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Original Research Paper

Nephrology

THE SPECTRUM OF KIDNEY DISEASE PATTERNS DIAGNOSED BY KIDNEY BIOPSY: A SINGLE-CENTRE TERTIARY CARE HOSPITAL – BAGALKOTE.

Dr. Chirag. G MBBS, MD, DM, Nephrology, Assistant Professor, Department of General Medicine, S.N. Medical College Bagalkote, India.

Dr. Kruthika. S. Patil MBBS, MD, Assistant Professor, Department of General Medicine, S.N. Medical College Bagalkote, India.

Dr. Nagesh Babu. C MBBS, MD, Resident, Department of General Medicine, S.N. Medical College, Bagalkote, India.

ABSTRACT Kidney biopsy is the gold standard procedure in diagnosing and managing many kidney diseases. Age, gender, race, environment, socioeconomic status, and nutritional factors all have an impact on the prevalence of kidney diseases. The present study was done at Sri Nijalingappa Medical College, a tertiary care teaching hospital in Bagalkote (District), Karnataka, India, to show the current frequency of different types of kidney diseases through histopathological findings. **Materials and Methods:** It is a retrospective study of kidney biopsies done in our institute between January 2020 and May 2023, and clinical and histopathological correlation was done from the available medical records. **Results:** A total of 200 biopsies were performed from January 2000 to May 2023. Out of 200 Biopsies done 147 (73.5%) were males and 53 (26.5%) were females, with male predominance. The average age of the study population was 40.85 ± 16.87 years. The Most Common clinical sign was proteinuria. Type II Diabetes Mellitus was seen in 49 (24.5%) Patients, Hypertension in 70 (35%) Patients and Nephrotic syndrome was seen in 108 (54%). The most common Histopathological finding was IgA Nephropathy 23 (11.3 %) biopsies, followed by Diabetic Nephropathy class III 21(10.5%), followed by C3 – mediated glomerulonephritis, Chronic Diabetic Nephropathy and Focal segmental Glomerulosclerosis 17 (8.5%). **Conclusion:** In this retrospective study, IgA nephropathy and Diabetic nephropathy were the most prevalent diagnoses and Nephrotic syndrome was the major indication for biopsy.

KEYWORDS :

INTRODUCTION:-

A renal biopsy (commonly referred to as a kidney biopsy) is a technique that is performed to obtain a segment of renal tissue, usually with the use of a needle or another surgical instrument. As the incidence of kidney diseases is rising to alarming proportions due to rising cases of diabetes mellitus, hypertension, and the growing geriatric population, the "gold standard" diagnostic tool in patients with kidney disease is kidney biopsy which not only provides a precise diagnosis but also provides knowledge regarding the level of disease activity and severity, assisting in the selection of specific therapeutic decisions to be made and predicting prognosis.[1] Age, gender, racial, social, dietary, and environmental factors all influence the prevalence of kidney diseases.[2,3]

According to recent studies, the pattern of glomerular disease incidence across the globe is shifting.[4]

The kidney biopsy can be extremely helpful in assessing the extent of disease activity (e.g., inflammatory cell proliferation, crescent formation, and necrosis) and chronicity (e.g., sclerosis and fibrosis), which may help guide prognosis and therapy, as well as establishing renal involvement of systemic diseases, such as autoimmune and paraprotein disorders.[5]

Since the prevalence of kidney diseases varies between different parts of the world and also within different regions of the same country, the present study was performed at a tertiary care teaching hospital in Bagalkote to show the current frequency of different types of kidney diseases through histopathological findings at this region.

Biopsy Techniques: -

The Percutaneous Renal Biopsy: -

Percutaneous renal biopsy (PRB) is the current standard of care, and most large case series describe ultrasound-guided PRBs performed by nephrologists or radiologists. PRBs are most commonly performed under local anaesthesia with disposable, automatic, spring–loaded devices using 14-, 16-, or 18-gauge needles (outer diameter of 2.11, 1.65, and 1.27 mm, respectively). Adequate tissue is obtained in 95%–99% of PRBs, with a typical yield of about 10–20 glomeruli when using 14- and 16-gauge needles.[6] The diagnostic yield does not seem to differ significantly when comparing 14- and 16-gauge needles, but some studies indicate lower yield with smaller (18-gauge) needles. Other factors, such as patient characteristics (e.g., kidney size) and operator experience, may also affect diagnostic yield.

