

Renal Data from the Arab World

Renal Biopsy Findings in the Kingdom of Bahrain: a 13-Year Retrospective Study

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ABSTRACT. Glomerular diseases continue to be the leading cause of end-stage renal disease globally. Hence, it is important to recognize the pattern of these diseases in any given geographical area. A total of 498 renal biopsies performed on patients with proteinuria, hematuria and mild to moderate renal impairment during a period of 13 years (between January 1990 and December 2002) at the Salmaniya Medical Complex (a tertiary care hospital of the Kingdom of Bahrain), were reviewed and categorized. Primary glomerular disease accounted for two-third of the glomerular diseases, which in turn constituted 44.8% of all renal biopsies. The most common histological lesion was minimal change disease (30%). Focal and segmental glomerulosclerosis was the second most common lesion (23.8%) followed by membranoproliferative glomerulonephritis (14.3%). Secondary glomerular disease comprised 33.6% of glomerular diseases (22.7% of all the renal biopsies) with lupus nephritis forming the commonest lesion (38.9%) followed by diabetic nephropathy (31.9%) and hypertension (20.4%). Tubulointerstitial diseases accounted for 13.1% of all renal biopsies whereas transplant diseases were noted in 12.2%. The miscellaneous group including inadequate biopsies constituted 7.2% of all the biopsies. The results of this analysis were compared with surveys from other parts of the World.

Key Words: Epidemiology, Glomerulonephritis, Renal histology, Bahrain.

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Introduction

Glomerular disease represents the most common cause of end-stage renal disease in many countries. Its pattern, however, differs in different countries. The glomeruli are affected

by a variety of environmental insults and systemic disorders apart from the primary glomerulopathies. Glomerular diseases generally present with variable degrees of proteinuria, hematuria, hypertension and/or impaired renal function. Some glomerular diseases may be indolent and develop into insidious uremia.

Renal biopsy plays a fundamental role in the evaluation of proteinuric patients not only to establish an accurate diagnosis but also to help deciding on appropriate treatment and assess the prognosis.

There are no data on the pattern of glomerular disease in the Kingdom of Bahrain. A retrospective study was therefore undertaken, to analyze the glomerular diseases by reviewing the renal biopsies performed during a 13-year period (January 1990 to December 2002) at the Salmaniya Medical Complex.

Materials and Methods

The patients referred to the Nephrology Department at the Salmaniya Medical Complex, Kingdom of Bahrain and who were subjected to kidney biopsy, from January 1990 to December 2002, constituted the subjects of this study. A total of 498 renal biopsies were performed in this period and were reviewed retrospectively to analyze the pattern of glomerular diseases.

There were 288 males and 210 females with age ranging from two days to 80 years. The demographics of Bahrain reveal a cosmopolitan population with nationals of many foreign countries, particularly from South Asia, constituting the bulk of the expatriate work force.

The patients' ethnic origin was classified into two categories for the purpose of this study: Arabs and non-Arabs, the majority of whom being Indians and Pakistanis.

The indications for renal biopsy included proteinuria, unexplained microscopic or macroscopic hematuria, systemic disease with evidence of renal involvement, unexplained renal impairment and renal impairment in post-transplant patients.

All samples were obtained by percutaneous method using a trucut needle under ultrasound guidance. Three renal biopsy samples were taken from each patient, which were processed for light microscopy, immunofluorescence and electron microscopic studies. Sections were made from formalin fixed paraffin embedded tissue and stained by hematoxylin-eosin, periodic-acid schiff (PAS) and Jones stains for light microscopy; all samples were examined by a histopathologist.

Immunofluorescence microscopy panel included staining for IgA, IgM, IgG, C3, C1q and fibrinogen. Electron microscopic study was performed at laboratories in France or the United Kingdom.

The patients' data were obtained from the medical records.

Results

A total of 498 renal biopsies were analyzed. Glomerular disease constituted 67.5% of the total renal biopsies. Of the patients with glomerular diseases, 75% were Arabs and the male to female ratio was 1.4:1. The histopathologic profile of the renal biopsies and the sex and

Table 1. Histopathologic profile of the 498 renal biopsies according to sex and ethnicity of the patients.

Categories	Number of biopsies	Male	Female	Arabs	Non- Arabs
Glomerular Disease	336 (67.5%)	185	151	250	86
Tubulointerstitial disease	65 (13.1%)	46	19	44	21
Transplant Pathology	61 (12.2%)	32	29	55	6
Miscellaneous	36 (7.2%)	25	11	26	10
Total	498	288	210	375 (75.3%)	123 (24.7%)

Table 2. Categorization of glomerular diseases in the renal biopsies according to sex and ethnicity of the patients.

Category	Number of biopsies	Male	Female	Arabs	Non-Arabs
Primary Glomerular Diseases	223 (66.4%)	130	93	159	64
Secondary Glomerular Diseases	113 (33.6%)	55	58	91	22
Total	336	185	151	250	86

ethnic distribution of the patients are given in Table 1.

Primary glomerular disease constituted 66.4% of the glomerular diseases while secondary glomerular disease accounted for 33.6% (Table 2).

Among primary glomerular diseases, minimal change disease (MCD) was the commonest lesion (30%). The second commonest diagnosis was focal and segmental glomerulosclerosis (FSGS, 23.8%). The other types of primary glomerular disease, their numbers and the age, sex and ethnic distribution of the patients are given in Table 3.

Lupus nephritis (38.9%) was the commonest cause of secondary glomerular disease followed by diabetic nephropathy (31.9%) and hypertensive nephropathy (20.4%). Table 4 shows the histopathologic profile along with the age, sex and ethnic distribution of the secondary

glomerular diseases.

