

Study of Histopathological Examination in Autopsy Specimens at a Tertiary Care Center in Maharashtra

Dnyaneshwar S. Jadhav¹, Sneha S. Deshmukh², Aditya S. Keswani³, Suresh A. Chaware⁴

How to cite this article:

Dnyaneshwar S. Jadhav, Sneha S. Deshmukh, Aditya S. Keswani *et al.* Study of Histopathological Examination in Autopsy Specimens at a Tertiary Care Center in Maharashtra. Indian J Forensic Med Pathol.2024;17(4): 271-276.

Abstract

Context: Medical autopsies which carried out to identify the cause of death; medicolegal autopsies are performed to describe the injuries and identify the precise COD (Cause of Death) in cases involving suspicious circumstances.

Aims: To study the significance of histopathological examination and pattern of disease in autopsy specimens.

Settings and Design: Descriptive Study conducted at Vilasrao Deshmukh Government Medical College, Latur.

Materials and Methods: This descriptive research has been performed among all specimens received during 18 months of data collection period in Department of Pathology at Vilasrao Deshmukh Government Medical College, Latur during the study period from January 2021 to December 2022.

Results: Distribution according to histopathological findings in the Heart showed that normal histology was observed in 34.2% of specimens. This is followed by 18.4% had atherosclerosis. Distribution according to histopathological findings in Lung showed that 40.7% had pulmonary edema followed by 33.3% had pneumonia. Distribution according to histopathological findings in the Liver showed that 56.7% had congestion, and 25% had fatty liver. Distribution according to histopathological findings in the kidneys showed that the majority had cloudy changes i.e. 59.6% followed by 21.3% with chronic pyelonephritis. COD in the majority of the cases was sudden death i.e. 86.5% followed by 8.3% having road traffic accident, 3.1% with myocardial infarction and 2.1% had drowning.

Conclusions: The most commonly received organs were the heart, lungs, and brain. Commonly observed findings in the heart were atherosclerosis (18.4%), in lungs-Pulmonary edema (40.7%), in liver-congestion (56.7%), in kidney-cloudy kidney (59.6%), brain-congestion (52.1%). Sudden death is a cause of death in almost all age groups with females preponderance for sudden deaths.

Keyword: Histopathological examination; Autopsy Specimens; Heart; Lung and brains.

Author's Credentials: ¹Associate Professor, ²Junior Resident, Swami Ramanand Teerth Rural Government Medical College, Ambajogai, Maharashtra 431517, India, ³Senior Resident, ⁴Associate Professor, Vilasrao Deshmukh Government Medical College, Latur, Maharashtra 413512, India.

Corresponding Author: Aditya S. Keswani, Junior Resident, Swami Ramanand Teerth Rural Government Medical College, Ambajogai, Maharashtra 431517, India.

Email: adityakeswani@hotmail.com

Received on: 26-06-2024

Accepted on: 12-09-2024

INTRODUCTION

An essential step in determining the cause of an unexpected and sudden death is an autopsy.¹ Two broad categories can be used to characterize autopsies. One sort of autopsy called a clinical autopsy is performed to determine the clinical diagnosis of a patient that caused their death and that could not have been determined antemortem. A pathologist usually performs this kind of autopsy. In order to further our understanding of the



disease process, this kind of autopsy is occasionally performed even when the diagnosis is known.¹

In a medicolegal autopsy, the goal is to help law enforcement agencies find out the precise cause, time, and circumstances of a person's death. A forensic expert conducts this kind of autopsy, which tries to ascertain the cause of death along with the circumstances surrounding a person's passing. Law enforcement agencies typically request this kind of autopsy when there is suspicion of foul play or in cases where a death seems suspicious.¹

According to a systematic review by Gallagher *et al.*, a significant diagnostic error will be found in roughly 25% of autopsies. Therefore, by adding a histopathological examination of the autopsy specimen to the medicolegal autopsies, these diagnostic errors can be further reduced and even more significantly reduced. The process of histopathologically examining tissue specimens entails closely examining the tissues under a microscope in order to detect minute changes in the tissues that could be overlooked during a gross examination. This type of investigation is crucial in poisoning and unexpected, unexplained death cases, where a gross examination may not always be conclusive. A crucial aspect that is frequently disregarded is gathering specimens for pathological analysis. Inadequate sample collection techniques could make the entire exercise pointless. Common errors include sample autolysis, pathology sample collection that is not representative and necrotic tissue sampling.¹

