

## HISTOPATHOLOGICAL SPECTRUM OF KIDNEY LESIONS IN AUTOPSY: A TEACHING HOSPITAL BASED STUDY

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### Abstract

**Background:** By exposing the uncommon lesions that are a source of learning from a pathologist's perspective, autopsies contribute to our understanding of pathology. Since many don't result in any functional impairment, several of them are only identified at autopsies. The myriads of incidental lesions that would have gone unnoticed during a person's life are highlighted by this study. **Materials and Methods:** The present study entitled "A study of histopathological spectrum of kidney lesions in autopsy" was carried out in the department of Pathology and department of Forensic Medicine and Toxicology, VIMSAR Burla from January 2021 to December 2022. In this 2-years study after exclusion of the 10 autolysed kidney specimens finally 80 cases were included. **Results:** Out of 80 cases, the major kidney changes grossly were normal soft to firm consistency (55 cases -68.75%). 5 cases (6.25%) each of cystic lesion and swollen/ enlarged kidney also observed. Major microscopic change being congestion (20 cases-25%). **Conclusion:** Autopsy is an indispensable part of medical science. Autopsy study reveals many undiagnosed histologic lesions which are not clinically detected. Many renal lesions produce no functional derangement and are detected for the first time at autopsy. This study revealed that the most common finding in kidney autopsy is normal kidney with congestion 20 cases (25%) followed by no renal pathology in 18 cases (22.5%).

## INTRODUCTION

By exposing the uncommon lesions that are a source of learning from a pathologist's perspective, autopsies contribute to our understanding of pathology. Since these occult lesions don't result in any functional impairment, several of them are only identified at autopsies. The myriads of incidental lesions that would have gone unnoticed during a person's life are highlighted by this study.<sup>[1]</sup> The earliest opportunity to detect renal lesions may come from the histological examination of autopsy kidneys. In adult autopsies, pathologists have seen a wide range of renal disease, such as vasculitis, thrombotic microangiopathy, glomerulonephritis, and diabetic nephropathy.<sup>[2]</sup> Today, chronic kidney disease (CKD) is acknowledged as a significant public health issue on a global scale and as a separate risk factor for cardiovascular disease.<sup>[3]</sup> Approximately 10% to 15% of adults globally have CKD.<sup>[4]</sup> Chronic inflammatory conditions, neoplasms, medications, and metabolic problems frequently harm the kidneys,<sup>[5]</sup> and cases that have been looked into using light microscopy

demonstrate glomerular alterations.<sup>[6]</sup> With high rates of morbidity and mortality, end-stage kidney disease (ESKD) is one of the most prevalent medical conditions in the world. Based on biopsies, glomerulonephritis (GN) is the leading cause of chronic renal insufficiency, with primary GN accounting for the majority of cases, particularly in Western and Eastern Europe.<sup>[7]</sup> Patients who have suffered a stroke or an abdominal aortic aneurysm experience renal parenchymal damage.<sup>[8]</sup> After hematopoietic stem cell transplantation (HSCT), renal insufficiency is one of the typical organ failure.<sup>[9]</sup>

### Aims and Objectives

- To establish the various incidental pathological findings in renal autopsy through histopathological examinations.
- To analyze the incidence of various kidney diseases in autopsy cases, which give us data regarding incidence in general populations of Western Odisha.
- Histopathological study can diagnose various glomerular, tubulointerstitial and vascular diseases of kidney.

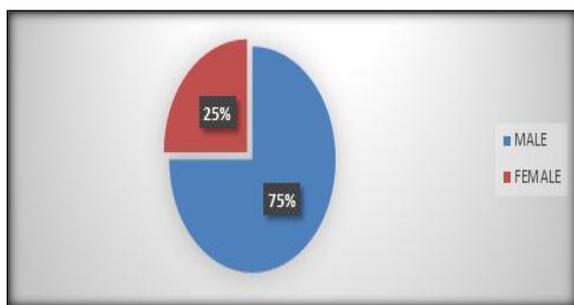
- The study will also show the long-term effects of various toxins, infection, enzymatic alteration and metabolic storage disorders on kidney.
- Correlation of this data gives information to clinician regarding prevention & management of silent kidney disease.

