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Original Article

Morphological pattern of glomerular diseases in a tertiary care hospital.

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Abstract

Background: Glomerular diseases are a universal health issue, and Pakistan ranks eighth in renal disease, causing 20,000 deaths every year. Renal biopsy is a valuable diagnostic tool and provides prognostic insight and therapeutic plans. The study's objective is to determine the frequency and pattern of various glomerulopathies concerning age and gender.

Methodology: A cross-sectional study was performed at the Department of Pathology, Ziauddin Medical University, and Hospital, Karachi, from 19th December 2018 to 15th April 2019. A total of 91 patients were included of either gender with a clinical history of glomerulonephritis. All biopsy samples were analyzed by using light and immunofluorescence microscopy techniques. Patient data were compiled and analyzed through SPSS version 20.0.

Results: A total of 91 cases of the renal biopsy were evaluated; 51.6% of these cases were male patients. Forty-nine (53.8%) cases were reported as focal segmental glomerulosclerosis, 35(38.5%) were diagnosed with membranous glomerulonephritis, and 7(7.7%) were reported as mesangiocapillary glomerulonephritis. In membranous glomerulonephritis, 7.7% were pre-spike membranous glomerulonephritis. In the current study, 35.2% of cases showed diffuse glomerular basement membrane (GBM) thickening with spikes, and 4.4% showed GBM thickening with focal spikes on silver stain.

Conclusion: Glomerular diseases are slightly more prevalent in males than females. The most commonly diagnosed primary glomerulonephritis was focal segmental glomerulosclerosis, followed by membranous glomerulonephritis.

Keywords

Focal Segmental Glomerulosclerosis, Membranous Glomerulonephritis, Mesangiocapillary Glomerulonephritis, Pre-Spike Membranous Glomerulonephritis, Immunofluorescence, Silver Stain.

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Introduction

The occurrence of glomerular diseases varies in different populations with distinctive genetic and demographic characteristics. These are public health apprehensions throughout the world. They are the twelfth leading reason for mortality and the seventeenth leading cause for disability[1]. Glomerular disease epidemiology is broadly changed in different countries, highlighting the change in the cause, history, social aspects, sex, and age. The information regarding the frequency and pattern of renal disease after diagnosis provides clinical details to the nephrologists. At present, the exact and true epidemiological picture of renal pathology is deficient in Pakistan but accessible from large national renal biopsy registries in Western Europe and other countries[2].

No doubt, some reports of biopsy-proven biopsy-proven renal disease have been issued from Pakistan; however, the exact picture in this area is not well known. The main etiology for this is the absence of a national renal biopsy registry and the deficiency of utilization of specialized techniques, including immunofluorescence (IF) and electron microscopy (EM) in evaluating kidney biopsies in multiple laboratories in Pakistan[3].

The usual clinical sign and proof for renal biopsy is a nephrotic syndrome (NS), defined as proteinuria >3,500 mg/day associated with hyperlipidemia, hypoalbuminemia, and edema. Multiple other etiologies include prolonged acute renal failure (ARF), rapidly progressive renal failure (RPRF), systemic disease with renal dysfunction, non-nephrotic proteinuria, isolated microscopic hematuria, unexplained renal failure, renal transplant dysfunction, and familial renal disease[4]. Primary glomerulopathies accounted for the commonest type of all kidney biopsies, the lowest 42.6% in Malaysia[5] and highest 94.4% in Pakistan[6]. Focal segmental glomerulosclerosis (FSGS) was the most frequent pattern of primary glomerular disease worldwide, with the lowest incidence as 18.2% in India[7,] whereas the highest reported incidence was 59% in Saudi Arabia[8].

Biopsy of the kidney has a basic thing in diagnosing and treating renal disease. In a few patients, the renal biopsy is necessary for exacting a diagnosis and prognosis and selecting a suitable treatment plan[9]. There is a dreadful need to work in this area and add to the subsist body of information for a worthwhile assessment of disease burden in this part of the world.

The study aimed to assess the pattern of glomerular diseases with their clinical and pathological outline to help nephrologists better understand the nature of diseases and their diagnosis, proper management and treatment plan, and provide a base for future research in medicine.

