Pathological changes in Kidney Autopsies from North Maharashtra – A Descriptive Study

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Date of Submission: 10/03/2022

Date of Review: 15/05/2022

Date of Acceptance: 20/02/2023

ABSTRACT

Background: Chronic Kidney disease is a major public health concern. In India, the burden of chronic Kidney disease cannot be assessed properly. In such case autopsy study becomes an indispensible part of Medicine.

Aim: To explore the spectrum of changes seen in kidneys and correlating it with clinical findings.

Material & Methods: A descriptive study of kidneys of Medico legal autopsies from January 2019 – December 2019 was conducted. A total of 665 Medico legal autopsies were received, in 73 cases kidneys were not received, while 23 kidneys had autolytic change. A total of 569 Kidneys were included in the study. The Gross and Microscopic features along with special stains were studied and the cause of death was noted.

Results: A total of 569 kidney autopsies were assessed. On Gross 26% were congested, 13% had contracted granular kidney. On Histopathological examination, Non specific changes were seen in 53.4%, specific nephropathological lesions noted were chronic pyelonephritis (8.9%), acute tubular necrosis (5.6%), sickle cell nephropathy (4.7%), tubercular nephritis (1.2%).

Conclusion: Infective etiology was the commonest cause, along with sickle cell nephropathy. It has provided the spectrum of lesions seen in this area along with correlation of cause of death. Screening for diabetes mellitus and hypertension would lead to early detection and timely management which would reduce chronic kidney diseases.

KEYWORDS: Autopsy, Chronic Kidney Disease, Sickle cell nephropathy.

INTRODUCTION

The role of Autopsy is a subject of debate. Detractors, questions the role of autopsy, while supporters, claim it is

an integral part of Medical Knowledge. Autopsy provides critical data for Medical quality assurance and quality improvement. Despite the decline in autopsy numbers, autopsy data continue to embellish medical literature and figures most prominently in Neuroscience, Cardio vascular, Hematology, Respiratory and Genito urinary fields.^[1]

There is an increased prevalence of chronic Kidney diseases (CKD) in India due to increase in burden of Hypertension and Diabetes Mellitus. By 2020 India is expected to have the world's largest population of patients with diabetes.^[2] CKD is an independent risk factor per se for cardiovascular disease.^[3, 4] Due to lack of accurate data collection, the incidence of CKD is not clear, but studies estimate that the number of new patients diagnosed with End stage Kidney disease who are started with dialysis or transplantation is one lakh per year.^[5]

In certain occasions the gross and microscopic alteration of the kidney, is not notified by functional derangement. ^[6] They are diagnosed only on Autopsy.

An Autopsy study of Kidney will help us to identify the changes in kidneys in asymptomatic or undiagnosed cases and will help us in better correlation. It will also provide useful information in determining the prevalence of CKD.

Hence, the aim of present study was to identify the spectrum of changes seen in kidneys and correlating it with clinical findings.

MATERIALS AND METHODS

A descriptive study was carried in Department of Pathology, Shri Bhausaheb Hire, Government medical college, Dhule, which is a tertiary center in North Maharashtra. The gross specimen of kidneys received of Medico legal Autopsies received in the period from January 2019 to December 2019, in autopsy section of our department were subjected for the study. A total of 665 Medico-legal autopsies were received in the study period. In 73 cases, Kidneys were not received. A total of 592 kidneys were assessed.

Medico-legal autopsy specimens with kidneys, received in study period were included for analysis. 23 kidneys were autolysed hence excluded from study. Total of 569 kidneys were included in the present study. The age, gender, clinical history was noted from the documents. The capsule, external surface, cut surfaces – cortex, medulla of renal pelvis was studied on gross examination. The Histopathological slides taken from cortico-medullary junctions were stain by Hematoxylin and Eosin stain and were reviewed by two pathologists. Special stains were done as and when required.

