



ISSN (P): 2617-7226  
ISSN (E): 2617-7234  
[www.patholjournal.com](http://www.patholjournal.com)  
2021; 4(4): 149-153  
Received: 06-07-2021  
Accepted: 10-08-2021

**Vijay R Bhosale**  
Assistant Professor,  
Department of Pathology,  
Prakash Institute of Medical  
Sciences and Research,  
Islampur, Sangli, Maharashtra,  
India

**Pankaj R Pande**  
Associate Professor,  
Department of Pathology,  
Prakash Institute of Medical  
Sciences and Research,  
Islampur, Sangli, Maharashtra,  
India

**Sudhir M Gavali**  
Assistant Professor,  
Department of OB&G,  
Prakash Institute of Medical  
Sciences and Research,  
Islampur, Sangli, Maharashtra,  
India

**Corresponding Author:**  
**Pankaj R Pande**  
Associate Professor,  
Department of Pathology,  
Prakash Institute of Medical  
Sciences and Research,  
Islampur, Sangli, Maharashtra,  
India

## A clinico-pathological study of percutaneous renal biopsies in South-western region of Maharashtra

Vijay R Bhosale, Pankaj R Pande and Sudhir M Gavali

DOI: <https://doi.org/10.33545/pathol.2021.v4.i4c.435>

### Abstract

**Introduction:** Renal biopsy is the corner stone of diagnostics modalities in renal parenchymal disease and offers vital prognostic information for nephrologists. The present study was undertaken with a view to become familiar with the histological patterns of different renal lesions and their correlation with clinical manifestations, hematological and biochemical changes.

**Methods:** This study includes 129 renal biopsies received in the Department of Pathology, Prakash institute of medical sciences and research over a period 3 years January 2017 to December 2019. In all the cases, percutaneous renal biopsy was done under local anesthesia. The technique used was that of Kark and Muehrcke via Wilms Silverman needle with Franklin's modification.

**Results:** The commonest lesion observed was minimal change disease (31.87%). This was followed by acute glomerulonephritis (26.36%). Maximum number of cases were observed in second and third decade of life, together comprising about 70% of cases. Overall male preponderance was observed. The commonest cause of nephrotic syndrome was observed to be minimal change disease.

**Conclusion:** Nephrotic syndrome is common in adults also as against the general belief. Minimal change disease and acute glomerulonephritis are the commonly observed lesions causing nephrotic syndrome in most of the cases.

**Keywords:** Renal biopsy, glomerulonephritis, minimal change disease, nephrotic syndrome

### Introduction

Renal biopsy is the corner stone of diagnostics modalities in renal parenchymal disease and offers vital prognostic information for nephrologists. Renal biopsy findings differ on the basis of geographical location, environmental and socio-economic factors<sup>[1]</sup>. The distribution of renal disease may also differ over time and an understanding of developing trends can help in better diagnosis and treatment. To ascertain the definitive diagnosis of renal parenchymal disease, a histopathological analysis is of vital importance. Although renal biopsy remains the gold standard for diagnosis, therapeutic management and outcome prediction in patients with renal parenchymal diseases, there is currently poor consensus about proper indications and clinical usefulness of this procedure. As a result, the decision on performing renal biopsy is usually based on personal opinion and/or single-center policies<sup>[2]</sup>. Lack of clear guidelines on indications for renal biopsy may hamper the epidemiological classification of renal diseases, as well as the future of biomarkers validation. The present study was undertaken with a view to become familiar with the histological patterns of different renal lesions and their correlation with clinical manifestations, hematological and biochemical changes.

### Materials and Methods

This study includes 129 renal biopsies received in the Department of Pathology, Prakash institute of medical sciences and research over a period 3 years January 2017 to December 2019. A proforma was used for recording the data, clinical as well as laboratory findings. Detailed clinical information was obtained. Hematological investigations were done where ever indicated. In all the cases, urine examination was done for albumin, sugar and microscopy was performed. Biochemical investigations done using standard methods were blood urea, serum cholesterol, serum creatinine, serum proteins and serum electrolyte levels. Serum bilirubin was done where ever indicated. Investigations were repeated as and when necessary. In all the cases, percutaneous renal biopsy was done under local anesthesia.