There were more males than females affected with primary glomerular diseases in general (58.3% vs. 41.7%). When assessed individually, the male preponderance was evident in FSGS (62.3% vs. 37.7%), MCD (67.2% vs. 32.8%) and membranous glomerulonephritis (63.3% vs. 36.7%). The age of patients with primary glomerular diseases ranged from five weeks to 75 years.

Females were more frequently affected with secondary glomerular disease than males (51.3% vs. 48.7%). This was particularly evident with lupus nephritis (75% vs. 25%) and Henoch Schonlein Purpura (two cases, both were female). However, hypertensive and diabetic nephropathy were more common in males. The age of patients with secondary glomerular diseases ranged from 10 to 80 years.

Table 3. Categorization of primary glomerular diseases according to sex and ethnicity of the patients.

Type	Number of biopsies	Age Range	Male	Female	Arabs	Non-Arabs
Minimal Change Disease	67 (30%)	7 wks-67 years	45	22	44	23
Focal and Segmental glomerulosclerosis	53 (23.8%)	5 wks-71years	33	20	36	17
Mesangio Proliferative GN	13 (5.8%)	11-67 years	4	9	10	3
Membranous GN	30 (13.5%)	22-67 years	19	11	22	8
Membrano Proliferative GN	32 (14.3%)	9-75 years	16	16	24	8
Crescentic GN	6 (2.7%)	19-44 years	3	3	4	2
IgA Nephropathy	1 (0.4%)	18years	1	0	1	0
Thin Membrane Disease	9 (4%)	27-50 years	3	6	8	1
Congenital Nephrotic Syndrome	2 (0.9%)	4 months-2 yrs	0	2	2	0
Alport's Syndrome	2 (0.9%)	9-38 years	2	0	2	0
Sickle Cell Nephropathy	1 (0.4%)	40 years	0	1	1	0
Post Infectious GN	7 (3.1%)	11-42 years	4	3	5	2
Total	223 (100%)		130	93	159	64

GN= Glomerulonephritis

Table 4. Categorization of the secondary glomerular diseases according to sex and ethnicity of the patients.

Category	Number of biopsies	Age- range (Years)	Male	Female	Arabs	Non-Arabs
Lupus Nephritis	44 (38.9%)	10-55	11	33	38	6
Diabetic Nephropathy	36 (31.9%)	15-80	20	16	30	6
Hypertension	23 (20.4%)	23-76	19	4	16	7
Amyloidosis	3 (2.7%)	26-45	2	1	2	1
Goodpasture's Syndrome	1 (0.9%)	32	1	0	0	1
Hemolytic Uremic Syndrome	3 (2.7%)	30-35	1	2	3	0
Henoch Schonlein purpura	2 (1.8%)	13-45	0	2	1	1
Scleroderma	1 (0.9%)	42	1	0	1	0
Total	113 (100%)		55	58	91	22

Discussion

In the literature, there is limited population-based epidemiological data on the spectrum of biopsy proven glomerular diseases. A review of renal biopsy data can give some insight into the spectrum of clinically significant renal disease in the community. Our institution receives renal biopsies from the entire island nation of Bahrain with a population of 656,397, which includes 228,424 non-nationals.

This report is a national epidemiological study of the biopsy-proven renal diseases. The rate for biopsy-proven renal diseases underestimates the true prevalence of diseases, as not all patients with renal disease are biopsied.

Bahrain has an expatriate population which constitutes nearly one-third of the total population. However, expatriates constituted only a quarter of the biopsies reviewed in this report.

The incidence rates of renal biopsies performed, vary in different countries. We have an incidence of 5.8/100000/year, which was similar to the studies in Spain¹ and Macedonia,² while the report from Australia³ showed a much higher incidence of 21/100000/year. An epidemiological study from the United Arab Emirates⁴ (UAE) had 490 biopsies over an 18-year period, which is less than in our series. These variations could be because of

the time span of the reviews and/or because of the different biopsy polices adopted by different centers.

Glomerular diseases in our study constituted 3.9/100000/year, which is 67% of the total renal biopsies. This is similar to reports from Australia, Denmark, Iran and Senegal,^{3,5,6,7} while data from the UAE and Saudi Arabia^{4,8} revealed a higher rate of glomerular diseases. This discrepancy may be due to the fact that Saudi Arabia and UAE reported on only native kidney biopsies while our study also included transplant biopsies.

The 44.8% prevalence of primary glomerular diseases among the total renal biopsies in our series is low, compared to studies from UAE, Iran, Senegal and Saudi Arabia.^{4,6,7,8} This could be explained by the high rate of inadequate biopsy samples (approximately 10%) as well as inclusion of transplant biopsies in our study.

Amongst the primary glomerular diseases, the various conditions differ in their incidences in different studies. Our study showed a high incidence of MCD and FSGS, while a study from Saudi Arabia⁸ reported a high incidence of FSGS and in the UAE⁴ a high incidence of membranoproliferative glomerulonephritis was reported. This difference could be due to a selection bias in the study from Saudi Arabia which is a single hospital study; however, the reason for the major difference between the report from UAE and our study needs to be

explored. Changing incidences of glomerular diseases over a time frame have been found in different communities.⁹ This could be because of genetic and environmental factors.

Vasculitis was not a major cause in any of the studies from the Arab Countries including our study. However, it formed a major diagnosis in the Australian and Spanish studies.^{1,3}

Amongst the secondary glomerular diseases, lupus nephritis constituted the commonest condition with female preponderance, which was consistent with the reports from Spain, Australia and some Arab countries.^{1,3,4,6,7,8}

Conclusion

There exists a wide variability in the different categories of primary and secondary glomerular diseases in different parts of the world and even within the Arabian Gulf countries. Future studies should be directed to analyze the causes for these variations.

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