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Analysis of Kidney Biopsy Data From a Single Center in the Midland Rural Area of China, 1996–2010 ☆

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ABSTRACT

Objective: To survey the clinical epidemiology and correlations between pathology and clinical features of major groups of kidney diseases in a rural area of China.
Methods: From January 1996 to December 2010, histologic diagnosis of renal disease was made on samples collected from 919 patients from a single center in the midland rural area of China. Demographic data were obtained from all patients, and clinical profiles were analyzed in 917 patients.
Results: The mean age of the whole group was 33.13 (14.13) years (range 16–72 years). Men accounted for 55.28% (n = 508) and women made up 45.72% (n = 408). Patients aged 16 to 50 years comprised 83.75% of the sample (n = 770). Lupus nephritis was the predominant diagnosis in women; renal diseases were predominant in men. In patients with nephrotic syndrome, mesangial proliferative glomerulonephritis was the most frequent pathologic pattern (39.46%), followed by IgA nephropathy (18.39%), whereas in patients with nephritic syndrome, IgA nephropathy (39.64%) was the most frequent pathologic pattern, followed by mesangial proliferative glomerulonephritis (32.38%). The most common pathologic pattern in patients with secondary glomerulonephritis was Henoch-Schŏnlein purpura nephritis, followed by lupus nephritis.
Conclusions: Mesangial proliferative glomerulonephritis was the most common renal pathologic pattern. Male adolescents were predominant in this group of patients. The most common clinical syndrome was nephrotic syndrome.

Introduction

Glomerulonephritis (GN) is a relatively familiar kidney disease with numerous subtypes, and it is the most common pathogeny leading to end-stage renal disease in China.[1] However, the field of nephrology has developed in China only during the past few decades. Most regional nephrology hospitals treat only a limited number of patients every year, especially in developing midland rural areas of China. Our hospital has the great advantage of collecting renal disease prevalence data in the rural population because rural patients are the greatest proportion of our hospital patients, although information about the prevalence in the rural population was rather scarce. Renal biopsy has been performed routinely in our hospital for 15 years.

Information about the prevalence and incidence of GN in the large national renal biopsy registries varies,[2–7] and epidemiologic difference is evident in various parts of China.[3–5] It is necessary to obtain rudimentary data regarding pathology and clinical features of kidney diseases in a major rural population. Therefore, we report epidemiologic data of renal biopsies from a single unit, which focused on the midland rural area of China.

Methods

Renal biopsy specimens from 919 patients were collected from January 1996 to December 2010. To allow comparison with the collected data, "adult" was defined as age ≥16 years. All patients were from the rural population and patients accepting a transplant kidney were excluded. All of the renal biopsies were collected using ultrasonography and biopsy needle guidance technique. The following data were collected at the time of renal biopsy: name, sex, age, serum creatinine concentration (sCr),

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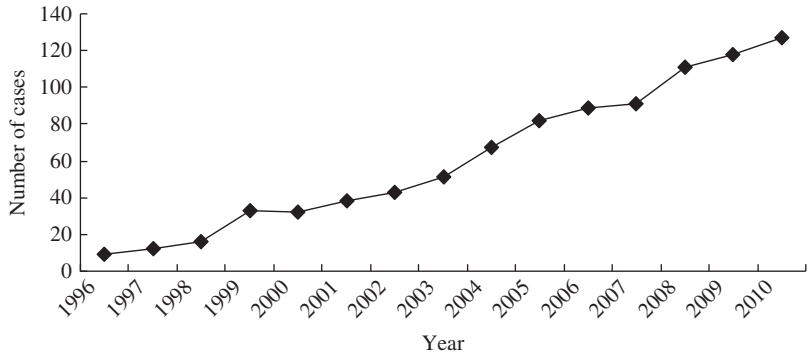

Figure. Annual number of renal biopsies.

24-hour proteinuria, presence of hematuria, serum albumin level, and clinical and histologic diagnosis. The clinical and laboratory conditions observed at the time of renal biopsy were reported as follows: nephrotic syndrome: 24-hour proteinuria ≥3.5 g with serum albumin <30 g/L and normal renal function (sCr <110 mmol/L); nephritic syndrome: persistent low-grade proteinuria (<3.5 g/24 hours) with normal renal function (sCr <110 mmol/L); isolated hematuria: presence of micro- or macrohematuria without any proteinuria; or renal insufficiency: sCr 110–400 mmol/L, with or without proteinuria and hematuria. Final diagnosis was made for each patient on the basis of both clinical and histologic investigations.