Computed tomography (CT) may be used as a primary imaging modality or may be preferred in obese patients, those with complicated anatomies (e.g., cysts or horseshoe kidney), and those for whom kidney visualization with ultrasound is difficult.[7,8] Fluoroscopy-guided PRB with or without retrograde contrast injection through a urethral catheter has also been used for localization. Newer imaging techniques, such as CT fluoroscopy and fusion ultrasonography, may be useful in the future in certain patients undergoing PRB.[9] These options must be considered with the risk of radiation/contrast exposure and cost in mind.

Other Biopsy Techniques: -

Trans jugular kidney biopsies (TJKBs) were initially described in the early 1990s, with many subsequent case series describing this technique in patients with contraindications to PRB or who required simultaneous liver/ kidney biopsies [8]. However, contrast-induced nephropathy is a TJKB complication that is not encountered with PRBs, occurring in 7.8% of patients in one study, and some studies report high rates of capsular perforation that may require coil embolization.[9]

A laparoscopic (through a retro- or transperitoneal approach) or open kidney biopsy may be the best option in selected circumstances, such as morbid obesity, solitary kidney, coagulopathy, failed PRB, polycystic kidney disease with rapidly progressive GN, high location of the kidney, and/or poor visualization with imaging. These approaches have the theoretical advantage of direct visualization and application of haemostatic materials to the biopsy sites.

MATERIALS AND METHODS: -

It is the retrospective study done on 200 native kidney biopsies performed on suspected kidney disease in our institute from January 2020 to May 2023. The study was given ethical clearance from the Institutional Ethics Committee. Following data were recorded from a patient: age, gender, indication for kidney biopsy, haemoglobin, serum creatinine, 24-hour urinary protein level, urine microscopy, hepatitis B surface antigen, hepatitis C antibody, human immunodeficiency virus and histopathological diagnosis. All kidney biopsies were performed by a nephrologist percutaneously under ultrasound guidance using an automated gun (16, 18 G). The kidney biopsy specimens were prepared as per the standard protocol and examined by the renal pathologists. Biopsy specimens were processed for light microscopy and immunofluorescence examination.

Statistical Analysis: -

Statistical analysis was done using SPSS software 19.0. The data obtained were tabulated in the Excel sheet and analysed.

Quantitative data was expressed as mean + standard deviation and non-parametric data was expressed as median and min-max values.

Percentages are used for representing qualitative data. Chi-square test for proportions in qualitative data. Student's unpaired t–test for Quantitative data. Other appropriate statistical tests were applied.P< 0.05 was considered statistically significant.

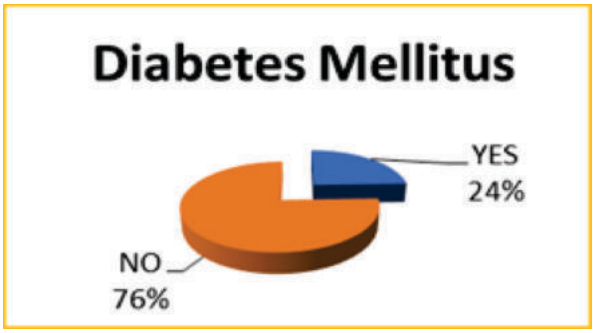
RESULTS:-

From January 2000 to May 2023, 200 biopsies were carried out in total. Out of 200 Biopsies done 147 (73.5%) were males and 53 (26.5%) were females, with male predominance. The study participants had an average age of 40.85 ± 16.87 years.

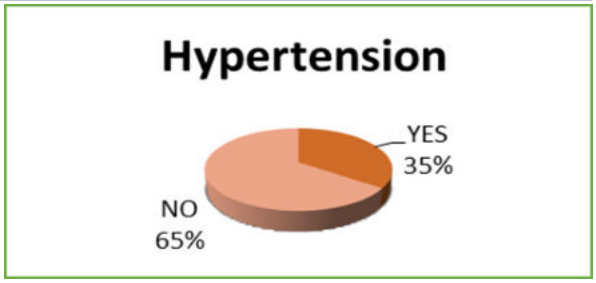
Table 1. Age Distribution of study population.

