

# Evaluation of the Significance of Obtaining Two Histopathological Samples from the Same Kidney at Autopsy Examination

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## Abstract

**Introduction:** Histopathology examination is a common and recommended practice among all types of autopsy practitioners; there are few scientific outlooks guidelines or protocols about the number of samples that need to be obtained at autopsy for the histopathology examination. The aim of this study was to evaluate the value of taking multiple samples from the same kidney at autopsy examination.

**Methodology:** A cross-sectional descriptive prospective study was carried out among 108 post mortem reports and histopathology samples at the department of forensic medicine of Base Hospital Panadura and District General Hospital Kalutara and Kegalle. All autopsies with available microscopic samples of kidney irrespective of the cause of death were used for the study. The data collection process was carried out from November 2019 to February 2020 and the ethical clearance was obtained prior to the data collection.

**Results:** Data from the 108 post mortem reports were obtained. The studied sample consists of 69% (n=74) of males and 31% (n=34) females. With regard to the age distribution, the majority of 40% (n=43) cases belonged to the 51-70 age category. 69% (n=74) samples were collected from the left kidney while remaining 31% (n=34) from the right. Considering the macroscopic appearance of the kidney, cortical thickness reduction was noted among 34% (n=37) samples followed by granular contracted kidney of 31% (n=33). In the microscopic findings, the different numbers of pathologies were identified in both samples. However, the 1st sample had a higher frequency of histopathological findings than sample 2 and no significant difference in identification pathologies between 1st sample and 2nd samples were determined ( $p=0.784>0.05$ ).

**Conclusion:** Taking two samples from same kidney during the autopsy does not suggest statistical difference. However, where the resources are available it is suggested that taking two samples is beneficial.

**Keywords:** Multiple kidney samples, autopsy findings, histopathological evaluation

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## Introduction

An autopsy is a scientific examination that is systematically conducted and includes collecting samples for the purpose of additional testing by carefully dissecting and observing the body and organs. The specific examination goals depend on the nature of the case. Human autopsies often generate both legal and medical information. The histopathology plays a major contribution in diagnosis, in autopsy practice among other examination methods. However it is not a simple

procedure. It needs some practice and also depends on a number of factors such as sample number, section type, stain type, frequency, etc. The systematically well-conducted histopathological and anatomical evaluation will provide the cause of death in autopsy examination in scientific manner.<sup>[1]</sup>

The number of samples to be collected for the histopathology during autopsy is highly subjective. It affects the final outcome in several ways. Because, inappropriate number of samples is

associated with poor representation of pathology, missing of some specific features of the pathology. Adequate numbers of sample/multiple samples are associated with the proper presentation of the pathology.

There are few scientific outlooks guidelines or protocols about the number of samples that need to be obtained at autopsy for the histopathology examination.

Nevertheless, during the post mortem, two or more samples are taken from all the solid organs except kidney by most of the judicial medical officers. But, Royal Stoke University Hospital in United Kingdom practices obtaining two or more samples from the kidney as well.<sup>[2]</sup>

Autopsy kidneys show clinical as well as medical lesions. In which we can come to the exact cause of death and can comment about clinic- pathological correlation including the clinical features, the investigation reports and post mortem gross and microscopic findings.<sup>[3,4,5]</sup> Certain renal pathologies might not affect the renal function thereby not causing clinical manifestations. Therefore obtaining multiple samples is very important for the identification of undiagnosed pathology. Because a single sample does not always represent all the pathology, eg – in Pylonephritis, some parts of the kidney are nearly normal in histopathology studies as a result, it will lead to wrong conclusion.<sup>[5]</sup>

Obtaining histopathology samples are done routinely during an autopsy examination. The number of samples obtained is a subjective phenomenon and it varies from pathologist to pathologist and institute to institute. It may lead to a waste of resources, money and manpower.

The study was done to evaluate the necessity of obtaining two or more samples from the same kidney at autopsy. The research provides some knowledge on the pros and cons of taking two samples from the same kidney at autopsy.

### Methods

The study was conducted as cross-sectional descriptive retrospective study. Sample collection from the post mortems was carried out parallel at the departments of forensic medicine of Base Hospital Panadura and District General Hospital Kalutara and Kegalle from November 2018 to November 2019.

All autopsies with available microscopic samples of kidney irrespective of the cause of death are included for the study further post mortem reports where no descriptions regarding the gross pathology/findings of the kidney were excluded. Every other post mortems were selected for the

study after considering the inclusion and exclusion criteria.

Ethical clearance was obtained from the National Institute of Health Sciences, Nagoda, Kalutara Sri Lanka. Permission from the relevant hospital authority was also obtained to proceed with the study. Permission to attain relevant data and two or more sample reports were obtained from the respective coroner/s,

### Results

A sample of 108 post mortem reports and histopathology samples were obtained from three centers at the same time.

Table. 01: Demographic Information

	Characteristics	N=108 n (%)
<b>Age</b>	<30 years	05 (05)
	30-50 years	36 (33)
	51-70 years	43 (40)
	> 70 years	24 (22)
<b>Gender</b>	Male	74 (69)
	Female	34 (31)

Considering the demographic factors of the sample, the majority of 40% (n=43) belongs to the age group between 50-70 whereas the lowest recorded among age category below 30 years of 5% (n=5). The male representation noted considerably high which represented 69% (n=74) out of total furthermore the highest female representation accumulated from the age group above 70 while highest male representation gained from the age group between 51-70 category.