The technique used was that of Kark and Muehrcke via wilms Silverman needle with Franklin's modification. Biopsy specimens were immediately fixed in 10% formal saline. Bits were processed routinely for paraffin embedding. Thin sections were stained with hematoxylin and eosin and periodic acid schiff stain routinely. Special stains employed were Periodic acid Silver Methanamine, Congo Red using standard procedures.

**Results:** 129 renal biopsies were performed. Table 1 shows the distribution renal biopsy cases by diagnosis. Acute glomerulonephritis: This group includes 34 cases, in which 20 were males and 14 females. History of sore throat was obtained in 5 cases, otitis media in 1 case, tonsillitis in 2 cases and skin infection in 1 case. Out of 34 cases, 30 presented with oedema of duration varying from 4 days to 2 years. Gross haematuria was present in 5 cases and oliguria in 6 cases. Urine examination showed albuminuria in all the cases. Thirteen cases had microscopic haematuria. All the cases showed uniform swelling of the glomeruli with distended Bowman's Capsule, Cellularity was increased. Mesangial and/or endothelial cell proliferation was seen nearly in all cases. Epithelial cell proliferation and crescent was noted in 1 case. In 17 cases glomerular tuft contained poly-morpho-nuclear cells and eosinophils.

**Rapidly progressive glomerulonephritis:** This group included 4 cases in whom males were 2 (50%) and females were 2 (50%). History of otitis media was present in 2 cases. All cases presented with oedema of duration varying from 4 days to 6 days. All the cases presented with oliguria and history of gross haematuria was elicited in 2 cases. All the cases showed albuminuria, 24 hours urinary albumin was estimated in 2 cases and values were 0.5 g and 0.7 g. Two cases had gross haematuria and in 1 more case, it was detected microscopically. Casts were seen in 3 cases. Three cases showed significant number of W. B. Cs in their urine. All the cases had raised blood urea levels. Three cases there were areas of tubular atrophy. A single case showed arteriosclerotic changes in arterioles. Interstitial inflammatory cells infiltration was seen in all the cases.

**Chronic glomerulonephritis:** This group is composed of 6 cases in whom males were 5 (83.33%) and female, 1 (16.6%). Urine examination revealed albuminuria in all the cases. All cases had microscopic haematuria, besides 1 case with gross haematuria. All the glomeruli showed partial to complete sclerosis with many of them showing hyalinization in all the cases. Tubules showed atrophy and irregular dilatation in all the cases. The interstitium showed moderate scattered round cell infiltration and focal fibrosis in majority of the cases.

**Table 1:** Distribution of renal biopsy cases by histopathology diagnosis. (N=129)

Lesion	Total Cases (n)	Percentage
Acute glomerulonephritis.	34	26.36%
Rapidly progressive glomerulonephritis	04	03.10%
Chronic glomerulonephritis	06	04.65%
Focal glomerulonephritis	04	03.10%
Minimal change disease	41	31.78%
Focal glomerulosclerosis	05	03.87%
Congenital nephritic syndrome	01	00.78%
Membranoproliferative glomerulonephritis	13	10.08%
Membranous glomerulonephritis	11	08.53%
Amyloidosis	06	04.65%
Diabetic glomeulosclerosis	02	01.55%
Haemolytic uremic syndrome	02	01.55%
Total	129	100.00%

**Focal glomerulonephritis:** This group includes 4 cases, in whom 1 was male and 3 females. History of upper respiratory tract infection was present in 2 cases. All the cases presented with oedema of duration varying from 1 month to 3 months. In all the cases only, some glomeruli were hypercellular, while rest showed no significant lesion. Focal mesangial and / or endothelial cell proliferation was seen in 2 cases. Epithelial cell proliferation and crescent was noted in 1 case, while focal necrosis scarring in 1 case.