RESULTS

A total of 569 specimens of autopsy kidneys were assessed, 327(57.4%) cases were of Male, and 242 (42.5%) cases belonged to Females. Maximum no. of patients were in age group of 21-40yrs followed by 40-60yrs Table 1.

On gross examination, 42.53% cases of the kidney showed unremarkable changes. 26% cases showed congestion, while 13% had contracted granular appearance.Figure 1Table 2

Pigmented renal stones were seen in the calyces of the kidney in three cases, of an average size of 1 cm. Three kidneys showed hydronephrotic changes.

On Histopathological examination various kidney lesions were observed Table $\ensuremath{\textbf{3}}$

On Histopathological examination, congestion and hydropic degeneration were seen in 53.4% of cases. In 14.23% of kidneys, findings were unremarkable Table 4

Tubules and interstitium were injured in majority of cases (19.4%). The predominant cause was Chronic Pyelonephritis (8.9%).

It was followed by acute tubular necrosis, interstitial nephritis, tubercular nephritis, abscess, acute pyelonephritis. Thus, all infective etiology dominated the damage of tubules and interstitium. Figure 2

In 38 (6.25%) cases of vascular lesions including sickle cell nephropathy, diabetic nephropathy and benign nephrosclerosis were reported. Figure 3 In sickle cell nephropathy (4.7%), capillaries of glomerulus and interstitial were packed with sickle shaped RBC's forming a sickle shaped thrombi.

In chronic pyelonephritis and chronic glomerular nephritis arterioles showed hyaline arteriosclerosis. The various Glomerular lesions seen were focal global glomerular sclerosis in chronic glomerular nephritis [Fig-2] and benign nephrosclerosis. Nodular sclerosis (Kimmelstial- Wilson lesions) were seen in diabetes and segmental focal glomerular sclerosis in chronic pyelonephritis. A single case of Amyloidosis was seen in our study. Deposition of Amyloid was present in mesangium of glomerulus, around the arterioles of interstitial. Amyloid was confirmed by PAS and Congo Red stain.Figure 4

A small white nodule of 3mm in size was seen in medulla of a single case. On histopathology, it was a medullary fibroma. Figure 4 Similarly a case of Leukemic infiltrate involving the capillaries of kidney was seen.

Gender	Male	Female	Total
0-20 yrs	46	39	85
21-40 yrs	158	135	293
41-60 yrs	77	64	141
>61 yrs	32	18	50

Table 1: Age and sex wise distribution of cases

Sr. No	Gross Appearance	Total
1	Unremarkable	242 (42.53%)
.2	Congestion	153(26%)
3	Contracted Granular Kidney	79(13%)
4	Large Pale Kidney	68(11%)
5	Renal Cyst	10(1.7%)
6	Caseous Necrosis	6 (1.05%)
7	Abscess	4 (0.7%)
8	Renal stones	4 (0.7%)
9	Hydronephrotic Kidney	3 (0.5%)
10	Total	569

Table 2: Gross features of kidney lesions.



Figure 1: Gross photographs (a) external surface showed small granular contracted kidney. (b)cut surface showed congested kidney.

DISCUSSION

The Indian Chronic Kidney disease (CKD) Registry was set up by The Indian Society of Nephrology in 2005. The main



Figure 2: Photomicrographs showing (a) Acute pyelonephritis showing marked inflammatory exudate, mainly neutrophils in tubules and interstitium. (Haematoxylin and Eosin x 400) (b)Chronic pyelonephritis showing atrophy and dilatation of tubules. Dilated tubules contain colloid cast (thyroidisation) (Haematoxylin and Eosin x 400)(c) Chronic glomerulonephritis showing completely hyalinised glomerulus with chronic inflammatory cell infiltrate (Haematoxylin and Eosin x 400) (d) Tuberculous pyelonephritis showing caseating epithelioid cell granuloma with Langhans' giant cell.(Haematoxylin and Eosin x 400)