Methodology

This cross-sectional study was carried out at the Pathology Department of Dr. Ziauddin Medical University and Hospital, Karachi. The duration of sample collection was four months, from 19th December 2018 to 15th April 2019. A sample size of 91 patients of glomerulonephritis was calculated, keeping a 95% confidence interval and margin of error.

All the biopsies of patients with a clinical history of glomerulonephritis with presenting symptoms of nephrotic or nephritic syndrome, e.g., hematuria, proteinuria, hypertension, edema, were included in the study. Only those renal biopsies included in the study showed an optimal number of glomeruli, i.e., 10 to 11 glomeruli, in adults and pediatric patients.

The diagnosis was made on Hematoxyline and Eosin (H&E) sections with Immunofluorescence (IMF) performance, where required. Patient data were assembled and scrutinized through SPSS version 20.0. Mean ± SD were calculated for quantitative variable, i.e., number of glomeruli. Frequency and percentages were used to display categorical variables. The stratification was done on a number of glomeruli to see the effect of these modifiers on outcomes. After stratification, the Chi-square test was used to assess significance. P-value ≤0.05 was considered significant.

Results

Renal biopsies of the patients of either gender between 1- 65 years meeting inclusion criteria of the study were evaluated. The overall mean age of patients was 30.71 ± 14.99, with a median of 25 years. The overall mean number of cores was 2.65 ± 1.04. Among 91 cases, 16.5% (15/91) showed cortex only, 1.1% (1/91) showed medulla predominantly with focal cortex, and in 82.4% (75/91) cases, both cortex and medulla were seen. The mean number of glomeruli was 25.42 ± 11.39. There were 49(53.8%) cases reported as Focal segmental glomerulosclerosis (Table 1, Figure 1), and 38.5% (35/91) were diagnosed as Membranous glomerulonephritis (Table 2, Figure 2). Out of which 7.7% were pre-spike Membranous glomerulonephritis, seven cases (7.7%) were reported as Mesangiocapillary glomerulonephritis (Table 3).

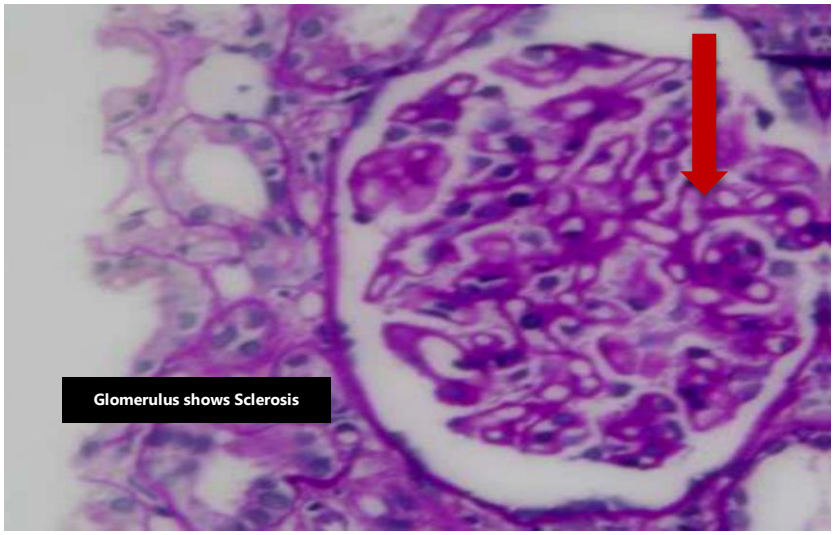

Figure 1: PAS stain shows focal segmental glomerulosclerosis.

Table 1: Frequency of focal segmental glomerulosclerosis according to gender, age group, and glomeruli number.