**Minimal change disease:** In this group, total number of cases were 41, males were 28 and females were 13. Out of these cases, 6 were below 12 years. It is observed that most of the cases with nephritic syndrome belonged to minimal change disease in both age groups (pediatric and adult), but the incidence was higher in pediatric age group (61.5%) as compared with adult age group (41.25%). Figure 1 shows microscopic picture o minimal change disease. Focal glomerular sclerosis: Total number of cases in this group were 5, 4 males and one female. In all the cases only occasional glomerulus showed pathology, while rest were with no significant pathology. There were focal areas of

solidification and hyalinization. Cellularity was pushed to the periphery.

**Congenital nephrotic syndrome:** Only one case was seen in this group. Nine months old male infant was admitted with oedema for 15 days and ascites. He was hypertensive. Microscopically the tubules showed marked dilatation and microcyst formation in areas. The remaining tubules showed atrophy and interstitial fibrosis. Glomeruli did not show any significant lesion.

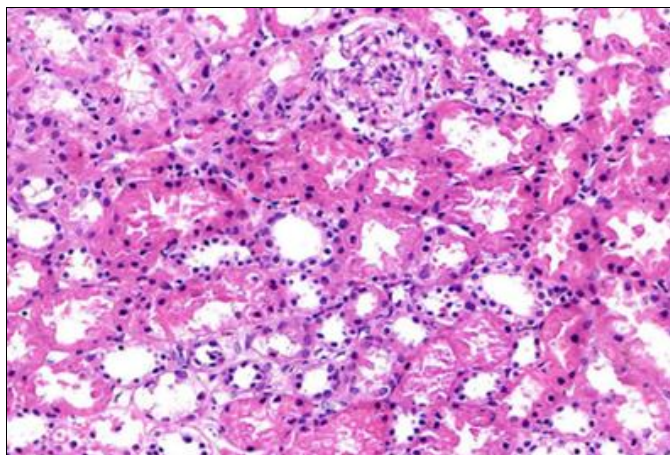
**Membrano-proliferative glomerulonephritis:** This group is comprised of 13 cases. 11 of them were males and 2 were females. Oedema was the presenting symptom in all the cases, with duration varying from 2 months to 1 ½ year. Three patients had oliguria and none had gross haematuria, six cases were detected to be hypertensive. Only 3 cases gave history of sore throat. All the cases showed varying degree of basement membrane thickening. Reduplication of basement membrane was seen in 2 cases. Because of increased cellularity and thickened basement membrane, there was narrowing of capillary lumen in 4 cases.

**Membranous glomerulonephritis:** This group includes 11 cases, 5 were males and 6 were females. Previous history of probable streptococcal infection was given by 2 patients. Glomerular size was normal in all the cases. Cellularity was normal in all the cases except 2. All the cases showed varying degree of basement membrane thickening. Periodic acid schiff stain confirmed basement membrane thickening. Two cases showed reduplication of basement membrane. In 2 cases there was narrowing of the capillary lumen because of thickened basement membrane. In 4 cases, the tubules contained casts and R. B. Cs in the lumen. Tubular lining epithelium showed degeneration in 4 cases. Figure 3 shows Membranous glomerulonephritis.

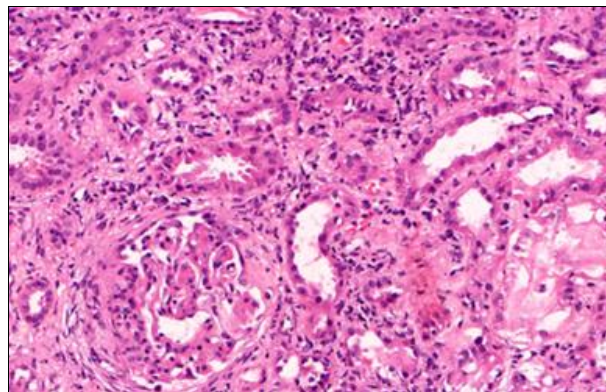
**Amyloidosis:** There were 6 cases in this group. All the patients had albuminuria. Two patients were having significant W. B. Cs in the urine. All cases showed early and minimal or extensive deposits of homogenous, eosinophilic material in the glomeruli, almost completely replacing them. Amyloid deposits were seen in vessels and tubular basement membrane also. In some, the tubules showed atrophic changes. Presence of amyloid was confirmed by special stains, Congo Red and Methyl Violet. Figure 4 shows amyloidosis kidney.