Age	No of Cases	Per cent
≤ 10	6	3.0
11-20	19	9.5
21-30	37	18.5
31-40	42	21.0
41-50	36	18.0
51-60	32	16.0
61-70	24	12.0
> 70	4	2.0
Total	200	100.0
Mean & Sd	40.85 ± 16.87	

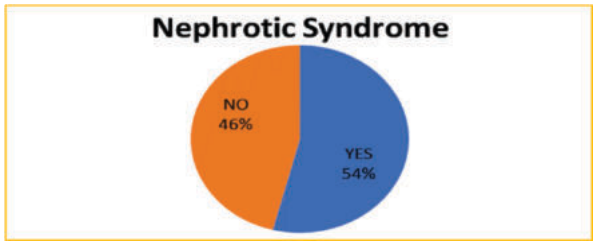
The Most Common clinical sign was proteinuria which was seen in approximately three out of every four patients and was seen in both adults and children. The other common reasons for kidney biopsy were Decreased urine output, Altered Renal function tests.49 (24.5%) patients had Type 2 diabetes mellitus, 70 (35%) patients had Hypertension and 108 (54%) patients had Nephrotic syndrome.



Graph.1:-Patients with Diabetes



Graph.2:-Patients with Hypertension.



Graph.3: -Patients with Nephrotic Syndrome.

The most common Histopathological finding was IgA Nephropathy 23 (11.3 %) biopsies, followed by Diabetic Nephropathy class III 21(10.5%), followed by C3 – mediated glomerulonephritis, Chronic Diabetic Nephropathy and Focal segmental Glomerulosclerosis accounting for 17 (8.5%). The rest of the histopathological findings are given in Tab.2

Tab.2:-Various Histopathological Findings in Kidney Biopsies.

IMPRESSION	No of Cases	Per cent
Acute Pyelonephritis	5	2.5
Acute Tubular injury	11	5.5
Chronic Interstitial Nephritis	8	4.0
C3 - mediated Glomerulonephritis	17	8.5
Cast Nephropathy	3	1.5
Chronic Diabetic Nephropathy Class 4	17	8.5
Chronic Sclerosing Glomerulopathy	5	2.5
Chronic Tubulointerstitial Nephritis	3	1.5
Diabetic Nephropathy Class 3	21	10.5
Diffuse Infiltration of Non - Hodgkin Lymphoma, Acute tubular injury	2	1.0
Focal Proliferative Glomerulonephritis	4	2.0
Focal segmental Glomerulosclerosis	4	2.0
Focal segmental Glomerulosclerosis, NOS type.	17	8.5
IgA nephropathy	23	11.5
Immune Complex mediated Glomerulonephritis	4	2.0
Lupus Nephritis	6	3.0
Lupus Nephritis Class 3	3	1.5
Membranous Glomerulonephritis	16	8.0
Membranous Nephropathy	4	2.0
Minimal Change disease	12	6.0
Post Infectious Glomerulonephritis	3	1.5
Proliferative Glomerulonephritis	5	2.5
Thrombotic Microangiopathy	2	1.0
Advanced Diabetic Glomerulosclerosis	1	0.5
Amyloidosis	1	0.5
Chronic Granulomatous Interstitial Nephritis	1	0.5
Non - Proliferative Glomerulus	1	0.5
Type 3 Hyperlipoproteinemic Nephropathy	1	0.5
	200	100.0

DISCUSSION:-

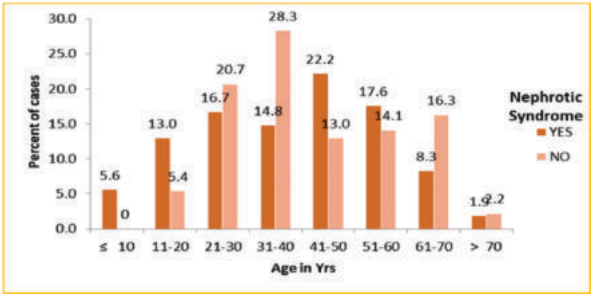
If the following conditions are present, a kidney biopsy is advised as an invasive diagnostic test:

(1) A kidney biopsy is needed to determine a diagnosis or to offer information that will help with treatment.
(2) The natural history of suspected diseases is associated with significant morbidity and/or Mortality.
(3) Treatment can change the course of these diseases' natural history.
(4) The treatments for these diseases differ between diagnoses that are made by kidney biopsy.
(5) The treatments' adverse event profiles are acceptable to your patient in his/her current state of health.
(6) The risk of the procedure is acceptable to your patient in his/her current state of health.

These criteria have been increasingly met for kidney biopsy since its initial description by Iversen and Brun in 1951.[5]

This was a single-centre retrospective study from a tertiary care teaching hospital to understand the pattern of biopsy-proven kidney diseases in Bagalkote over the last 3 years. This single-centre retrospective analysis from a tertiary care teaching hospital offers details on the demographic profile, the clinical indication of kidney biopsy, and the distribution of various kidney disorders that have been confirmed by kidney biopsies. Data on kidney biopsies from our state are scant, and none are available from this region of India.