Doing medicolegal autopsies may result in a great deal of incidental findings. While many of these findings might just be coincidental, some might be connected to the cause of death. Similar to this, a lot of coincidental discoveries could be made when histopathologically examining the samples that came from the medico-legal autopsies. While certain findings, when correlated with the purported history, may help us pinpoint the exact cause of death, the other coincidental findings may allow us to examine the natural course of evolution of many diseases, which might not be possible in living patients.²

When combined with an analysis of demographic factors, the histopathological diagnosis of autopsy specimens helps explain a number of community-acquired infections, inflammatory illnesses, and clinically undetected neoplasms.³ As a result, it also aids in improving public health planning.⁴

Histopathologic analysis is not routinely performed on all medicolegal autopsies. Histopathologic examination is only performed on cases in which the COD is not immediately apparent or evident upon gross autopsy. This is done in order to:

- a. Confirm the presence of COD
- b. Confirm the nature of the disease
- c. Establish the basis of COD. Divergent views exist regarding the value of histopathological examination in medicolegal cases.⁵

Hence this research has been performed to study the significance of histopathological examination and pattern of disease in autopsy specimens.

MATERIALS AND METHODS

This descriptive study was carried out on all specimens received in the Department of Pathology at our tertiary care center during the 18-months data collection period, which ran from January 2021 to December 2022.

Sample size: All specimens received during the 18 months of the data collection period were considered as the sample size for our study.

Inclusion criteria: All autopsy specimens received in the Pathology department.

Exclusion criteria: Autolyzed specimens will be excluded.

Methods of data collection

A study was carried out on all specimens of autopsy received during the study period. Internal organs from autopsy cases were received and a gross examination of specimens has been performed after fixing specimens in 10 percent formal in for 24 to 48 hours and tissue sections of 4 to 5 microns in thickness were obtained followed by paraffin embedding.

After tissue block cutting slides were obtained and stained with hematoxylin and eosin stain, cleared by xylene, and mounted on a glass slides.

Slides were examined under a light microscope and histopathological examination was done.

IHC marker TTF1 was used for a case of adenocarcinoma lung which was metastasized to multiple organs like the brain, kidney spleen.

Statistical analysis

Data was gathered using a proforma for structure. Data entered into an MS Excel spreadsheet was analyzed using IBM USA's SPSS 24.0 version. Poisson data was utilized to express qualitative data. Standard deviation and mean were used to express quantitative data. Using Fischer's exact test and Chi-square, an association between two qualitative variables was observed. A statistically significant p-value was defined as less than 0.05, and a highly significant p-value as less than 0.001.

RESULTS

We included a total of 96 autopsy cases received in the Pathology department. Out of 96 cases, the majority of belonged to the 21-30 yrs age group i.e. 50% followed by 17.7% from 31-40 years, 12.5% from 10-20 years, 9.4% from 51-60 years, 7.3% from 41-50 years and least i.e. 3.1% from above 60 years age group. 62.5% were females and 37.5% were males.

Distribution according to organs received showed the results as follows: Heart - 39.6%, Lung - 84.4%, Liver - 62.5%, Kidney - 49%, Brain - 50%, Spleen - 42.7%, and Uterus - 16.7%.

Table 1: Distribution according to Histopathological findings in Heart (n-38)

Histopathological findings in Heart	Frequency	Percentage
Atherosclerosis	7	18.4%
Early changes in MI	2	5.3%
Metastatic deposits	1	2.6%
MI with atherosclerosis	2	5.3%
Myocarditis	1	2.6%
Normal Histology	13	34.2%
Old Healed MI with atherosclerosis	3	7.9%
Pericarditis	1	2.6%
Ventricular hypertrophy	4	10.5%
VH with atherosclerosis	4	10.5%

Distribution according to Histopathological findings in the Heart showed that normal histology was observed in 34.2% of specimens. This is followed by 18.4% having atherosclerosis, 10.4% having ventricular hypertrophy, and VH with atherosclerosis each. 5.3% had early changes of MI. 5.3% had MI with atherosclerosis. Metastatic deposits, Myocarditis, and Pericarditis were found in 2.6% of cases each. Metastatic deposits from adenocarcinoma lung were observed.