**Diabetic glomerulosclerosis:** Only two cases were studied in this group. Both were males of age 45 years, and both were known diabetic and hypertensive under treatment for 10 and 9 years respectively. In both the cases, biopsy showed diffuse enlargement of the glomeruli with accentuated lobulation giving rise to nodular appearance. Nodules had homogenous eosinophilic appearance in the centre with peripherally pushed capillaries. Hyaline arteriosclerosis was seen in one case.

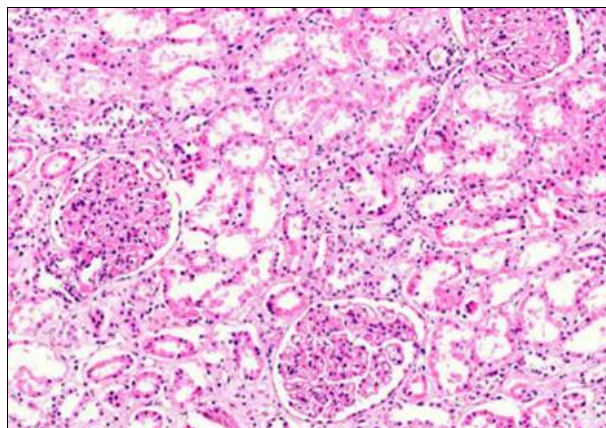
**Hemolytic uremic syndrome:** There were two cases in this group, one case of two months male infant and the other of 50 years female. The infant was admitted with anuria. There was a history of loose motions with blood and mucous, 3 days prior to admission. Physical examination showed that the child was anaemic (Hb-11.3 gms%), dehydrated and his blood pressure was not recordable. The 50 years old female was admitted with anuria. There was a history of snake bite 9 days back. She was hypotensive at the time of admission. Laboratory findings showed that she was anaemic. (Hb. 4.8g%). Peripheral blood smear examination showed Burr cells and schistocytes. The platelet count was reduced (80,000/cumm.). Blood urea level was markedly raised (297mg%).



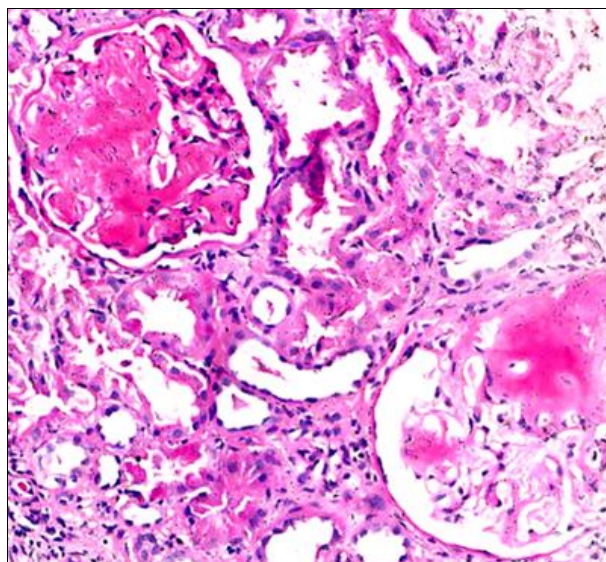
**Fig 1:** Minimal change disease (lipid nephrosis), H&E stain.