## MATERIALS AND METHODS

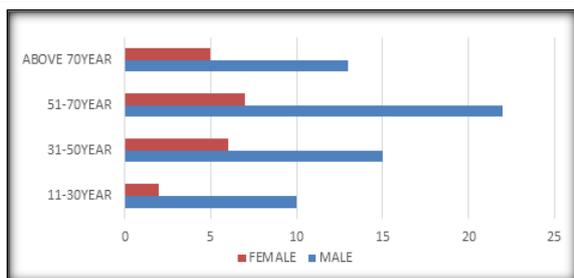
To determine the prevalence of different renal lesions during autopsy, a prospective study was undertaken on the renal specimens of 80 regular autopsies received in the pathology and forensic medicine and toxicology departments at VIMSAR, Burla during the period from January 2021 to December 2022. In the provided proforma, the medical history and clinical history were recorded. The kidney samples that were received were weighed, fixed in 10% formalin, and measured dimensions were noted. Per kidney, at least two portions were examined. Each and every histological segment was mounted after being stained with H&E dye. Every histological section underwent a microscopic examination, and the results were noted and tallied with studies by different authors.

## RESULTS

The present study entitled “A study of histopathological spectrum of kidney lesions in autopsy” was carried out in the department of Pathology and department of Forensic Medicine and Toxicology, VIMSAR Burla from January 2021 to December 2022. In this 2-years study after exclusion of the 10 autolysed kidney specimens finally 80 cases were studied.

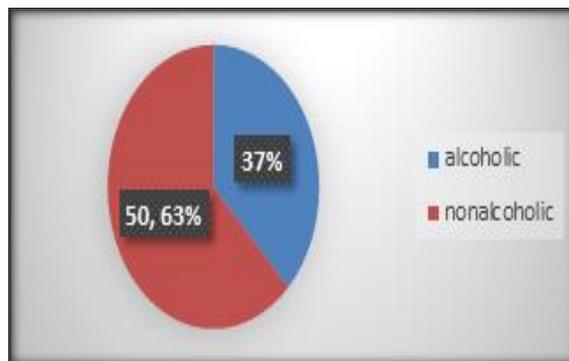


**Pie Chart 1: Distribution of Male and Female Cases (N=80)**



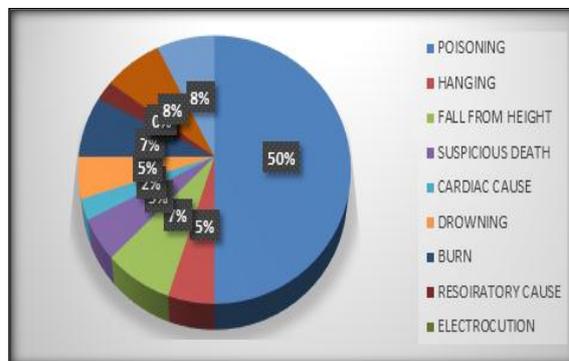
**Bar Diagram 1: Distribution of Cases According to Age and Sex (N=80)**

Pie Chart:1 and Bar Diagram: 1 shows distribution of cases according to age and sex. Pie chart shows total number of male and female cases studied. Out of the 80 cases studied 60 cases (75%) were male and 20 cases (25%) were female, males constituting the predominant component. Most cases were in the age group 51-70 years. It included 29 cases out of 80 cases which is 36.25%. Both males 22(27.5%) and females 7(8.75%) were included within this age group 51-70 years [Table 1].



**Pie Chart 2: History of Alcoholism**

Table :2 and Pie chart: 2 shows cases divided according to history of alcoholism.30 cases (37.5%) found to be alcoholic and 50 cases (62.5%) were non-alcoholic out of 80 cases, according to history collected from close relatives. Out of 30 alcoholic cases males were 28cases and females were 2 cases [Table 2].



**Pie Chart 3: Distribution of Cases with Cause of Death**

Table: 3 and Pie Chart:3 show that out of 80 cases in majority of the cases, 40 cases (50%) cause of death is road traffic accident and second majority of cases comprises of poisoning, 20 cases (25%) [Table 3].