Fig. 1: Gross specimen of Heart showing Atherosclerosis of the Aorta

Table 2: Distribution according to Histopathological findings in Lung (n-81)

Histopathological findings in Lung	Frequency	Percentage
Chronic venous congestion	5	6.2%
HMD	2	2.5%
Interstitial pneumonia	10	12.3%
Adenocarcinoma	1	1.2%
Miliary TB	1	1.2%
Pneumonia	27	33.3%
Pulmonary edema	33	40.7%
Thromboembolism	2	2.5%

Distribution according to Histopathological findings in Lung showed that 40.7% had pulmonary edema followed by 33.3% had pneumonia, 12.3% had interstitial pneumonia, 6.2% had Chronic venous congestion and 2.5% each had HMD and thromboembolism. 1 case of adenocarcinoma lung and 1 case of miliary TB was found.

Distribution according to Histopathological findings in the Liver showed that 56.7% had congestion, 25% had fatty liver, 11.7% had cirrhosis 3.3% had metastasis and 1.7% had hepatitis and TB. Two cases of metastasis in the liver were observed one from adenocarcinoma lung and another from undifferentiated sarcoma.

Table 3: Distribution according to Histopathological findings in kidney (n-47)

Histopathological findings in Kidney	Frequency	Percentage
Acute pyelonephritis	1	2.1%
Acute tubular necrosis	6	12.8%
Cloudy change	28	59.6%
Chronic pyelonephritis	10	21.3%
Metastasis	1	2.1%
TB	1	2.1%

Distribution according to histopathological findings in kidneys showed that the majority had cloudy changes i.e. 59.6% followed by 21.3% with chronic pyelonephritis, and 12.8% had acute tubular necrosis. 2.1% each had acute pyelonephritis, metastasis, and TB.

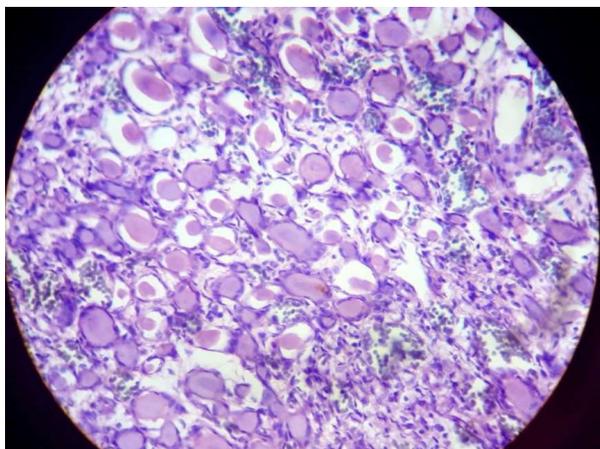


Fig. 2: Photomicrograph of kidney showing thyroidisation of renal tubules - Chronic Pyelonephritis (40X)

Table 4: Distribution according to Histopathological findings in Brain (n-48)

Histopathological findings in Brain	Frequency	Percent
Acute Meningitis	3	6.3%
Congestion	25	52.1%
Edema	18	37.5%
Metastasis	1	2.1%
TB	1	2.1%

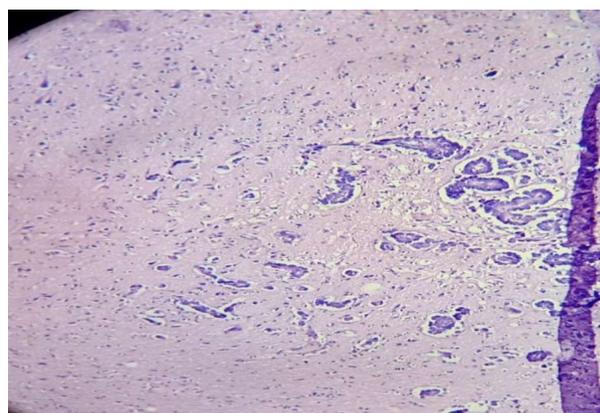


Figure 3: Photomicrograph of cerebrum showing metastatic deposits from Adenocarcinoma Lung arranged in a glandular pattern (10X)

Distribution according to Histopathological findings in Brain showed that the majority had congestion i.e. 52.1% followed by edema in 37.5%, and acute meningitis in 6.3%. 2.1% had metastasis and also 2.1% had TB. Distribution according to Histopathological findings in the spleen showed congestion in 95.1% and metastasis and TB in 2.4% each. Distribution according to Histopathological findings in myometrium revealed that 100% had myometrial hypertrophy.