**Fig 2:** Crescentic glomerulonephritis, H&E stain



**Fig 3:** Membranous glomerulonephritis, H&E stain



**Fig 4:** Amyloidosis kidney, H&E stain

## Discussion

The commonest lesion observed was minimal change disease (31.87%). This was followed by acute glomerulonephritis (26.36%). Both together comprised more than 50% of the cases. Nephrotic syndrome was observed more commonly in adult age group.

Total number of cases in the present study was 129 biopsy cases. Distribution of various renal lesions which also gives comparative figures of distribution of renal lesions studied by others [3-5]. In our series we found that the group 'Minimal change disease' was predominating with 31.78% of the total. Habib and Sud *et al.*, reported similarly predominance of 'Minimal lesion' with 41.5% and 39.8%

cases respectively [4-6]. We found lower incidence of chronic glomerulonephritis, congenital nephritic syndrome and diabetic glomerulosclerosis. Sud *et al.*, also have reported lower incidence of chronic or end stage glomerulonephritis and congenital nephritic syndrome [5]. Habib *et al.*, have reported lower incidence of diabetic glomerulosclerosis and chronic glomerulonephritis [4]. In our series incidence of congenital nephrotic syndrome was 0.78% while Sud *et al.*, have reported it as 0.44% [6].

**Acute glomerulonephritis:** In the present series, males predominated over females. This finding is consistent with the series of Lewy *et al.* [7] In the present series history of previous infection was present in 26% cases. This finding is comparable with the series of Berry *et al.*, and Baldwin *et al.* [8-9] In the present series 83% cases presented with oedema. In the series of Berry *et al.*, all the patients (100%) presented with oedema [8]. In our series 29% cases were hypertensive. This finding is comparable with the series of Lewy *et al.*, who have reported the frequency in 32% cases [9]. Elevation of blood urea level is a consistent biochemical abnormality in acute glomerulonephritis and there is a positive correlation between hypertension and azotaemia. It may occur due to immunological infectious or non-infectious etiology [10].

**Rapidly progressive glomerulonephritis:** In the present series, sex incidence was equal. This finding is consistent with the series of Berlyne *et al.* [11] In the series of Heptinstall, male preponderance was seen. The high incidence of previous infection in the present series could be due to very small number of cases included in the study. In the present series proteinuria was present in 100% cases and microscopic haematuria in 75% cases. All the patients (100%) had azotaemia and raised serum creatinine level. All these findings are comparable with those of Heptinstall [12]. Oliguria was observed mostly in patients with rapidly progressive glomerulonephritis. Hypertension was observed mostly in patients with rapidly progressive.

**Chronic glomerulonephritis:** Youngest patient was of 2 ½ years and oldest was of 40 years. Heptinstall states that most cases occur in the second to the fifth decades, but no age group is exempt and he further states that the condition may be found in children and among the elderly. [12] History of upper respiratory tract infection was present in 50% cases. This finding is comparable with the series of Nakamoto *et al.* [13] Epithelial cell proliferation and crescent formation was noted in one case (25%). Levy *et al.*, reported it in 19% cases [7].

**Nephrotic syndrome:** Nephrotic syndrome is comprised of a myriad of symptoms that may be due to primary or secondary causes [14]. There were 93 cases of nephrotic syndrome. This was the most common indication of renal biopsy [15]. Those with minimal change disease were predominant. Many other workers have reported similar findings [16]. In our series, incidence of minimal change disease was highest with 44.08%. This finding is comparable with the findings of Sud *et al.*, who have reported 34.94 and 41.33% incidence respectively. In this group more cases were seen in adult age group (86%) than pediatric age group (14%) while in series of Sud *et al.*, children (56.44%) predominated over adults [6]. There is gross dissimilarity between potential causes of nephrotic syndrome all over the world [15].

