

The Pattern of Glomerulonephritis in the North Indian Gangetic Plain- A 13-Year Epidemiological Study

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ABSTRACT

Introduction: Epidemiologic studies, along with clinico-pathologic correlations, are important indicators which can be used for defining the burden of a particular disease and also to ascertain the trend of that entity, in order to monitor it according to the population which is at risk.

Methods: The present study was undertaken over a period of thirteen years and it comprised of 226 patients at a single tertiary care centre in the northern part of India, so as to take a glimpse at the pattern of the disease in an area which had poor human development indices in comparison to the rest of India. Four percutaneous core (specimen) biopsies were retrieved after the ultra-sonographic localization of the kidneys in each individual case and these were subjected to light microscopic studies. The patients complaints and the complications post procedures were noted.

Results: There were 139 (61.50%) males and 87 (38.49%) females, with a male to female ratio of 1.5:1. The post procedure complications which were recorded were local pain at the biopsy site in 3.8% patients, loin to groin pain in 1.9 % patients and gross/ microscopic haematuria in 0.9% patients. The indications

which required the performance of the biopsies among the different age groups were nephrotic syndrome (121 patients; 53.53%), nephritic syndrome (66 patients; 29.20%), renal failure of unknown aetiology (29 patients; 12.83%) and asymptomatic haematuria (10 patients; 4.42%). Of all the glomerulopathies, membranous glomerulonephritis (MGN) was the commonest morphological pattern (13.27%) which was noted, followed by end stage renal disease (ESRD)-12.83% and mesangioproliferative (MeGN)-8.84% and membranoproliferative glomerulonephritis (MPGN)-7.96% respectively.

Conclusions: The significant point which was noted in the present study was that the second commonest lesion which was seen on the biopsy specimen was that of ESRD (12.83%). In contrast to the findings of our study, ESRD was found to be not prevalent to such a degree in other studies which were done at other various geographical regions of India. Although ESRD was the second most common lesion which was found in the present study, a relatively high incidence in this area provided an insight into the challenges which were faced by the clinical nephrologists in the diagnosis and management of glomerular diseases in resource challenged countries.

Key Words: Glomerulonephritis, Epidemiology, Pattern, North India

INTRODUCTION

Epidemiologic studies, along with clinic-pathologic correlations, are important indicators which can be used for defining the burden of a particular disease and also to ascertain the trend of that entity, in order to monitor it according to the population which is at risk. This helps in not only imparting important information in the clinical practice, but also in planning and implementing various health related programs and therapeutic strategies to ensure an early diagnosis and an eventual treatment. In the field of nephrology, the best method which can be used to monitor glomerular diseases, apart from clinical and various biochemical tests is renal biopsy, which remains the gold standard for diagnosing various renal disorders.

The present study was undertaken over a period of thirteen years at a single tertiary care centre in the northern part of India, so as to take a glimpse into the pattern of the disease in an area which had poor human development indices in comparison to the rest of India. An attempt was also made to compare the trend between our study area and the rest of India, and between our study area and the neighboring countries of Asia and the world. The clinical part of this epidemiological study enquired into the indications of the renal biopsy, the rates of inadequate

renal biopsies and the complication rates of the procedures which were used.

MATERIALS AND METHODS

The present study comprised of all the patients who underwent percutaneous renal biopsies at our centre over a period of thirteen years (1995-2007). A total of 226 renal biopsies were reviewed, which pertained to renal parenchymal disease (excluding the neoplastic, traumatic and the surgical aetiologies) from the archives of the Department of Pathology, MLN Medical College with SRN hospital, Allahabad, Uttar Pradesh (India), which is an 850 bedded hospital which caters to the rural as well as the urban population of 5,959,798 people in and around the Allahabad district (According to 2011 Census). Most of the patients who were included in the biopsy were of the adult age group, with very few paediatric cases. Therefore, no subanalysis for the adult versus the paediatric age group was attempted in the present study, owing to the lesser number of paediatric samples.

The indications which required the performance of the biopsies were nephrotic syndrome, nephritic syndrome, acute and chronic renal failure of unknown aetiology and persistent or recurrent asymptomatic haematuria or proteinuria.