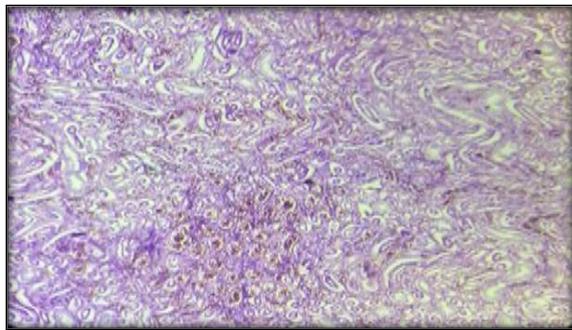
Table 4 shows that most of the cases have normal size of kidney in gross findings, 62(77.5%) cases, while 10(12.5%) cases show increased size of kidney and 8(10%) cases show decreased size of kidney [Table 4].

Table 5a shows cases divided according to the histopathological findings. Normal kidney with congestion occupies majority of cases, (20 cases - 25%) (Fig 1) followed by normal kidney without congestion (18 cases -22.5%). Chronic glomerulonephritis(Fig 2) with chronic

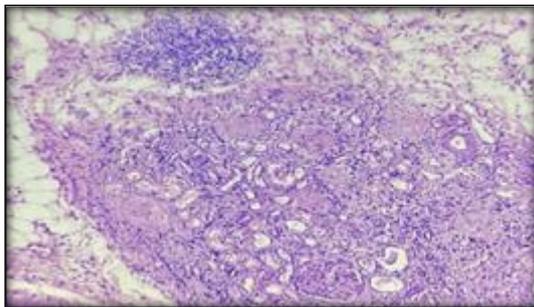
inflammatory cell infiltration in glomerulus and interstitium occupies 14 cases (17.55%) and chronic kidney disease with thyroidisation of tubules occupies 8 cases (10%) ( Fig 3), 7 cases of sickle cell nephropathy, 3 cases each of massive congestion and simple cyst, 2 cases each of tubercular granuloma (Fig 4), renal cell carcinoma (Fig 5 & Fig 6) and polycystic kidney disease (Fig. 7), and 1 case of drug induced nephropathy was detected out of 80 cases [Table 5a].

Table 5b shows age wise distribution of cases. Maximum no of cases, 29(36.25%) are within the age group of 51-70 years followed by 20 cases (25%) which are within the age group 31-50 years [Table 5b].

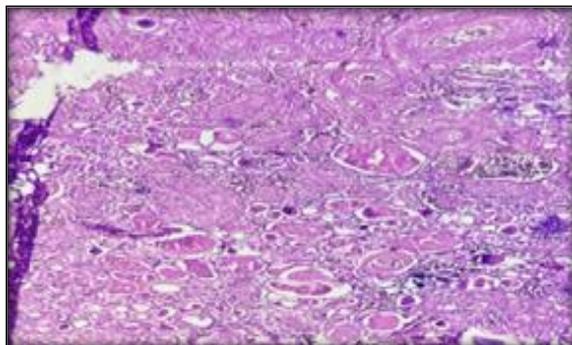
Table (5c) shows among the total 30 alcoholic cases 5 show chronic glomerulonephritis and 6 show features of chronic kidney disease. So chronic kidney disease is more common in alcoholic than non-alcoholic persons [Table 5c].



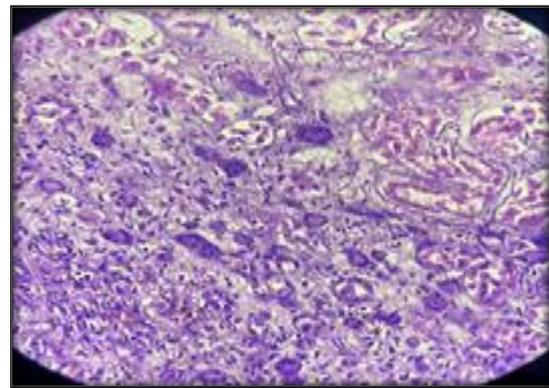
**Figure 1: Microsection shows hydropic change of the tubules and congestion (H &E × 100X)**