**Minimal change disease:** The incidence was higher in the adult age group than pediatric age group. This finding is comparable with the finding of Jennette *et al.* [17] and Sud *et al.*, have reported equal incidence in both the age groups [6]. In the present series, male preponderance was observed. This finding is consistent with many other workers *viz.* Oedema was present in 100% cases while hypertension was present in 17% cases and gross haematuria in 7% cases [12]. These findings are comparable with the findings of White *et al.* [18] Glomeruli did not show any abnormality in 38 cases. In 3 cases there was mild increase in number of mesangial cells. Heptinstall also noted similar findings [12].

**Focal glomerulosclerosis:** In all the cases, occasional glomerulus showed focal sclerosis. These findings are comparable with White *et al.*, and Heptinstall [12, 18]. Hematuria was present in 40% cases in our study, which is comparable with the finding of Jennette *et al.*, (31%), 14 White *et al.*, (68%) [18] and Novet *et al.*, (66%) [19]. The prevalence seems to be increasing worldwide and is considered a major contributor of end stage renal disease [20].

**Congenital nephrotic syndrome:** Histologically glomeruli did not show any pathology. Membrano-proliferative glomerulonephritis: There were 13 cases in the present series. All presented as nephrotic syndrome and all were from adult age group. This finding is comparable with that of Davis BK *et al.* [21] In our series azotemia was present in 31% cases. This finding is comparable with the series of Mukharjee *et al.* [22] Membranous glomerulonephritis: All the patients presented as nephrotic syndrome in the present series. Fawcett *et al.*, have reported membranous glomerulonephritis as the commonest cause of nephrotic syndrome in adults. Though gross haematuria is very rare in membranous glomerulonephritis, we found microscopic haematuria in 9% cases. All the cases showed varying degree of basement membrane thickening, with reduplication in two cases. This finding is consistent with Heptinstall [12].

**Amyloidosis:** In the nephrotic syndrome group, the incidence of amyloidosis was 7.5% similar to Johnney *et al.*, 8% incidence. Amyloidosis was mostly secondary due to chronic diseases. The multisystem nature of such chronic illnesses may contribute to the fluid retention and hemodynamic instability [23].

**Diabetic glomerulosclerosis:** In the present series the mean duration of the disease was 9.5 years. Both patients presented with proteinuria. This finding is comparable with that of Heptinstall *et al.* [12] Significant pyuria was present in both. This is consistent with the finding of Johnney *et al.* [24] Both the patients had azotaemia with an average blood urea level of 113 mg% which is comparable with the 80% incidence of azotaemia in Mukharjee *et al.* [22]

**Haemolytic uremic syndrome:** In the present series, there were only 2 cases. Both were characterized by a triad of anaemia, thrombocytopenia and acute renal failure. This had followed as a complication of diarrhoea which was of acute onset associated with blood and mucous in male infant of age 2 months. Gianantonio *et al.*, [14] and many other workers have reported similar findings. Consumptive coagulopathy may lead to thrombocytopenia and hypoprothrombinemia.

Both the cases had azotaemia; in the second case it was severe (297 mg%). This is consistent with the finding of Heptinstall<sup>[12]</sup>. As the lesion is focal in distribution, a few glomeruli seen on biopsy examination as normal might not be from affected area. Heptinstall *et al.*, states that, in mild cases going to recovery, the extent of involvement is much less, thus many glomeruli appear normal.

Limitations of our study are immunological histo-chemistry was not performed. Data of remission and relapse was unavailable. Newer modalities not used. In conclusion, Nephrotic syndrome is common in adults also as against the general belief. Minimal change disease and acute glomerulonephritis are the commonly observed lesions causing nephrotic syndrome in most of the cases. Complete histopathological analysis is required to assess the parenchymal disease and distinguishing between pathological classifications.