When evaluated, the spectrum of renal illnesses affecting the elderly differs from that of young people. However, the clinical and morphological picture of the elderly is made more confusing by age-associated changes, making its diagnosis and prognostication difficult. Acute kidney injury and Nephrotic syndrome are the two most frequent reasons for biopsies in the population, according to studies.[10] This was consistent with our analysis, where nephrotic syndrome was the most prevalent clinical manifestation (54%).



Graph 2:- Nephrotic syndrome and Age relationship.

Nephrotic syndrome is a prevalent clinical presentation not only in primary forms but also in some secondary glomerulopathies. Studies have shown a higher frequency of nephrotic syndrome in different glomerulopathies, mainly MCD, FSGS and MN,[7,8] which has also been described in many systematic reviews,[14] and are the main clinical presentation of primary glomerulopathies.[15,16]

The most common diagnosis found was IgA nephropathy, it has a distinct epidemiological profile in different countries and continents. In Asia, its predominance is notorious and has been described in several studies. IgA Nephropathy was found to be more common than MPGN, MN, and MCD, according to Yang et al.16; only 4.6% of instances of FSGS were noted. IgA nephropathy was discovered in 28.3% of cases in South Korea[17], according to the same data, and 26% of cases in Taiwan, according to Chiu et al.[18].

The second most common diagnosis encountered in the present study was diabetic nephropathy. Usually, renal biopsy is indicated in patients with type 2 diabetes mellitus in the presence of atypical conditions to rule out non-diabetic kidney disease, thus defining another pathology that potentially indicates immunosuppression. Short-term diabetes (less than 5 years), absence of diabetic retinopathy, acute renal function loss that is incompatible with the progression of diabetes, abrupt nephrotic proteinuria, acute renal function loss, and/or signs and symptoms of systemic disease are some of these criteria.

The NHANES study underlined how diabetes had a stronger impact on renal function than ageing itself, showing that the increasing prevalence of renal impairment in the US population in the period 2005-2008 was related to the increasing trends of diabetes, while the age distribution of that population did not change during the observation period.[19]

The overall high prevalence of diabetic kidney disease in elderly T2DM (Type 2 Diabetes Mellitus) patients is likely to be the result of two opposite trajectories, i.e. the high frequency of T2DM in this age group, and the decreased mortality rate due to better control of the disease, which may have contributed to increased survival, allowing sufficient time to develop complications of chronic diabetes, including renal damage. In our analysis, C3-mediated glomerulonephritis, Focal segmental glomerulosclerosis, Membranous Glomerulonephritis and Minimal change disease were the other diagnostic groups that were most frequently observed. Studies frequently observe renal impairment in association with Hypertension.[20] Our study also revealed a similar pattern of renal injury in many patients with renal failure secondary to Hypertension, shown as increasing creatinine levels or proteinuria.

In many nations, the prevalence of each glomerulopathy varies in different age groups. Previous studies have indicated that in primary glomerulopathies, the most frequent in the age group between 18-50 years was IgA Nephropathy and FSGS, and FSGS and Membranous Nephropathy in the 51-65 year and > 65-year group Respectively. Regarding the secondary manifestations, systemic vasculitis and monoclonal gammopathies were more common in people over 65, DKD and FSGS were more common in people between the ages of 36 and 60, and Lupus Nephritis was more common in people between the ages of 18 and 35.

The diagnosis of renal disease now relies mostly on kidney biopsy. Even though it is now a standard operation, complications might sometimes arise. Haemorrhage, urinoma, arteriovenous fistula, discomfort and, very infrequently, infection are complications of kidney biopsy. 1-7% of kidney biopsy patients experience serious consequences, including the need for surgical intervention. Death can occur in up to 0.1% of kidney biopsy patients.

Our study has some limitations. As this is a retrospective study, the medical records of some patients showed incomplete demographic, clinical and laboratory data. As this was a single-centre study, the results may not represent the actual prevalence of the studied disorders at other centres.

CONCLUSIONS:-

In this kidney biopsy study, 200 biopsies carried out between January 2020 to May 2023 were documented, together with demographic and clinical information and the range of renal histology. Diagnosis for IgA Nephropathy and diabetic nephropathy was most prevalent. The most common reason for biopsy was a nephrotic syndrome, which was followed by proteinuria and proteinuria coupled with haematuria.

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