**Figure 2: Microsection shows lymphocytic infiltration into the interstitium (H &E × 400X)**



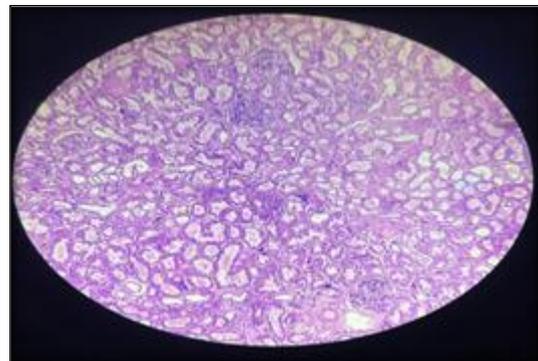
**Figure 3: Microsection shows thyroidisation of tubules (H &E × 400X)**



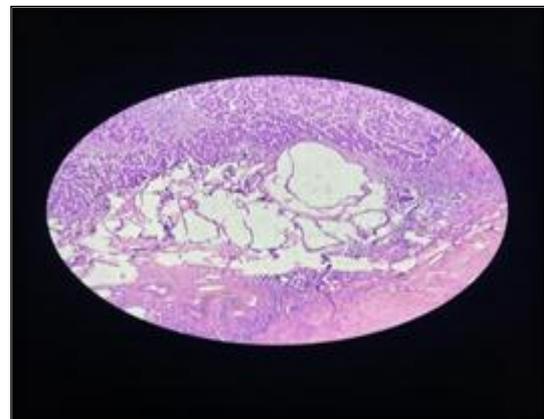
**Figure 4: Microsection shows granuloma (H &E × 400X)**



**Figure 5: Gross showing cut open kidney with a tumor mass at the upper pole**



**Figure 6: Microsection of renal cell carcinoma showing tubules lined by clear cells (H &E × 100X)**



**Figure 7: Microsection shows features of polycystic kidney disease (H &E × 400X)**

**Table 1: Distribution of Cases According to Age and Sex (N=80)**

Age In Years	Male	Female	Total	Percentage
11-30	10	2	12	15
31-50	15	6	21	26.25
51-70	22	7	29	36.25
Above 70	13	5	18	22.5

**Table 2: History of Alcoholism**

H/O alcoholism	No of cases	Percentage
Alcoholic	30(M=28, F=2)	37.5%
Non-alcoholic	50(M=32, F=18)	62.5%
total	80	

**Table 3: Case Distribution with Cause of Death**

Cases	No of Cases	Percentage
RTA	40	50%
Poisoning	20	25%
Hanging	2	2.5%
Fall from height	3	3.75%
Suspicious death	2	2.5%
Cardiac cause	1	1.25%
Drowning	2	2.5%
Burn	3	3.75%
Respiratory cause	1	1.25%
Electrocution	0	0
Post-operative	0	0
After treatment	0	0
Assault/murder	3	3.75%
Others	3	3.75%

**Table 4: Gross Findings- Size**

Size	No of Cases	Percentage
Increased	10	12.5%
Decreased	8	10%
Normal	62	77.5%

**Table 5: Histopathological Findings:( 5a)**

Histopathological findings	No of cases	Percentage
No renal pathology	18	22.5%
Normal kidney with congestion	20	25%
Chronic glomerulonephritis	14	17.5%
Chronic kidney disease	8	10%
Sickle cell nephropathy	7	8.75%
Massive congestion	3	3.75%
Simple cyst	3	3.75%
Polycystic kidney disease	2	2.5%
Drug induced nephropathy	1	1.25%
Renal cell carcinoma	2	2.5%
Tubercular granuloma	2	2.5%

**Table 5(b): Histopathological Findings: Age Wise Distribution of Cases**

Histopathology	11-30	31-50	51-70	> 70	Total (%)
No renal pathology	7	6	3	2	18(22.5)
Normal kidney with congestion	2	7	8	3	20(25)
Chronic glomerulonephritis	0	3	7	4	14(17.5)
Chronic kidney disease	0	1	4	3	8(10)
Sickle cell nephropathy	1	1	4	1	7(8.75)
Massive congestion	0	0	3	0	3(3.75)
Simple cyst	0	0	0	3	3(3.75)
Polycystic kidney disease	0	2	0	0	2(2.5)
Drug induced nephropathy	1	0	0	0	1(1.25)
Renal cell carcinoma	0	0	0	2	2(2.5)
Tubercular granuloma	2	0	0	0	2(2.5)
total	13	20	29	18	80