As far as the medical history of the sample concerns, hypertension claimed as highest prevalence among the studied population with 48% (n=37) and diabetes mellitus and ischemic heart disease equally noted among 24% (n=19) cases.

Table 02: Duration of Illness and Duration of Treatment

	Duration	(N=108) n (%)
<b>Illness</b>	≤ 1 year	03 (04)
	1 - 5 years	23 (34)
	5 -10 years	22 (31)
	≥10 years	22 (31)
<b>Treatment</b>	≤ 1 year	02 (03)
	1 - 5 years	24 (36)
	5 - 10 years	20 (30)
	≥10 years	21 (31)

The duration of the illness and duration of treatment years noted in the cases in which  $\leq 1$  year illness duration 04% (n=03) and 2 (3%) from the total sample start treatment under 1 year time, moreover from cases which duration of the illness running more than 10 years' time 31% (n=22) followed the treatment regime parallelly until the demise 31% (n=21).

Table 03: Cause of Death

Cause	(N= 108) n (%)
Sepsis	12 (11)
Heart disease	33 (31)
Respiratory disease	22 (20)
Internal Haemorrhage	16 (15)
Other	25 (23)

The majority of 31% (n=33) from the sample populations' deaths were caused by heart-related disease followed by 20% (n=22) respiratory-related disease and 23% (n=25) other different cases.

With regard to the sample collection, 68% (n=74) samples were collected from the left kidney while remaining 32% (n=34) samples were collected from the right kidney of the studied.

Table 04: Macroscopic examination findings of kidney

Macroscopic appearance of the kidney	(N= 108) n (%)
Granular contracted kidney	33 (31)
Congested Medulla	27 (25)
Cortical thickness reduced	37 (35)
Cortical scarring	09 (08)
Pale kidney	25 (23)
Unremarkable	19 (18)

Considering the macroscopic appearance of the kidney, cortical thickness reduction was noted among 34% (n=37) samples followed by granular contracted kidney of 30% (n=33) and congested medulla of 25% (n=27) from the total study sample.

Table 05: Microscopic finding of the samples

Pathology category	1st sample (N=108) n (%)	2nd sample (N=108) n (%)
Glomerular change	77 (71)	75 (69)
Vascular change	95 (90)	87 (81)
Tubular change	22 (20)	22 (20)
Interstitial change	23 (21)	17 (16)

Upon microscopic findings, the different numbers of pathologies were identified in both samples. However, the 1st sample had a higher frequency of histological findings than sample 2.

Table 06: Comparison of mean score according to histology sample

Pathology category	Histology sample 1	Histology sample 2	P value
Mean Score	2.50±1.072	2.59±0.816	0.786

With the calculated mean score of the predefined scoring system, the total mean was 2.50 in sample 1 and 2.59 in sample 2. Hence the data was skewed, non-parametric was used to assess the significance. Mann Whitney U test was carried out and the p-value was 0.786 (p>0.05). Hence was no significant difference in identification pathologies between one sample and two samples were determined.

### Discussion

During the 1960s, around a third of death certificates were incorrect. Also, around 50% of the autopsy had findings in the patients said to be unsuspected deaths. However, about 20% of clinically unexpected findings which include 5% of major findings also were found during the examination of the histopathological findings.<sup>[6]</sup>

Researcher has examined the patients aged from the 30s to above 70s mostly where males and predominant and highest frequent comorbidity identified as hypertension which was there among 47% patients. The highest frequency of cause of death noted as heart disease-related deaths (31%). Hypertension might act as a risk factor on development of atherosclerosis and may lead to heart disease related death.

At present, multiple samples are taken during the postmortem examination for histopathological assessment. This protocol is carried out to ensure the identification of underlying histopathological findings of all the tissues examined. One might argue that macroscopic examination would easy to recognize the underlying pathologies rather than sampling. Nonetheless, there might be discrepancies in the macroscopic and microscopic findings of tissue pathologies. In practice, multiple histological samples are obtained from brain, heart, lungs, liver and spleen in order to minimize the missing a localized pathology. But it is observed that a single sample is taken from the kidney for histological assessment which might miss a localized pathology in a kidney. Local micro infarctions, small abscess or glomerular pathologies may easily be missed even by an experienced Judicial Medical Officer.

As far as macroscopic appearance is concerned, the highest number of patients had reduced cortical thickness in their kidneys (35%, n=37). Granular contracted kidneys were detected in 31% (n=33) individuals. However, glomerular changes were detected around 100 patients in both

histopathological samples which might not reflect the frequencies of reduced cortical thickness.

In the present study the main objective was to evaluate the reliability of the assessment of a single histopathology sample. Researcher has obtained two samples from the different aspects of the same kidney and evaluates them histopathologically. The histopathological findings were categorized into 4 main domains. They are glomerular changes, vascular changes, tubular changes and interstitial changes. According to the presence of each domain each sample was scored and those scores were compared between 2 samples. The histological evaluation and scoring were done by the most experienced Judicial Medical Officer in the unit.

When comparing each domain it has been observed that the 1st sample had detected a higher number of pathologies than the 2nd sample. However the observation is not statistically significant ( $p=0.786>0.05$ ) according to the Mann Whitney U test. Due to the limited resources and facilities, we would suggest obtaining a single sample from the kidney as it would not make such a significant difference.

### Conclusion

Taking two samples from same kidney during the autopsy do not suggest statistical difference. However, where the resources are available it is suggested that taking two samples is beneficial.

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