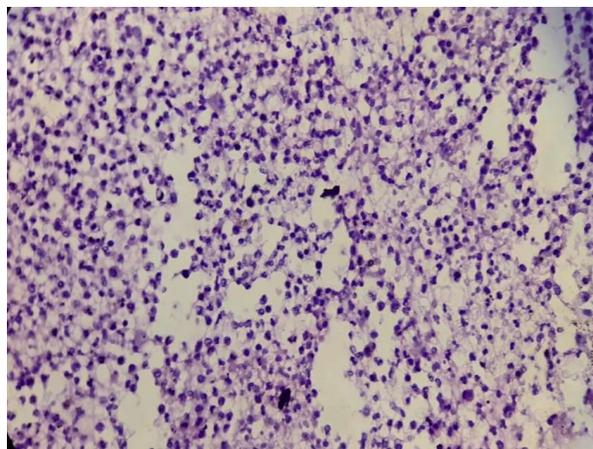


Fig. 4: Photomicrograph of meninges showing acute meningitis - acute inflammatory infiltrate of polymorphs notes (40X)

Table 5: Distribution of cases according to cause of death

Cause of death	No of cases	Percent
Drowning	2	2.1%
MI	3	3.1%
RTA	8	8.3%
Sudden Death	83	86.5%
Total	96	100.0%

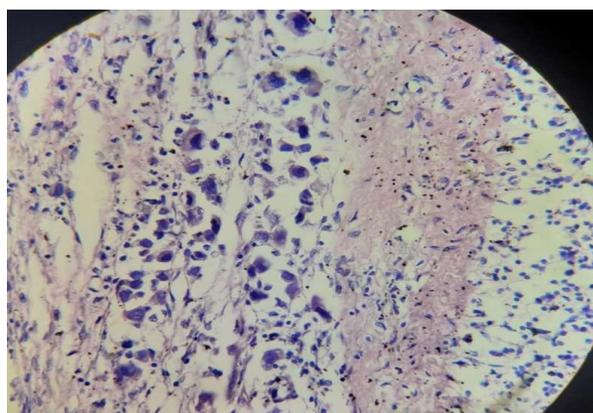


Fig. 4: Photomicrograph of spleen showing metastatic deposits from adenocarcinoma lung (40X)

COD in the majority of the cases was sudden death i.e. 86.5% followed by 8.3% having road traffic accident, 3.1% with myocardial infarction and 2.1% had drowning.

In the 10-20 yrs age group, the majority of the deaths were attributed to sudden deaths i.e. 91.7%. In the 21-30 years age group, the majority of the deaths were attributed to sudden deaths i.e. 89.6%. In the 31-40 years age group, the majority of the deaths were attributed to sudden deaths i.e. 76.5%.

In the 41-50 years age group, the majority of the deaths were attributed to sudden deaths i.e. 85.7%. In the 51-60 years age group, the majority of the deaths were attributed to sudden deaths i.e. 77.8%. In the above 60 years age group, the majority of the deaths were attributed to sudden deaths i.e. 100%. We observed no significant association between age and cause of death in our study ($p > 0.05$).

The proportion of males with a cause of death due to drowning was 2.8%, MI 8.3%, RTA 16.7%, and sudden death 72.2%. The proportion of females with cause of death due to drowning was 1.7%, MI 0%, RTA 3.3%, and sudden death 95%. We observed a significant association between gender and cause of death in our study ($p < 0.05$).

DISCUSSION

The mean age of the study population was 31.98 ± 10.23 yrs. 62.5% were females and 37.5% were males. **Pathak A. et al**⁶ reported the age-wise distribution as 5 from 0-10 years, 8 from 11-20 years, 23 from 21-30 years, 24 from 31-40 yrs, 11 from 41-50 yrs, 8 from 51-60 yrs and 11 from above 60 years. **Sapna Patel et al**⁷ in their study reported that out of the total 202 cases majority (48.5%) of cases were between 21-40 years, constituting 98 of the total cases. 39.6% from 41-60 years, 5.9% from 61-80 years age group.