Histologic evaluation by light microscopy and immunofluorescence was performed routinely, combined with electron microscopy in some cases. Histologic classification of renal diseases used the 1995 World Health Organization recommendations. Renal diseases were divided into 5 groups: (1) primary GN, including minimal change disease (MCD), focal segmental glomerulosclerosis (FSGS), membranous GN, IgA nephropathy (IgAN), mesangioproliferative GN, membranoproliferative GN, crescentic GN, proliferative endocapillary GN, sclerosing GN, unclassified GN, and IgM nephropathy; (2) secondary GN, including immune-mediated GN such as systemic lupus erythematosus, Henoch-Schŏnlein purpura nephritis (HSPN) and Goodpasture's syndrome; GN caused by dysgammaglobulinaemia or paraproteinaemia, such as myeloma kidney and essential mixed cryoglobulinaemia; metabolic disorders, particularly diabetic nephropathy; or hypertensive nephrosclerosis; (3) acute and chronic tubulointerstitial nephritis and acute tubular necrosis; (4) vascular diseases, including benign and malignant nephroangiosclerosis, renal scleroderma, and cortical necrosis; and (5) other nephropathies, including hereditary nephropathies (eg, thin basement membrane glomerulopathy or other hereditary diseases), end-stage renal disease of undetermined cause, and unclassified nephropathies.

Data were stored on a personal computer for statistical analysis. Clinical and laboratory data were obtained by review of clinical records. The following data were noted: age, sex of the patient, indications for renal biopsy, renal function studies, 24-hour urinary protein excretion, and the pathologic diagnosis. The standard statistics processor (SPSS version 16.0; IBM Corp, Armonk, New York) was used. Simple descriptive statistics were used for variables such as age and clinical and laboratory features. Percentages were used for categorical data.

Results

Primary GN was the most important and prevalent kidney disease in China.[1] Among renal biopsy specimens from 919 rural patients in 15 years, 508 patients (55.3%) were men and 411 patients (44.7%) were women. Mean (SD) age was 33.1 (14.1) years (range 16–72 years). As shown in the **Figure**, the number of renal biopsies performed was increasing gradually. But the small pool of renal biopsies from patients with kidney disease in recent years still afforded some significant epidemiologic investigation. **Table I** shows the incidence of renal diseases in 919 renal biopsies. Except 2 renal biopsies that were unclassified, 917 renal biopsies were analyzed. The number of men was more than the number of women and the ratio of primary to secondary GN was 5.55:1 (760 out of 137). Distribution of primary and secondary GN by age group is shown in **Table II**. As shown in **Table II**, the majority of patients were in the 16–40 years age group.

Table III shows IgAN, mesangioproliferative GN, and MCD were commom primary glomerular diseases. As shown in **Table IV**, purpuric nephritis was the most common in secondary renal lesions. Data shown is from patients residing in the Guangxi Zhuang autonomous region of China.[5] The proportion of various

Table I
Classification of renal diseases based on 919 renal biopsies.

Diagnosis	Patients				Total	
	Men		Women			
	n	%	N	%	n	%
Primary glomerular diseases	416	54.7	344	45.3	760	82.7
Secondary glomerular diseases	78	56.9	59	43.1	137	14.9
Sclerosing glomerulonephritis	8	66.7	4	33.3	12	1.4.
Hereditary and congenital renal disease	1	100	0	0	1	0.1
Rare renal disease	2	50	2	50	4	0.4
Tubulointerstitial disease	1	50	1	50	2	0.2
Unclassified	2	66.7	1	33.3	3	0.3
Total	508	55.3	411	44.7	919	100

Table II
Age distribution in 919 renal biopsies.

Age, y	Primary Glomerular Diseases	Secondary Glomerular Diseases	Others	Total	
	n	n	n	n	%
16–20	183	36	3	222	24.2
21–30	166	32	4	202	22.0
31–40	201	28	6	235	25.6
41–50	104	21	4	129	14.0
51–60	72	12	3	87	9.5
>60	34	8	2	44	4.7
Total	760	137	22	919	100

Table III
Prevalence of primary glomerular diseases in 760 renal biopsies.