Variables		Total	Focal Segmental Glomerulosclerosis		p-value
			Yes (n=49)	No (n=42)	
Gender	Male	47	29(61.7)	18(38.3)	0.120
	Female	44	20(45.5)	24(54.5)	
Age Group	≤18 years	24	13(54.2)	11(45.8)	0.671
	≥18 years	67	36(53.7)	31(46.3)	
Glomeruli Number	≤ 25	44	22(50)	22(50)	0.476
	≥25	47	27(57.4)	20(42.6)	

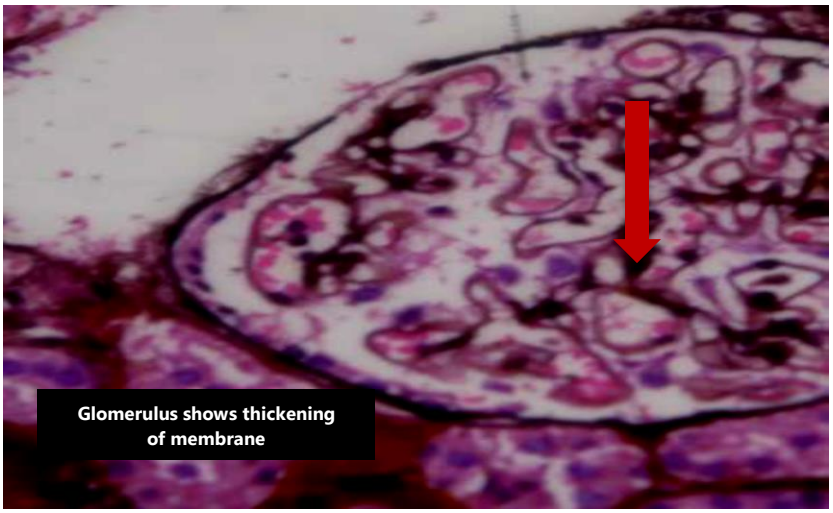

Figure 2: Silver stain shows Membranous glomerulonephritis.

In membranous glomerulonephritis, 35.2% (38/91) cases showed diffuse GBM thickening with spikes (Figure 3), and 4.4% (4/91) showed GBM thickening with focal spikes on silver stain.

Table 2: Frequency of membranous glomerulonephritis according to gender, age group, and glomeruli number.

Variables		Total	Membranous Glomerulonephritis		p-value
			Yes (n=35)	No (n=56)	
Gender	Male	47	15(31.9)	32(68.1)	0.185
	Female	44	20(45.5)	24(54.5)	
Age Group	≤18 years	24	9(37.5)	15(62.5)	0.910
	≥18 years	67	26(38.8)	41(61.2)	
Glomeruli Number	≤ 25	44	21(47.7)	23(52.3)	0.079
	≥25	47	14(29.8)	33(70.2)	

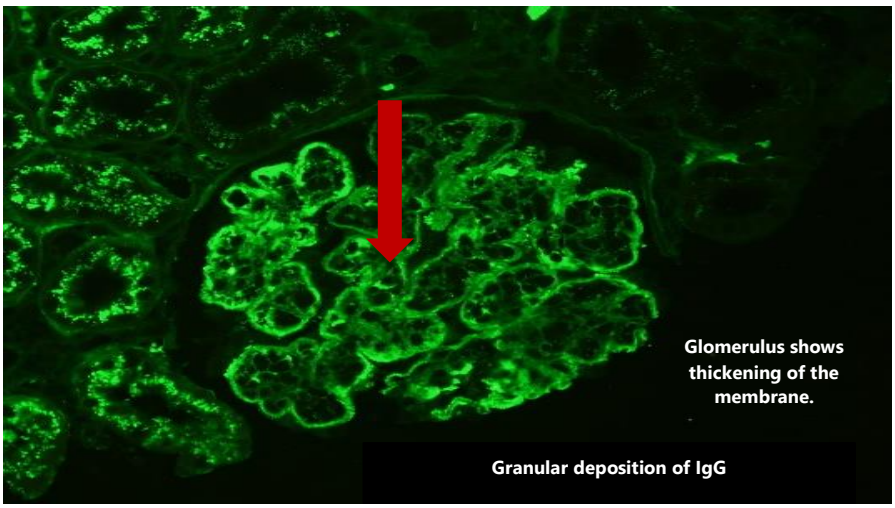

Figure 3: Immunofluorescence shows positive IgG in Membranous glomerulonephritis.

