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Pattern of glomerular diseases in tertiary care center. A retrospective observational study

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ABSTRACT

Background

There is limited population-based epidemiological data on renal disease. The knowledge of the epidemiology of biopsied renal diseases provides useful information in clinical practice.

Aim

To find out the prevalence of primary and secondary glomerular diseases and to study the pattern of the glomerular disease in a tertiary care center.

Material and Methods

This was a retrospective cross-sectional observational study where we saw the data of more than 20,000 patients in the department of Nephrology. In a study the clinical and histopathological data of these patients were analyzed. Age, gender, address, record number, date of assessment and date of last follow-up were noted.

Results

This study shows review of total 3120 renal biopsies retrospectively from 1973-2013, out of which 1822 (58.39%) were male and 1298 (41.60%) were female. The mean age of patients was 26.20 $\pm$ 25.45 years (range 1 month to 94 years). The classification of histopathology of glomerular disease was done in primary and secondary glomerular disease. In Primary glomerulonephritis (PGD) Minimal Change Disease (MCD) was 21.25% the most common presentation followed by Membrano Proliferative glomerulonephritis (MPGN) 18.5% and Focal Segmental glomerular sclerosis (FSGS) 14.95%, while in Secondary glomerular disease (SGD) Lupus Nephritis (LN) 9.16% was commonest presentation followed by Amyloidosis 3.16% & Diabetic Nephropathy 0.33% (DN).

Conclusion

MPGN and FSGS were increasing and MCD was the leading histopathological pattern.

Keywords: MCD, MPGN, Amyloidosis and FSGS.

INTRODUCTION

Kidney Diseases have come a long way from the original description of kidney diseases by Richard Bright of acute, sub-acute and chronic nephritis, made more than 150 years of age. Both chronic kidney disease (CKD) and acute kidney injury (AKI) are devastating conditions.[1] CKD is

a serious condition associated with premature mortality, decreased quality of life and increased health care expenditure. [2] The prevalence of glomerular diseases in the general population is poorly known because epidemiological survey studies suggesting a prevalence of glomerular disease are difficult to conduct. Incidence of glomerular disease is changed in different geographical areas because of variation in environmental factors, ethnicity, genetics and socioeconomically conditions.[3] It has been considered traditionally membranous nephropathy was the common cause for nephritic syndrome, but some recent studies conducted at Europe and Australia suggested focal segmental glomerular sclerosis as the leading cause for nephritic syndrome.[4] In India, Membranous glomerulonephritis (MGN) is the commonest pattern of glomerular injury seen in south India, primary IgA glomerulonephritis is the commonest in western India and MCD is the commonest lesion in northern India. While having advance health care system, glomerulonephritis is the one of the leading cause of mortality & morbidity and imposes considerable burden on health services.[5] It affects predominantly young & productive age group in developing countries & major contributor to End Stage Renal Disease (ESRD) burden. Epidemiologic studies, along with clinic-pathologic correlations, are important indicators which can be used for defining the burden of a particular disease. Renal biopsy is a commonly performed procedure in the assessment of kidney diseases. It can provide diagnostic precision, especially in glomerular diseases and also provides important information of prognostic value and about treatment options. Renal biopsy also improves the understanding of utility and acts as a framework for future research in kidney disease. Studies on the prevalence of renal disease in India are limited and unfortunately we don't have central biopsy registry in India.[6] Glomerular diseases are the most important cause for CKD and ESRD. The CKD have reached epidemic proportions and are becoming an unbearable burden on the health care resources of individuals and society, the spectrum of causes of ESRD [7] in India is changing. In the absence of registries it is difficult to get accurate data on kidney disease. Though chronic glomerulonephritis (CGN) and chronic interstitial nephritis are deemed to be important causes of ESRD in the past, now diabetes has emerged as the most important cause of ESRD.[7] Considering all above factors, it was decided to study the frequency of glomerular diseases, demographical profile of these patients & different types of glomerular diseases at tertiary care centre Mumbai, India.