Diagnosis	n	%
MsPGN	306	40.3
IgAN	259	34.1
MCD	80	10.5
MN	65	8.6
MPGN	15	2.0
FSGS	11	1.4
EnPGN	11	1.4
CreGN	8	1.1
IgMN	5	0.6
Total	760	100

CreGN = crescentic glomerulonephritis; EnPGN = endocapillary proliferative glomerulonephrits; FSGS = focal segmental glomerulosclerosis; IgAN = IgA nephropathy; IgMN, IgM nephropathy; MCD = minimal change disease; MN = membranous nephropathy; MPGN = mesangiocapillary glomerulonephritis; MsPGN = mesangial proliferative glomerulonephritis.

clinical types are shown in **Table V**. Nephrotic proteinuria and GN were most common, a total of 82.7%.

As shown in **Table V**, distribution of the pathologic types was inconsistent. For example, the pathologic types of the 484 patients with nephrotic syndrome were: mesangioproliferative GN (39.46%), IgAN (18.39%), MCD (16.53%), membranous nephropathy 11.36%), lupus nephritis (5.17%), diabetic nephritis (2.48%), HSPN (2.27%), membranoproliferative GN (1.65%), FSGS (1.03%), and IgM nephropathy (0.83%). Of the 68 patients with chronic nephritic syndrome pathologic types were: IgAN (39.64%), mesangioproliferative GN (32.38%), HSPN (8.81%), membranous nephropathy (5.43%), lupus nephritis (3.26%), hypertensive nephrosclerosis (1.81%), membranoproliferative GN (1.81%), and diabetic nephropathy (0.82%). The most common pathologic type was crescentic GN (88.89%) with 9 patients showing rapidly progressive GN. The most common pathologic type was sclerotic GN (50%) in 16 patients with chronic renal failure. In 26 patients with latent nephritis, IgAN was the most common at 50%, which is less than the pure gross hematuria renal biopsy results (73.3%) reported by General Hospital of Nanjing Military Region of China.[4]

Table IV
Prevalence of secondary glomerular diseases in 137 renal biopsies.

Diagnosis	n	%
Henoch-Schŏnlein purpura	49	35.8
Systemic lupus erythematosus	38	27.7
Hepatits B virus infections	20	14.6
Diabetic nephropathy	17	12.4
Hypertensive nephrosclerosis	10	7.3
Amyloidosis	2	1.5
Goodpasture's syndrome	1	0.7
Total	137	100

Manifestations of acute renal failure in 2 patients were acute tubular nephritis.

Comparison of frequencies of renal diseases among nations is shown in **Table VI**. Compared with the data from General Hospital of Nanjing Military Region, IgAN was lower, but MCD was higher in our report. And frequency of FSGS and amyloidosis in our report was lower than Japan, Pakistan, India, and United Arab Emirates.

Discussion

Our study provides information about the epidemiology of renal disease in the midland rural area of China. Unfortunately, due to regional and economic restrictions, we were not able to get full pathology on all patients. This may have resulted in some deviation in statistics. However, to avoid duplication of data statistics, we classified patients as having nephrotic syndrome or nephritic syndrome based on renal function, although the standard is slightly different in other literature.[6,8]

Pathologic type in primary renal disease was most commonly glomerular disease, accounting for 82.69%, which is higher than the General Hospital of Nanjing Military Region at 73.28% and the southern of Pakistan at 73%.[4,9] The relationship between the incidence of kidney disease and age showed primary renal disease was common in young adults, accounting for 72.25% of cases in patients aged 16–40 years; in patients aged >50 years, it

Table V
Pathologic and clinical classification of 917 renal biopsies.

Diagnosis	Nephrotic Syndrome		Nephritic Syndrome		Isolated Haematuria		Renal Insufficiency		Total	
	n	%	n	%	n	%	n	%	n	%
MsPGN	192	38.9	126	33.3	8	30.8	1	5.0	327	35.7
IgAN	89	18.1	155	41.0	13	50.0	2	10.0	259	28.2
MCD	80	16.2	-	-	-	-	-	-	80	8.7
MN	55	11.3	20	5.3	-	-	-	-	75	8.2
MPGN	8	1.6	7	1.9	-	-	-	-	15	1.6
FSGS	5	1.0	6	1.6	-	-	-	-	11	1.3
HSPN	11	2.2	34	8.9	4	15.4	-	-	49	5.3
LN	25	5.1	12	3.2	-	-	1	5.0	38	4.1
DN	12	2.4	3	0.8	-	-	2	10.0	17	1.8
HT	1	0.2	7	1.9	-	-	2	10.0	10	1.1
ATN	-	-	2	0.5	-	-	-	-	2	0.2
SCGN	-	-	-	-	-	-	8	40.0	8	0.9
IgMN	4	0.8	1	0.3	-	-	-	-	5	0.5
Her	-	-	-	-	1	3.8	-	-	1	0.1
EnPGN	7	1.4	-	-	-	-	4	20.0	11	1.3
CreGN	3	0.6	5	1.3	-	-	-	-	8	0.9
AGBM	1	0.2	-	-	-	-	-	-	1	0.1
Total	493	100	378	100	26	100	20	100	917	100