Female predominance was noted in our study (62.5%), which was in contrast with a study done by **Patel CB et al**,⁸ **Sumaya et al**,⁹

Adil SA et al¹⁰ revealed that the heart (29.2%) was the most often received organ in the study, followed by the lung (13.3%) and the skin (12.3%). There were three cases of fatty liver and eighteen cases of atherosclerosis.

Distribution according to Histopathological findings in the Heart in our study showed that normal histology was observed in 34.2% of specimens. This is followed by 18.4% had atherosclerosis, 10.5% had ventricular hypertrophy, and VH with atherosclerosis each. 5.3% had early changes of MI. 5.3% had MI with atherosclerosis. Metastatic deposits, Myocarditis, and Pericarditis were found in 2.6% of cases each.

Pathak A. et al⁶ reported that 23.3% had coronary atherosclerosis. **Sapna Patel et al**² According to their study, atherosclerosis of the coronary arteries and aorta was the most frequently observed incidental histopathologic finding in 55 (27.2%) cases.

P. Arunalatha et al²⁸ reported that the most common incidental histopathologic outcome in

the heart was atherosclerosis i.e. 18%. **Adil SA et al**¹⁰ reported that the Histopathological findings in Heart showed atherosclerosis in 16.98%.

Pathak A. et al⁶ reported edema in 37.7% of cases, and pneumonia in 31.1% of cases. **Sapna Patel et al**⁷ in their study reported that histopathological findings in the lungs showed pulmonary edema in 12.5%, and pneumonia in 3.5%.

P. Arunalatha et al¹¹ reported that the most common incidental histopathologic finding in the lung was pulmonary edema in 11%, and pneumonia in 3%. **Adil SA et al**¹⁰ reported that histopathological findings in the lungs showed congestion in 5.66% and chronic bronchitis in 1.88%.

Distribution according to Histopathological findings in the Liver showed that the most common finding i.e. 56.7% had congestion, 25% had fatty liver, 11.7% had cirrhosis and 3.3% had metastasis and 1.7% had hepatitis and TB.

Pathak A. et al⁶ reported that 70% had congestion, 5.55% had fatty liver and 2.22% had necrosis and inflammation, 1.1% had cirrhosis. **Sapna Patel et al**⁷ in their study reported that fatty liver in 40 (19.8%) cases.

P. Arunalatha et al¹¹ reported that the most common incidental histopathologic finding in the liver was CVC i.e. 6% and cirrhosis at 3%. **Minal G. et al**³⁰ reported that the pathology observed in the liver is 33 (24%) cases of fatty change **Khiste JA et al**¹² reported the histopathology of the liver as fatty changes in 24% and congestion in 12.5%. Our study shows the most common finding 56.7% cases of congestion and 25% cases of fatty liver which is consistent with the findings of **Minal G. et al**,¹³ **Khiste JA et al**.¹²

Pathak A. et al⁶ reported that Histopathological findings in the kidney showed that the majority had congestion i.e. 70% followed by necrosis in 4.44% and CRF in 3.33%.

In our study distribution according to Histopathological findings in the Brain showed that the majority had congestion i.e. 52.1% followed by edema in 37.5%, and acute meningitis in 6.3%. 2.1% had metastasis from adenocarcinoma lung and also 2.1% had TB.

Pathak A. et al⁶ reported congestion in 77.7% and edema in 10% of cases. **Sapna Patel et al**⁷ in their study reported that histopathological findings in the brain showed meningitis in 1% of cases. In our study, 6.3% of cases of meningitis were seen.

Adil SA et al¹⁰ reported that the histopathological findings in the brain showed edema and SAH in 0.94% and congestion in 5.74% of cases.

Distribution according to Histopathological findings in the spleen showed congestion in 95.1% and 2.4% had metastasis from adenocarcinoma lung and TB in 2.4%.

Adil SA et al¹⁰ reported that histopathological findings in the spleen showed congestion in 5.66%.

Minal G. et al¹³ revealed that 35 (29.66%) cases of congestion and 83 (70.33%) cases of CVC spleen were the pathologies seen in the spleen.

Adil SA et al¹⁰ got 2 cases of endometrial decidualized stroma with villi and 1 case of myometrial hypertrophy. Our study shows 16 cases of myometrial hypertrophy.

The cause of death in the majority of the cases was sudden death i.e. 86.5% followed by 8.3% having road traffic accidents, 3.1% with myocardial infarction, and 2.1% drowning.