**Table 5(c): Chronic Glomerulonephritis, CKD and Alcoholic Person Relationship**

Histopathological Finding	Alcoholic	Non Alcoholic
Chronic glomerulonephritis	5	9
Chronic kidney disease	6	2

## DISCUSSION

The term autopsy is derived from the Greek word “autopsies” meaning auto (oneself) and opsis (eye) which is “to see for self.” Autopsies have made a major contribution to the education of medical students and allied health professionals.<sup>[10]</sup> An autopsy is an important audit tool that often discloses new information about the cause of death.<sup>[11]</sup>

Clinical or pathological autopsies are performed to diagnose a particular disease or for research purposes. The aim is to determine, clarify or confirm medical diagnosis that remained unknown or unclear prior to the patient’s death.<sup>[12]</sup> In some instances, direct benefits include the disclosure of genetic disease such as hemochromatosis and medium chain acyl CoA dehydrogenase deficiency.<sup>[13,14]</sup> Medico-legal autopsies are a mandatory specialized surgical procedure conducted on the corpse to determine the cause of death. Even

in the era of high-tech medicine, the autopsy remains an important tool for the quality assessment of clinical diagnosis. Various findings, unrelated to the cause of death may be noticed during histopathological examination of various organs and tissues retrieved during autopsies. Autopsies can also detect communicable infectious disease that could affect other family members; for eg. 5.1% of all tuberculosis in the United States between 1985 and 1988 was only recognized at autopsy.<sup>[15]</sup> Distribution of renal lesions vary with geographic area, age, gender, environmental, nutritional and genetic factors.<sup>[16,17]</sup>

This study on “histopathological spectrum of kidney lesions in autopsy” cases in Western Odisha for a period of two years showed that out of 80 cases 75% cases are male and 25% cases were female. Male to female ratio in the present study was 3:1, means there is male predominance that goes parallel with studies done by different authors as mentioned in table 6.

**Table 6: Male to female ratio in comparison to other studies**

Serial no	Study	Male: female
1	SNS Yadav et al <sup>[18]</sup>	1.8:1
2	P.S Mulay et al <sup>[19]</sup>	2.1:1
3	Amandeep Kaur et al <sup>[20]</sup>	4:1
4	Present study	3:1

In our study the commonest age group affected was 51-70 years which was comparable to studies mentioned in table 7.

**Table 7: Maximum affected age group comparative studies**

Serial no	Study	Age group
1	Amandeep Kaur et al <sup>[20]</sup>	21-40
2	P.S Mulay et al <sup>[19]</sup>	20-40
3	SNS Yadav et al <sup>[18]</sup>	31-50
4	Present study	51-70

Cause of death in post mortem cases coming for autopsy at VIMSAR, Burla are predominantly Road Traffic Accident, 40 cases (50%) followed by poisoning, 20 cases (25%) out of 80 cases.

In our study out of 80 cases 42 cases (52.5%) have definite renal pathologies. Kidneys unaffected and kidneys involved with pathologies detected in autopsies varies from region to region as shown in table 8.

**Table 8: Comparison of percentage of histologically normal kidneys in autopsy**

Serial no	Study	Year of study	Cases
1	SNS Yadav et al <sup>[18]</sup>	1980-87	422 out of 491(85.95%)
2	Usta et al <sup>[21]</sup>	2014	23 out of 55 (41%)
3	V.P Sandhu et al <sup>[6]</sup>	2017	27 out of 120 (22%)
4	Amandeep Kaur et al <sup>[18]</sup>	2018	25 out 100 (25%)
5	Kakadiya J et al <sup>[18]</sup>	220	160 cases out of 200 cases (80%)
6	present study	2022	42 cases out of 80(52.5%)

In the present study, all the cases with histopathological findings of glomerular lesions and non-glomerular lesions which included tubular lesions, vascular lesions, neoplasm and others were noted. We systematically examined all the four

compartments of renal parenchyma that is glomeruli, tubules, interstitium and vessels. Most probable cause of death in the present study observed was chronic illness, diabetes mellitus and chronic hypertension which may have contributed to

the cause of glomerular lesions as well. Vascular and glomeruli components are mostly compromised with these types of chronic illness. Tubules are mainly affected in cases where road traffic accident, haemorrhage and shock were cause of death.