Four percutaneous core (specimen) biopsies were retrieved after the ultra-sonographic localization of the kidneys in each individual case. The patients' complaints and complications post procedures were noted.

The specimens were subjected to light microscopic studies (with Haematoxylin and Eosin, Periodic Schiff, Masson' Trichrome and Periodic Methenamine Silver). The biopsy samples were considered as satisfactory for making a diagnosis if they contained five or more glomeruli (were put under a category of 'inadequate for diagnosis' if the glomeruli were less than 5). A total of 3 pathologists reviewed and reported the histopathological slides over this period to limit the interpersonal bias.

RESULTS/OBSERVATIONS

A total of 226 renal biopsies were performed at our centre over a period of thirteen years. There were 139 (61.50%) males and 87 (38.49%) females, with a male to female ratio of 1.5:1. A male predominance was virtually present in every lesion, except for those which were seen in lupus nephritis and renal cortical necrosis. The average age of the patients who underwent the procedure was 34-years (range 7-60 years) [Table/Fig-1].

The overall complication rate in this study was 4.0%. There was local pain at the biopsy site in 3.8% cases, loin to groin pain in 1.9 % cases and gross/ microscopic haematuria in 0.9% patients [Table/Fig-2].

The indications which required the performance of the biopsies among the different age groups were nephrotic syndrome (121 patients; 53.53%), nephritic syndrome (66 patients; 29.20%), renal failure of unknown aetiology (29 patients; 12.83%) and asymptomatic haematuria (10 patients; 4.42%) [Table/Fig-3].

Of all the glomerulopathies, membranous glomerulonephritis (MGN) was the commonest morphological pattern which was noted followed, by end stage renal disease (ESRD) and mesangioproliferative (MeGN) and membranoproliferative glomerulonephritis (MPGN) respectively [Table/Fig-1].

SN	Complication	Incidence
1	Pain at the biopsy site	3.8%
2	Loin to groin pain	1.9%
3	Gross/ Microscopic hematuria	0.9%
4	Massive hematuria requiring blood transfusion	0.0%

[Table/Fig-2]: Complications Post procedure

SN	Indication	Total	Incidence
1	Nephrotic Syndrome	121	53.53%
2	Nephritic Syndrome	66	29.20%
3	Renal Failure of uncertain etiology	29	12.83%
4	Asymptomatic hematuria	10	04.42%

[Table/Fig-3]: Indication for percutaneous renal biopsy

DISCUSSION

In our study, nephrotic syndrome was the commonest indication which required the performance of the biopsy (42.3% of the cases), which was in accordance with the rates which were mentioned in the literature [1, 2].

Among the 226 cases of various glomerular diseases, MGN was the commonest pattern of injury which was noted (13.2%). This was found to be on a higher side in comparison to the findings of other published Indian studies which were conducted in the southern and western parts of India (7.41% and 7.0% respectively) [3, 4]. MGN was shown to be a male prevalent lesion, which was in accordance with the findings of other studies. MGN remains the main cause of the nephrotic syndrome in European adults and in China and Indonesia. It is the second commonest lesion in Italy, Japan, Hong Kong, Singapore and Taiwan after IgA glomerulonephritis [5-8].

In India, however; MEGN is the commonest pattern of glomerular injury which is seen in south India [9], primary IgA glomerulonephritis is the commonest in western India [10] and Minimal Change Disease (MCD) is the commonest lesion in northern India [11,12].

Sn	Glomerulonephritis (GLN.)	Total	% of GLN	M	F	No. of GLO/Biopsy	Avg. Age
1	Membranous	30	13.27	12	04	08.50	34.75
2	End Stage Renal Disease (ESRD)	29	12.83	15	07	12.81	37.91
3	Mesangial Proliferative	20	08.84	07	04	12.08	31.77
4	Membrano Proliferative (MPGN)	18	07.96	04	04	13.87	27.64
5	Inadequate	18	07.96	06	01	00.00	34.66
6	Diffuse Proliferative	16	07.07	08	02	13.22	36.66
7	Systemic Lupus Erythematosus (SLE)	15	06.63	01	07	14.42	33.56
8	Diabetic Nephropathy	15	06.63	04	03	16.57	48.20
9	Minimal Change Disease	14	06.19	03	02	08.40	14.40
10	Focal Segmental Glomerulosclerosis (FSGS)	13	05.75	06	01	09.57	17.57
11	Crescentic	13	05.75	06	00	05.80	27.00
12	Focal Segmental/ Proliferative	10	04.42	07	03	15.40	49.33
13	Amyloid Nephropathy	09	03.98	04	00	18.75	33.75
14	Normal	03	01.32	03	00	03.66	37.00
15	Renal Cortical Necrosis	02	00.88	00	02	11.50	37.00
16	Focal Necrotizing	01	00.44	01	00	04.00	60.00
	Total	226		139	87	12.14	34.90