Adil SA et al¹⁰ reported that the main COD as reported in patient history was Sudden death (30%), **Sarangal S. et al**¹⁴ also reported most common COD was sudden death, our study also consistent with the same finding showing sudden death as a most common cause of death with 86.5%.

Tanushi et al¹⁵ revealed that sepsis with MODS (70%) and cardiorespiratory failure (30%) were the leading causes of death.

In our research, 91.7% of the deaths in the age group of 10–20yrs were attributed to sudden deaths. 89.6% of deaths in the age group of 21 to 30yrs were attributed to sudden deaths. In the age group of 31 to 40, sudden deaths accounted for 76.5 percent of all deaths. 85.7% of deaths in the age group of 41 to 50yrs were attributed to sudden deaths. In the 51-60 years, age group, the majority of the deaths were attributed to sudden deaths i.e., 77.8%. In the above 60 years age group, the majority of the deaths have been attributed to sudden deaths i.e., 100%. We observed no significant association between age and cause of death in our study ($p>0.05$).

CONCLUSION

The most commonly received organs were the heart, lungs, and brain. Commonly observed findings in the heart were atherosclerosis (18.4%), in lungs-Pulmonary edema (40.7%), in liver-congestion (56.7%), in the kidney-cloudy kidney (59.6%), in the brain-congestion (52.1%) and in the spleen-congestion i.e. 95.1%. We also observed that sudden death was a cause of death in almost all agegroups with females preponderance for sudden deaths.

REFERENCES

- Kandy NC, Pai MR, Philipose TR.** Role of histopathology on autopsy study: an audit. *SAS J Med* 2015;1(1):7-15.
- Gezelius C, Eriksson A.** Neoplastic disease in a medicolegal autopsy material. A retrospective study in northern Sweden. *Z Rechtsmed* 1988;101(2):115-30.
- Burton EC, Troxclair DA, Newman WP.** Autopsy diagnoses of malignant neoplasms: how often are clinical diagnoses incorrect? *JAMA* 1998;280(14):1245-8.
- Jhajj KK, Nibhoria S, Sandhu SK, et al.** A study of histopathological examination in medico-legal autopsies in Faridkot, Punjab. *IJFMT* 2013;7(1):76-81.
- Dettmeyer RB.** The role of histopathology in forensic practice: An overview. *Forensic Sci Med Pathol.* 2014;10:401-12.
- Pathak A, Mangal HM.** Histopathology Examination in Medico-legal Autopsy Pros & Cons. Governing Council 2010-2012. 2010 Jun;32:128.
- Sapna Patel, Rajalakshmi BR, Manjunath GV.** Journal of Clinical and Diagnostic Research. 2016 Nov, Vol-10(11): EC08-EC12.
- Patel CB, Patel K, Bhagat VM, Shah P.** Pattern of histopathological lesions in lung autopsy. *Int J Res Med Sci.* 2018;6:279-83.
- Sumaya, Aruna S, Gurudut KS, Kittur SK.** Histomorphological pattern analysis of lung autopsies in a tertiary care hospital. *Indian J Pathol Oncol.* 2020;7(2):279-84.
- Adil SA, Nataraju G, Anjali PV.** Histopathological study of medicolegal autopsy specimens. *JMSCR.* 2018; 6(10):75-9.
- P. Arunalatha, A. Sangeetha & Nalli. R. Sumitra Devi:** Spectrum of Histopathological Findings in Autopsies-Highlighting The Interesting and Incidental Findings. *International Journal of current Medical and Applied sciences;* 2017, 15(2),61-66.
- Khiste JA, SS D, Pandit GA, Bendre MA.** Histomorphological study of medicolegal autopsy cases. *Liver.* 2021;4:0-3.
- Minal G. Panchal, Rupali Giridhar Sonwane.** Histopathological Study of MLC and Autopsy Cases in Our Hospital. *Indian J Forensic Med Pathol.* 2019;12(2):106-112.
- Sarangal S, Arora S, Sharma S, et al.** To study the pattern of histopathological findings in cases of medicolegal autopsies. *J Evolution Med Dent Sci* 2022;11(03):406-409, DOI: 10.14260/jemds/2022/78
- Tanushri M, Soma M et al.** Retrospective Analysis of Histopathological and Microbiological Correlation of Autopsy series. *Journal of Clinical Medicine and Therapeutics.* 2017;2:2:1-4.