SUBJECTS AND METHODS

Study was conducted in compliance with the protocol, ICH GCP, ICMR, Schedule 'Y' guidelines and Indian regulatory requirements. This was an observational, retrospective study conducted at division of renal clinic in Nephrology department of K.E.M. hospital, Mumbai. Institute's ethics committee approval along with a waiver of consent was obtained for this study. After obtaining permission from record department, medical records of approximately 20,000 patients with kidney disease from January 1973 to April 2013 were assessed. Records of patients diagnosed of glomerulopathies by clinical, laboratory investigation or renal biopsy were separated from the available records. The records of 2400 patients with native renal biopsies were analyzed and data on demography, record number (a unique number given by the Nephrology department), date of assessment and date of last follow-up were noted. Glomerulopathies were classified into primary, secondary, systemic & hereditary. Records of patients with glomerulonephritis were assessed for presenting a clinical profile. A histopathological data if available was studied to assign final diagnosis in consultation with the nephrologists. The clinical presentations were classified in eight categories and defined as: nephrotic syndrome (proteinuria ≥3.5 g/day with or without hypoalbuminemia); nephritic syndrome(hematuria, red blood cell casts and a <3-month history of proteinuria a <3.5 g/day); chronic kidney disease (proteinuria 1-3.5 g/day and a >3-month history of hematuria); acute renal failure as without confirmed diagnosis, asymptomatic urinary abnormality (proteinuria <1.0 g/day and hematuria found in routine check-ups, without oedema, hypertension or abnormal renal function), hematuria, rapidly progressive glomerulonephritis

syndrome (with acute deterioration of renal function, such as a 2-fold increase in the serum creatinine concentration or a 50% decrease in creatinine clearance), and post infectious glomerulonephritis as secondary to systemic disease. According to histopathological report patients were classified into primary glomerular disease (PGD) and secondary glomerular disease (SGD). PGD sub classified into MCD, mesangial proliferative glomerulonephritis (MsPGN), MPGN, MGN, CGN, crescentic glomerulonephritis, diffuse proliferative glomerulonephritis (DPGN), IgA nephropathy, Alport's Syndrome. SGD sub classified into DN, LN, Amyloidosis. Simple descriptive statistics such as median and mean ± SD were used for variables such as age. Percentage was used for categorical data. Graphs were generated using Microsoft Excel 2007.

RESULT

A total of 3120 renal biopsy records for the period of January 1973 to January 2013 were reviewed. Out of which 2400 patients were included in study, remaining 720 patients were excluded because of incomplete data. Renal biopsies were performed in all patients and were subjected to light microscopy, immunofluorescence (IF) and electron microscopy (EM). Out of these 1399 (58.29%) were males with average age of 27.09 ± 14.71years and 1001 (41.70%) were females with average age of 27.2 ± 13.7 years. The most common indication for renal biopsy was Nephrotic Syndrome 1980 (82.5%), followed by Chronic kidney disease 130 (5.41%), Nephritic Syndrome 114 (4.75%), RPGN 80 (3.33%), PIGN 60 (2.5%), ARF 32 (1.33 %), AUA 4 (0.16%) cases. (Fig. 1)

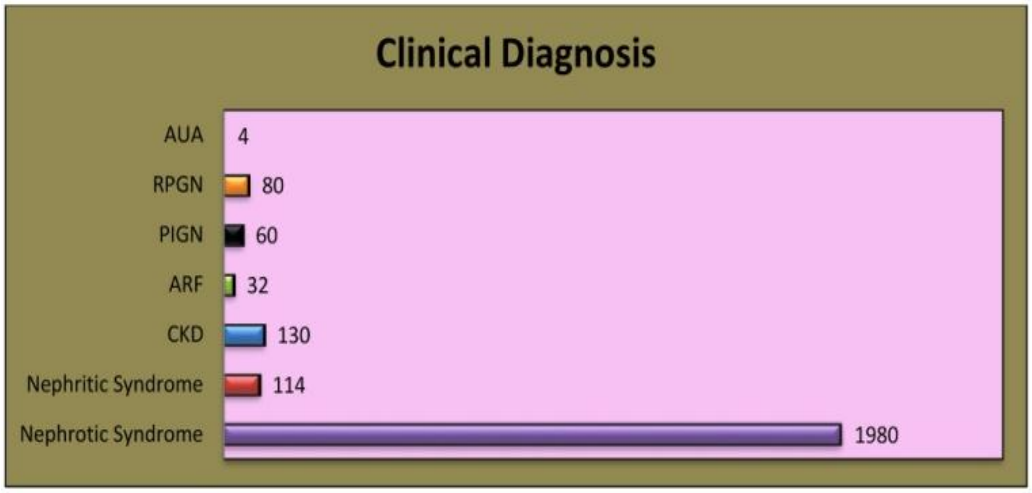

Figure No.1: Different types of clinical presentation

We classified histopathology of glomerular disease in PGD and SGD. In PGD, MCD was 21.25% the most common presentation followed by MPGN 18.5%, FSGS 14.95%, MsPGN 11.45%, MGN 7.04%, CGN 4.20%, Crescentric glomerulonephritis 3.25%, DPGN 3.08%, PIGN 2%, IgA Nephropathy 1.20%, Alport's syndrome 0.37%. In SGD LN was 9.16% commonest presentation followed by Amyloidosis 3.16% & DN 0.33%. (Fig. 2)