Figure 3: Photomicrographs showing (a) Sickle cell nephropathy showing glomerulus and blood vessel filled with sickle cell RBC's (Haematoxylin and Eosin x 400) (b) Benign nephrosclerosis showing hyaline arteriosclerosis, intimal thickening and obliteration of lumina of blood vessels. (Haematoxylin and Eosin x 400) (c)Diabetic nephropathy showing hyaline nodules within the lobules of glomeruli(Nodular glomerulosclerosis) (Haematoxylin and Eosin x 400) (d) PAS stain showing hyaline nodule are PAS positive (Haematoxylin and Eosin x 400).

aim was to have a comprehensive nationwide data about CKD. The Registry documents that there are demographic variations in etiology, patterns and special characteristics of CKD.^[7] Hence the present study aims to find spectrum of changes in the kidneys received for histopathology of Medico legal Post mortem.

In our study, maximum no. of cases were seen between 21-40 years of age. This is in concordance with study by kaur A et al and Patel S et al. [8, 9]

On gross examination 42.53% of kidneys were unremarkable. On histopathology, few of these kidneys showed nonspecific changes due to cellular response of the kidneys to stress or noxious stimuli and 14.23 % cases showed normal histology. The discrepancy is due to appearance of gross changes at later stage. ^[10]The examination of Kidney macroscopically helped us in correlating with microscopic findings in much better way.

While 13% cases showed contracted granular kidney, which co-related with histopathological findings of chronic pyelonephritis, chronic glomerular nephritis and benign



Figure 4: Photomicrographs showing (a) Amyloidosis of kidney showing deposits of amyloid on the basement membrane of glomerular capillary tufts, tubules and in the arterial wall. (Haematoxylin and Eosin x 400) (b) Renal Fibroma showing small spindle cells in basophilic stroma and periphery shows tubules. (Haematoxylin and Eosinx 400) (c) Amyloidosis of kidney showing PAS Positive (d) Amyloidosis of kidney showing Congo Red Positive.

nephrosclerosis. ^[11]

A single case of systemic Amyloidosis was seen in 73 years male patient with the gross appearance of large Pale kidney. These findings are similar to the findings by Padmanabhan A et al.^[12]

Sandhu Vet al ^[13] found 22.5% of kidneys with normal histology and 77.5% with nephropathological changes. While Kaur A^[8]noticed 25% of Kidneys with normal histologyand 75% nephropathological changes in his study. We found 14.23% of kidneys with normal histology and 85.77% with nephropathological changes.

The common pathological lesions seen in kidney on histopathology in our study were congestion, hydropic degeneration and cyst. These are initial response to injurious agents, stress or noxious stimuli.

Among the tubular interstitial lesions(19.4%), chronic pyelonephritis was seen in 51 cases (8.9%), followed by acute tubular necrosis in 32 cases (5.6%). These findings were in concordance with findings of chronic pyelonephritis (6.11%) by Yadav SNS. ^[14]Similarly Hailemariam S et al in his study had non glomerular lesions in 33%, glomerular and vascular pathology 28% and 29% combined lesions. ^[15]

The reason for chronic pyelonephritis being a common lesion in Indian study is due to poverty, poor sanitation, pollutants, water contamination, overcrowding and known and unknown nephrotoxins along with growing burden of Hypertension and Diabetes Mellitus. ^[2] Our study also showed similar results.

We observed 7 cases of renal tuberculosis, with a caseating granuloma in the interstitial. Renal tuberculosis develops in approximately 5% of patients with active tuberculosis. It remains clinically silent and often detected incidentally in autopsy studies. ^[16]

In our study we observed vascular lesions in 6.25% of cases, with sickle cell nephropathy in 27 cases(4.7%). The reason for more cases of sickle cell nephropathy in our study is due to institute situated near tribal district having high prevalence of sickle cell anaemia of (20%). ^[17]Sickle cell nephropathy is the common manifestation in sickle cell anaemia because the environment in renal medulla is characterized by hypoxia, acidosis and hypertonicity which favors sickling of red cells, which progresses to chronic Renal failure^{. [18]} The cause of death in these cases was vaso-occlusive crisis which correlated with study of Patel M. ^[19]