**Conflict of Interest:** None

**Sources of funding:** NIL.

#### References:

1. Su S, Yu J, Wang Y, Wang Y, Jia Li J, Xu Z. Clinicopathologic correlations of renal biopsy findings from northeast China-A 10-year retrospective study. *Medicine (Baltimore)*. 2019 Jun; 98(23):e15880.
2. Fiorentino M, Bolignano D, Tesar V, Pisano A, Van Biesen W, D'Arrigo G, *et al.* Renal Biopsy in 2015 - From Epidemiology to Evidence-Based Indications. *Am J Nephrol*. 2016;43:1-19.
3. Churg, J, Duffy JL. Classification of glomerulonephritis based on Morphology in Kincid-Smith, Mathew Baker (Ed). *Glomerulonephritis Part I*, John Wiley Sons, New York, 1972, P43.
4. Habib E. Classification of glomerulonephritis based on morphology in Kincid-Smith, Mathew and Backer (Ed). *Glomerulonephritis Part-I*, John Wiley and Sons - New York, 1972, P17.
5. Malhota KK, Tondon HD, Kathpalia SC. Spectrum of glomerulonephritis. *Ind J Med Res*. 1974 Jan;62:110.
6. Sud A, Bhuyan UN, Tondon HD. Spectrum of morphological lesions in renal biopsies associated with primary nephrotic syndrome. *Ind J Med Res*. 1978;8:811.
7. Lewy JE. Acute poststreptococcal glomerulonephritis. *Paed Clin N*. 1976;23:751.
8. Berry S, Prakash K, Shrivastava G, Gupta S. Acute glomerulonephritis in children *Ind Paed*. 1971;8:198.
9. Baldwin BS, Gluck MC, Schacht RC, Gallo G. Long term course of post streptococcal glomerulonephritis. *Ann Int Med*. 1974;80:342.
10. Bhalla K, Gupta A, Nanda S, Mehra S. Epidemiology and clinical outcomes of acute glomerulonephritis in a teaching hospital in North India. *J Family Med Prim Care*. 2019 Mar;8(3):934-937.
11. Berlyne GM, Baker SBC. Acute anuric glomerulonephritis. *Quart J Med*. 1964;33:105.
12. Heptinstall RA. *Pathology of Kidney*, Vol. I Little Brown and Company, Boston, 1983.
13. Nakamoto Y, Asno Dohi Y, Kibe KY. Primary IgA glomerulonephritis and S. H. purpura nsphritis: Clinicopathological and immuno histological characteristics. *Quart J Med*. 1978;47:495.
14. Gianantonio CA, Vitacco M, Mendilaharsu F, Gallo GE, Sojo ET. The haemolytic uremic syndrome. *Nephron*. 1973;11:74.
15. Imtiaz S, Drohliya MF, Nasir K, Salman B, Ahmad A. Analysis of renal diseases detected in renal biopsies of adult patients: A single-center experience. *Saudi J Kidney Dis Transpl*. 2017;28(2):368-378.
16. Tumlin JA, Campbell KN. Proteinuria in Nephrotic Syndrome: Mechanistic and Clinical Considerations in Optimizing Management. *Am J Nephrol*. 2018; 47Suppl 1:1-2.
17. Jennette JC. Clinicopathological correlations in 566 consecutive renal biopsies from North Carolina. *NCMJ*. 1983, 287.
18. White RHR, Glasgow EF, Mills RJ. Clinicopathological study of Nephrotic syndrome in childhood. *Lancet* 1970; 1:1353.
19. Novet HZ, McGregor DD. The fine structure of glomerulus in membranous glomerulonephritis in adults. *Amer J Clin Path*. 1959;32:109.
20. Rosenberg AZ, Kopp JB. Focal Segmental Glomerulosclerosis. *CJASN* March 2017;12(3):502-517.
21. Davis BK, Cavello T. Membranoproliferative glomerulonephritis. *Nmer J Path*. 1974;84:283.
22. Mukharjee SK. Nephrotic syndrome-A clinicopathological study *J Assoc Physic Ind* 1973; 21:299.
23. Dember LM. Amyloidosis-Associated Kidney Disease. *JASN*. 2006 Dec;17(12):3458-3471.
24. Johny KV, Puthooran P, Datey A, Koshy R. Etiological study in nephrotic syndrome: *J Ind Med Assoc*. 1972;58:265.