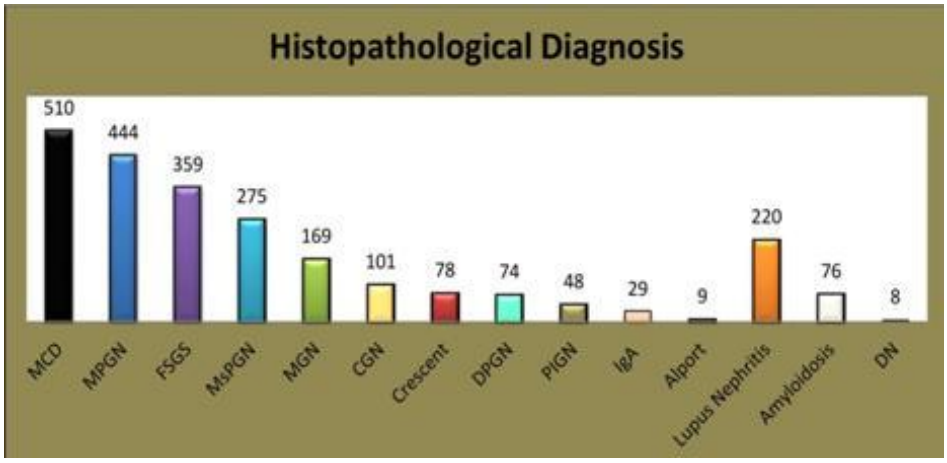

Figure No.2: Different Histopathological Presentations

The distribution of glomerular disease according to patient age was presented. There were 822, 1085, 390, and 81 patients with different histopathological presentation in the <19, 20-39, 40-59, and ≥60-year old groups, respectively. (Table 1)

- In the <19-year-old group, a high incidence of MCD was identified (233), followed by MPGN (155), FSGS (129), MsPGN (108), LN (57), DPGN (32), Crescents (29) PIGN (27) and MGN (23) cases
- In the 20-39-year-old group, was the majorly affected where the incidence of MCD was (200), MPGN (196), FSGS (162), LN and MsPGN (131) each. In this age group, there were smaller proportions of MGN (71), CGN (57), amyloidosis (39), Crescents (34) and DPGN (28) cases
- In the 40-59-year-old group, MPGN accounted for (75), MGN (63), FSGS (57), MCD (54), LN (30), MsPGN for (28), CGN (25) & amyloidosis (22) cases
- In the ≥60-year-old group, MCD (19) was the most common form of PGD followed by MPGN (15) & MGN (10) cases
- The present study was conducted to ascertain the histological spectrum of glomerular disease in population at our tertiary care centre during a period of 40 years from 1973 to 2013 and to understand the change in the spectrum of these diseases over last four decades.

Table No.1: Age distribution in glomerulonephritis

HISTOPATH	>19	20-39	40-59	<60	UNKNOWN	TOTAL	%
MCD	233	200	54	19	4	510	21.25
MPGN	155	196	75	15	3	444	18.5
FSGS	129	162	57	7	4	359	14.95
MsPGN	108	131	28	6	2	275	11.45
MGN	23	71	63	10	2	169	7.04
CGN	12	57	25	5	2	101	4.20
Crescent	29	34	12	2	1	78	3.25
DPGN	32	28	10	4	0	74	3.08
PIGN	27	16	3	2	0	48	2
IgA	8	14	6	0	1	29	1.20
Alport's	4	5	0	0	0	9	0.37
LN	57	131	30	0	2	220	9.16
Amyloidosis	5	39	22	9	1	76	3.16
DN	0	1	5	2	0	8	0.33
Total	822	1085	390	81	22	2400	100