Table 3: Frequency of mesangiocapillary glomerulonephritis according to gender, age group, and glomeruli number.

Variables		Total	Focal Segmental Glomerulosclerosis		p-value
			Yes (n=7)	No (n=84)	
Gender	Male	47	3(6.4)	44(93.6)	0.628
	Female	44	4(9.1)	40(90.9)	
Age Group	≤18 years	24	2(8.3)	22(91.7)	0.891
	≥18 years	47	5(7.5)	62(92.5)	
Glomeruli Number	≤ 25	44	1(2.3)	43(97.7)	0.060
	≥25	47	6(12.8)	41(87.2)	

Discussion

Glomerular diseases are a public health issue globally[10]. According to the renal biopsy registry of different countries, there are regional differences and variations in the presentation of biopsy-proven glomerular diseases[11,12]. As glomerular diseases are a growing burden, the integrity of the glomerulus plays a crucial part in maintaining the homeostasis of the body. The early prevention, appropriate diagnosis, and proper treatment strategies can overcome the growing stress towards kidney diseases, improves outcomes and overall prognosis.

In the current study, males were outnumbered by females. Similar results were reported in other national local studies[6,13] (56.5% males and 43.5% females), (56% males and 44% females) and Indian study[14] (68.75% males and 31.25% females). These findings highlight that glomerular diseases make significant weight for males. These specific variations present may be due to underlying pathologic processes which amongst genders have nevertheless to be once and for all outlined, despite the fact that genetic, hormonal, and immune responses are analyzed so far. Further analysis is predicted to further evaluate these variations and allow the event of gender-tailored treatment regimens. In our study, primary glomerulopathies were predominant as compared to secondary. Our findings are in agreement with other researches[6,13].

In the present study, primary focal segmental glomerulosclerosis (53.8%) was the most common histological diagnosis. Our findings are also in agreement with multiple local studies[15,16] and international studies[17,18]. As far as we reviewed the literature on FSGS, we noted it as the most prevalent type of histological pattern among Asians of middle age. This generality maybe because a single disease does not cause FSGS, and it can have numerous different causes. The scarring may happen because of an infection, drug, or a disease that influences the whole body, like diabetes, HIV infection, sickle cell disease, or lupus.

The current study showed that membranous glomerulonephritis is the second most common cause of primary glomerulopathy 38.5% in renal biopsy. These findings are comparable with other studies of Pakistan as reported by Asif et al. (27.7%)[15] and Hashmi et al. (33.6%)[16]. Outside Pakistan, it is reported by Hamilton et al. in the United Kingdom (11.4%)[17] and Hu et al. 24.96% in China[18]. Membranous glomerulonephritis in its pre-spike stage appeared in 7.7% of cases, largely in males of our study. Another local study of Karachi reported 2.63% out of 38 cases[19].

In this study, cases of mesangiocapillary glomerulonephritis were 7.7%. A study conducted by Gupta et al. [20] showed a 53.57% frequency of mesangiocapillary Glomerulonephritis, which is very high compared to our study, most likely due to the small sample size. A study by Drachenberg

et al. [21] reported 22 cases of mesangiocapillary glomerulonephritis in a total of 519 cases.

Conclusion

In the current study, glomerular diseases were slightly more prevalent in males than females. The most commonly diagnosed primary glomerulonephritis was Focal segmental glomerulosclerosis, followed by Membranous Glomerulonephritis. The present study confirms the importance of renal biopsy evaluation with the adjunct technique of immunofluorescence, making a pertinent approach to diagnosing glomerular diseases. Our study proposed an idea of the spectrum of glomerular diseases at only those cases which were received in our laboratory. Therefore, our analysis may not entirely represent the epidemiology of glomerular diseases in the whole population. More data and research work are urgently needed based on reliability and validity of assessment methods, especially regarding methods used in developed countries like the use of Electron microscope.

Conflicts of Interest

The authors have declared that no competing interests exist.

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