Most common histopathological findings seen in our study was non-specific edema and congestion {20 cases out of 80 cases (25%)}. Passive collection of blood within renal tissue and accumulation of extracellular fluid within interstitial space could be termed as congested and edematous kidneys. These changes occur due to increase in back pressure to the kidneys either from other organ failure or some systemic inflammatory process. Congestion and edema per se are not any disease entity but reflect as a significant part of some pathological process going on in the body. In the present study percentage of non-glomerulopathies (50%) was higher as compared to glomerular lesions (27.5%) which was comparable to studies done by P.S Mulay et al,<sup>[19]</sup> Usta et al,<sup>[21]</sup> and V.K Sandhu et al,<sup>[6]</sup> which also showed higher prevalence of non-glomerular lesions.

Acute tubular necrosis and arterio-nephrosclerosis are the most commonly noted findings of kidneys at autopsy.<sup>[23]</sup> Divyashree et al in a study of nephrectomy specimens in India found that non neoplastic lesions accounted for 72% of histological diagnosis and that chronic pyelonephritis was the most common non- neoplastic renal lesions in surgical nephrectomies.<sup>[24]</sup>

Among the glomerular lesions most common findings seen was glomerulosclerosis (8 cases-36.36%) followed by acute glomerulonephritis (5cases -22.72%), a similar finding observed by Kakadiya J et al,<sup>[22]</sup> who also observed glomerulosclerosis as the most common glomerular lesion followed by acute glomerulonephritis. Majority of the cases of glomerulosclerosis (4) were in the age group 51-70 years. Most of our glomerular lesions are secondary in nature that is associated with systemic chronic illness, diabetes mellitus and chronic hypertension. In our study diabetic nephropathy was seen in 3 cases in the form of focal segmental glomerulosclerosis. In our study renal mass was detected in two cases which on histopathological examination came out to be renal cell carcinoma of clear cell variant. In spite of high prevalence of tuberculosis (TB) in India, we found only 02 cases where kidneys were involved with TB. Kidneys are secondarily involved in these cases as a part of miliary tuberculosis. Renal TB usually seen in immunocompromised individuals like HIV, immunosuppressant drugs and transplants. Grossly, renal tuberculosis was difficult to distinguish from Xantho-granulomatous pyelonephritis. But microscopically, both of our cases showed characteristic changes of tuberculosis like epithelioid cell granulomas with caseous necrosis, interstitial fibrosis and tubular atrophy. Autolysis was evident in 10 cases which were inconclusive for pathological reporting. So they were excluded from

this study. Partial autolytic changes in kidney autopsy causes diagnostic confusion with tubular necrosis. Autolysis consists of degeneration, pyknosis of tubular epithelial nuclei & retraction from basement membrane. These microscopy findings somewhat overlap with those of acute tubular necrosis. There would be uniform degenerative changes in cases of autolysis. So, careful examination of other components of renal parenchyma is required. In our study we found 8 cases (10%) of chronic kidney disease (CKD). CKD is a global health crisis, with an estimated worldwide prevalence of 8-16%. One in five men and one in four women have CKD.<sup>[25]</sup>

## CONCLUSION

Autopsy is an indispensable part of medical science. Autopsy study reveals many undiagnosed histologic lesions which are not clinically detected. Many renal lesions produce no functional derangement and are detected for the first time at autopsy. This study revealed that the most common finding in kidney autopsy is normal kidney with congestion 20 cases (25%) followed by no renal pathology in 18 cases (22.5%). Actual renal pathology was detected in 42 cases. Most common cases coming for post mortem examination to VIMSAR, Burla are Road Traffic Accident; 40 cases (50%) out of 80. Most common age group affected was 51-70 years. 14 cases of chronic glomerulonephritis, 8 cases of CKD, 7 cases of sickle cell nephropathy, 3 cases each of massive congestion and simple cyst, 2 cases each of tubercular granuloma, renal cell carcinoma and polycystic kidney disease, and 1 case of drug induced nephropathy was detected in our study. Among the CKD cases 3 cases had history of diabetes mellitus and 4 had history of alcohol intake. So, public should be informed and they should modify their life style, dietary habits, sedentary lifestyle and avoid excess alcohol intake to prevent the pathological changes in kidney; and regular health check-up should be done as a routine procedure for early detection of occult diseases.

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