DISCUSSION

Glomerular diseases are the major cause for ESRD. This study reports 40 years of epidemiological data of patients referred to a tertiary care center for renal diseases. There are several biases regarding geographical, demographic characteristics, difference in indications for biopsy, clinical syndrome & pathological classification. [6] Hence accurate conclusion was a difficult task. The result confirms that MCD is the most common PGD, not only among the patients biopsied due to PGD, but also in the general population. In this study data of 2400 patients were collected. The mean age of patients was 27.12± 14.31 years. It is known that the renal pathology pattern can be different between age groups, hence, we have separately analyzed the data according to the age ranges, but in all age groups MCD is the commonest cause for glomerulonephritis followed by MPGN. In our study young adult group was the most affected group by glomerular disease, indicating that with the increase in age, disease incidence is declining. The most common indication for renal biopsy was Nephrotic Syndrome followed by CKD. Nephrotic syndrome was found to be the most frequent clinical presentation at all age groups accounting for 82.5% of cases. We observed male predominance in overall glomerular disease cases except LN. This is similar to many of other studies conducted around the world. [6] Das U et al studied patterns of biopsy proven renal disease in a center of south India. In this study a total of 1849 biopsies during a period of 19 years were analyzed. The most common indication for renal biopsy was Nephrotic syndrome followed by CRF. In histopathological reports most common type where minimal change disease followed by FSGN. [6] In PGD, MCD was the most common presentation followed by MPGN, FSGS, MsPGN, MGN, CGN, DPGN, Crescentric glomerulonephritis, IgA Nephropathy, PIGN/PSGN & Alport's syndrome. In this study commonest cause was MCD followed by MPGN, FSGS, MsPGN and MGN, which are similar to other studies conducted in India. [6, 8] Northeast countries like Korea also show similar results, MCD along with MGN & IgA were common etiology of glomerular disease. [9] MPGN was the second most common etiology for PGD observed in our study. MPGN was the most common glomerulonephritis reported in Romania, [10] while in Brazil incidence of MPGN was very low may be due to geographical variation.[11] Some other studies from different parts of the world show that there is a decrease in incidence of MPGN because of improved hygienic condition and vaccination. [6] However, our study does not support these and MPGN was the second leading cause for glomerular disease in our population. FSGS was the third most common etiology for PGD observed in our study. The distribution of FSGS also varies from country to country, there is a worldwide increase in the incidence of FSGS. A more widespread use of IF and electron microscope in the analysis of renal biopsy can explain the increased diagnosis of MGN and FSGS, which are otherwise likely to be misdiagnosed as a MCD. It is commonest glomerulonephritis in Brazil, USA, Saudi Arabia, Zaire & Kuwait. MsPGN was the fourth commonest type observed in our study while in other studies, it was not so common. Young adult group was more affected with predominance in males. MGN was the fifth commonest type in our study. One another study from India, show MGN is most common in northern India. [8] IgA nephropathy was less common in this study while it was more frequent primary renal disease in the French region. [12] We also observed that there was an increase in incidence of CGN, DPGN and PIGN/PSGN. With improvement in standards of living, better public health and the early effective antibiotic treatment of pharyngeal infections, it has been reported that the proportion post-streptococcal acute glomerulonephritis declined in many countries. Alport's syndrome was also present in some cases. The most common SGD in this study was LN. In this study, we also found a significant increase in the incidence of LN. In all other types of glomerulonephritis male predominance is present, only the LN where females were more affected than males and the mean age was 26.44 $\pm$ 10.73 years. Amyloidosis and DN were the next frequent causes and incidence of other categories of SGD was very less. Even though this study was performed at one hospital with stable biopsy and diagnosis criteria, there are several limitations.

- It is not a randomized population study.
- Detection bias might have occurred since the referral patients in this study were not from the population.

Finally, this is an observational study with no evidence to understand the influence factor(s) for the changing spectrum. PGD is continuously the leading cause of renal biopsy, but the spectrum of PGN is changing. The aim of this study was to report a detailed epidemiology of glomerular disease, based on the histological/clinical diagnosis, in a large representative sample from the tertiary care center (KEM Hospital Mumbai). After analyzing the data, obtained in our study it is concluded that, a wide variation of histological groups in PGD has been observed. PGN is continuously the leading cause of renal biopsy, but the spectrum of PGN is changing. The exact reason for this difference is not clear. Thus, in conclusion, there has been considerable heterogeneity in the histological spectrum of the glomerular disease. MPGN and FSGS were increasing and MCD was the leading histopathological pattern, while CGN was decreasing. In SGD, LN was the leading cause followed by Amyloidosis. The frequency of MCD has been increased in younger patients. The main limitation of the present study was the small sample size. Furthermore, the fact that our centre caters mainly to the population of specific regions of India, thus these results may not be applicable to other parts of the country. Therefore a large sample size studies are needed to know the exact scenario of kidney disease.

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