AGBM = antiglomerular basement membrane crescenticglomerulonephritis; ATN = acute tubular nephritis; CreGN = crescentic glomerulonephritis; DN = diabetic nephropathy; EnPGN = endocapillary proliferative glomerulonephropathy; FSGS = focal segmental glomerulosclerosis; Her = hereditary renal disease; HSPN = Henoch-Scahŏnlein purpura glomerulonephritis; HT = hypertensive nephrosclerosis; IgAN = IgA nephropathy; IgMN = IgM nephropathy; LN = lupus nephritis; MCD = minimal change disease; MN = membranous nephropathy; MPGN = membranoproliferative glomerulonephritis; MsPGN = mesangial proliferative glomerulonephritis; SCGN = sclerotic glomerulonephritis.

Table VI
Comparison of frequencies of renal diseases among nations.

Disease	Our Report	China*	Japan†	East Asia†	Pakistan‡
	←————————————————————%————————————————————>				
MsPGN	40.3	29.78	9.2	15.6 (11.4)	3.1
IgAN	34.1	39.55	47.4	40.2 (10.3)	1.5
MCD	10.5	1.22	14.2	13.7 (12.9)	5.8
MN	8.6	9.54	12.0	11.7 (2.7)	17.2
FSGS	1.4	5.82	2.4	6.9 (3.5)	21.2
HSPN	35.8	20.35	27.3	-	-
LN	27.7	74.14	40§	-	4.9
Amyloidosis	1.5	18.97	11.1§	-	4.6

FSGS = focal segmental glomerulosclerosis; HSPN = Henoch-Schŏnlein purpura glomerulonephritis; IgAN = IgA nephropathy; LN = Lupus nephritis; MsPGN = mesangial proliferative glomerulonephritis; MCD = minimal change disease; MN = membranous nephropathy; MPGN = mesangiocapillary glomerulonephrits.

* Based on reference 3.
† Based on reference 12. Data are presented as mean (SD).
‡ Based on reference 11.
§ From 2004-2008 Japan data.

accounted for only 9.43%. This suggests that primary renal disease is the common disease of young adults in midland rural areas of China. In regard to sex distribution, there were slightly more male patients than female patients; the ratio was 1.15:1. In primary GN, men accounted for about 54.7%, lower than the relevant domestic and international reports. In several common pathologic types, men were slightly more likely than women to be diagnosed with mesangioproliferative GN, MCD, IgAN, and membranous nephropathy. In the pathologic distribution, mesangioproliferative GN and IgAN were most common. Compared with data from General Hospital of Nanjing Military Region, IgAN was lower in our rural population; however, MCD was higher. And FSGS and amyloidosis were lower in our report than in Japan, Pakistan, India, and United Arab Emirates.[9–12] This may be due to the new characteristics of kidney disease in rural areas, but the exact cause would need further study.

Secondary GN accounted for 14.9% of cases in our study, which is a substantially reduced number compared with data from the Nanjing Military Region of China and Czechoslovakia.[3,8] This might be related to the lower awareness of kidney disease and renal biopsy. In addition, this difference might be due to more cases of secondary GN being diagnosed owing to improvement in the recognition of these diseases and more sophisticated diagnostic skills. HSPN was the most common in secondary renal disease (5.33%), which was significantly different from the Nanjing Military Region,[4,13] followed by lupus nephritis (4.13%) and hepatitis B virus-associated GN (2.18%); diabetic kidney disease was the lower proportion (1.85%). Men were more common diagnoses with these conditions, with the exception being lupus nephritis.

Conclusions

Our data make an important contribution to the understanding of the prevalence and pattern of end-stage kidney disease in the midland rural area of China. It may be used as reference data for further research into renal disease in rural areas, because peasants account for nearly 80% of the total population of China.

Acknowledgments

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Conflicts of Interest

The authors have indicated that they have no conflicts of interest regarding the content of this article.

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