[Table/Fig-1]: Subdivision of various glomerulonephritis according to the frequency, age and sex distribution (1995-2007)

T= Total; %= Percentage; M= Male; F= Female; Glo= Glomerulus; Avg= Average.

MEGN, which is often a common histological denominator for a number of diverse/ unrelated glomerulonephritis cases, was the third commonest lesion which was found in the present study (8.84%). Males were found to predominate in this category also, with a majority of patients presenting with the nephrotic-nephritic syndrome. Surprisingly, MCD and Focal segmental glomerulosclerosis (FSGS) were the least common patterns of the glomerular injuries which were noted in the present study, with 6.19% and 5.72% cases respectively [Table/Fig-1].

The significant point which was noted in the present study was that the second commonest lesion which was seen on the biopsy specimen was that of ESRD (12.83%). The patients who suffered from renal disability with diabetes (diabetic nephropathy) and those who had renal failure with amyloidosis were kept separately, with 6.63% cases of diabetic nephropathy and 3.98% cases of amyloidosis. If these 2 subcategories of secondary glomerular diseases were added together with the primary glomerular ESRD, then the combined ESRD would become the leading pattern of the glomerular injury. The patients with primary ESRD presented clinically with hypertension and elevated creatinine levels. Some presented with proteinuria and even nephrotic syndrome. The mean age of these patients was 37 years, with a male preponderance [Table/Fig-1].

In contrast to the findings of our study; ESRD is not prevalent to such a degree in other studies which were done in various geographical regions of India, as has been discussed above [9-12].

A high prevalence of ESRD in this study which was conducted at a tertiary care centre in the north Indian gangetic plain, speaks volumes about the delayed presentation and the patient ignorance being a great challenge to nephrologists in the developing countries of Asia and Africa. This is also explained by the fact that glomerular diseases continue to be the key factor, resulting in a large number of individuals suffering from renal disability/failure, resulting in considerable mortality and morbidity. This is more so compounded in the countries of Asia and Africa, where despite the advances in health care, additional factors such as environmental ones (both infectious and non -infectious), the standard of living and the access to health care and health education (awareness on the renal diseases) have a role to play. Thus, this leads to different patterns of glomerular diseases in different countries and communities. The difference sometimes lies within the same country (different regions) and populations (urban versus rural) and this is liable to change with time. For instance, immunoglobulin A nephropathy (IgAN) is common in the northwest regions of Italy [13], the far east, and eastern Europe [14,15], while FSGS appears to be most prevalent in the United States of America and Saudi Arabia [16,17].

The limitations which were faced in this study were two folds. The fact that there was a separate paediatric subunit (Children's Hospital, Allahabad) at the MLN Medical College, led to a relative paucity of adequate paediatric samples in the present study, due to which the sub-analysis for the adult and the paediatric age groups to check the pattern of glomerulonephritis could not

be attempted. Secondly, the presence of 2 big referral hospitals (SGPGI, Lucknow and BHU, Varanasi) within a distance of 250 kms led to the referral of many cases to the nephrology unit of these hospitals, leading to the selection of only 226 biopsies of renal parenchymal disease over a period of 13 years. This number though is still significant for revealing the pattern of glomerular diseases in Allahabad.

The aim of this study was to report a detailed epidemiology of renal disease, based on the histological diagnosis, in a large representative sample from the north Indian river plains and to identify the clinico-pathological correlations. Although ESRD was the second most common lesion in the present study, a relatively high incidence in this area provided an insight into the challenges which were faced by the clinical nephrologists in the diagnosis and management of glomerular diseases in resource challenged countries.

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