In our study Diabetic Nephropathy was seen in 6 cases, showing vascular as well as glomerular lesions. While benign nephrosclerosis were seen in 5 cases, which could be due to hypertension. As per Indian Council of Medical Research data, prevalence of diabetes in Indian population has risen to 7.1% and in urban it is as high as 28%. ^[20] However a study published from a rural belt of Karnataka, the prevalence

Sr No	Diagnosis	Total
1	Non specific changes (congestion, Hydropic Degeneration, cysts)	304 (53.4%)
2	Chronic Pyelonephritis	52 (8.9%)
3	Acute Tubular Necrosis	32(5.6%)
4	Chronic Glomerular Nephritis	31(5.4%)
5	Sickle cell Nephropathy	27(4.7%)
6	Interstitial Nephritis	9 (1.5%)
7	Tubercular Nephropathy	7(1.2%)
8	Abscess	6(1.05%)
9	Diabetic Nephropathy	6(1.05%)
10	Acute Pyelonephritis	6(1.05%)
11	Benign Nephrosclerosis	5 (0.8%)
12	Amyloidosis	1 (0.1%)
13	Medullary Fibroma	1(0.1%)
14	Leukemic Infiltrate	1(0.1%)
15	Normal Histology	81(14.23%)
	Total	569

Table 3: Histopathological Examination of kidney lesions.

of Diabetes was 3.82% and of Hypertension was 33.62%. ^[21] The prevalence of Chronic kidney disease between rural and urban India is getting blurred. ^[22] The prevalence of Diabetes and Hypertension are steadily increasing (16) ,because 50% of Diabetes and Hypertension are not aware that they are harboring the disease. ^[23]

In present study, the incidence of chronic glomerulonephritis found lower than Nzegwu M A et al $^{\rm [24]}$, the cause of which was not identifiable.

The cause of death in our most of nephropathological cases was due to cardiovascular diseases. Chronic kidney disease increases the risk of cardio vascular disease mortality, these findings correlated with Jha V et al. ^[25]

Histopathological Findings	Total
A) Non specific lesions	53.4%
B) Normal Histology	14.23%
 C) Tubular Interstitial lesions 1. Chronic Pyelonephritis 2. Acute Tubular necrosis 3. Interstitial Nephritis 4. Tubercular Nephritis 5. Abscess 6. Acute Pyelonephritis 	19.4%
D) Vascular lesions1. Sickle cell Nephropathy2. Diabetic Nephropathy3. Benign Nephrosclerosis	6.25%
E) Glomerular lesions 1. Chronic glomerular Nephritis	5.4%
F) Neoplasm & Amyloidosis	0.3%

Table 4: Distribution of Kidney lesions according to the components involved in Kidney

LIMITATIONS

Only medicolegal autopsies were studied for this study. Addition of clinical autopsies could have been included in this study.

CONCLUSION

The present study has helped us in determining which lesion is more common, the associated etiology and the lesions accompanying it. Infective etiology was the commonest cause followed by sickle cell nephropathy. Improved sanitation and personal hygiene should be observed in order to cut down rate of infective renal disorders. Measures for preventing sickle cell anaemia such as screening, health education against consanguineous marriage should be done on war footing. The vascular evidence of Diabetes and Hypertension in kidney is worsening epidemic of chronic kidney disease in India. It will add up to the mortality for cardio vascular disease. The screening for renal disorders should be stringent in patients with Hypertension and Diabetes mellitus. Autopsy studies can be helpful so more research should be conducted in the future.

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How to cite this article: Vasaikar M, Damle R, Ruikar K, Madavi S. **Pathological changes in Kidney Autopsies from North Maharashtra –A Descriptive Study**. Perspectives in Medical Research. 2023;11(1):35-40 DOI: 10.47799/pimr.1101.06