lesions in Native Kidney Biopsy Specimens: Results from the Boston Kidney Biopsy Cohort Study. *J Am Soc Nephrol*. 2018;29(8):2213-2224.
19. Dhaun N, Bellamy CO, Cattran DC, Kluth DC. Utility of renal biopsy in the clinical management of renal disease [published correction appears in Kidney Int. 2014 Dec;86(6):1268]. *Kidney Int*. 2014;85(5):1039-1048.
20. Hogan JJ, Mocanu M, Berns JS. The Native Kidney Biopsy: Update and Evidence for Best Practice. *Clin J Am Soc Nephrol*. 2016;11(2):354-362.
21. Sethi S, Fervenza FC. Standardized classification and reporting of glomerulonephritis. *Nephrol Dial Transplant*. 2019;34(2):193-199.
22. Ahmed HG, Alzayed FSM, Albluwe HKA, et al. Etiology of chronic kidney disease (ckd) in Saudi Arabia. International Journal of Medical Research & Health Sciences 2019; 8(5): 177-82.
23. Alkhunaizi AM. Pattern of renal pathology among renal biopsy specimens in Eastern Saudi Arabia. *Saudi Med J*. 2007;28(11):1676-1681.
24. Jalalah SM. Patterns of primary glomerular diseases among adults in the western region of Saudi Arabia. *Saudi J Kidney Dis Transpl*. 2009;20(2):295-299.
25. AlMatham KI, AlFayez AF, AlHarthi RA, et al. Glomerulonephritis disease pattern at Saudi tertiary care center. *Saudi Med J*. 2017;38(11):1113-1117.
26. Al Arrayed A, George SM, Malik AK, et al. The spectrum of glomerular diseases in the kingdom of bahrain: an epidemiological study based on renal biopsy interpretation. *Transplant Proc*. 2004;36(6):1792-1795.
27. 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;28(3):213-215.
28. Mitwalli AH, Al Wakeel JS, Al Mohaya SS, et al. Pattern of glomerular disease in Saudi Arabia. *Am J Kidney Dis*. 1996;27(6):797-802.
29. Mitwalli AH, Al Wakeel J, Abu-Aisha H, et al. Prevalence of glomerular diseases: king khalid university hospital, saudi arabia. *Saudi J Kidney Dis Transpl*. 2000;11(3):442-448.
30. Mitwalli AH. Glomerulonephritis in saudi arabia: a review. *Saudi J Kidney Dis Transpl*. 2000;11(4):567-576.
31. Wang H, Ren YL, Chang J, Gu L, Sun LY. A Systematic Review and Meta-analysis of Prevalence of Biopsy-Proven Lupus Nephritis. *Arch Rheumatol*. 2017;33(1):17-25.
32. Dragovic D, Rosenstock JL, Wahl SJ, Panagopoulos G, DeVita MV, Michelis MF. Increasing incidence of focal segmental glomerulosclerosis and an examination of demographic patterns. *Clin Nephrol*. 2005;63(1):1-7.
33. Bahiense-Oliveira M, Saldanha LB, Mota EL, Penna DO, Barros RT, Romão-Junior JE. Primary glomerular diseases in Brazil (1979-1999): is the frequency of focal and segmental glomerulosclerosis increasing?. *Clin Nephrol*. 2004;61(2):90-97.
34. Al Wakeel JS, Mitwalli AH, Tarif N, et al. Spectrum and outcome of primary glomerulonephritis. *Saudi J Kidney Dis Transpl*. 2004;15(4):440-446.

35. Mousa DH, Al-Hawas FA, Al-Sulaiman MH, Al-Khader AA. A Prospective Study of Renal Biopsies Performed Over One-year at the Riyadh Armed Forces Hospital. *Saudi J Kidney Dis Transpl*. 2000;11(3):449-454.
36. Ossareh S, Asgari M, Abdi E, et al. Renal biopsy findings in Iran: case series report from a referral kidney center. *Int Urol Nephrol*. 2010;42(4):1031-1040.
37. Simon P, Ramee MP, Boulahrouz R, et al. Epidemiologic data of primary glomerular diseases in western France. *Kidney Int*. 2004;66(3):905-908.
38. Kanjanabuch T, Kittikovit W, Lewsuwan S, et al. Etiologies of glomerular diseases in Thailand: a renal biopsy study of 506 cases. *J Med Assoc Thai*. 2005;88 Suppl 4:S305-S311.
39. Chen H, Tang Z, Zeng C, et al. Pathological demography of native patients in a nephrology center in China. *Chin Med J (Engl)*. 2003;116(9):1377-1381.