



## HISTOMORPHOLOGICAL STUDY OF LUNGS IN CASE OF DEATH IN COVID PANDEMIC OUTBREAK – AN AUTOPSY STUDY IN A TERTIARY CARE CENTRE.

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### INTRODUCTION:

The Coronaviridae viral family typically causes respiratory disease in human are enveloped virus comprising single-stranded RNA. Coronavirus disease 2019 (COVID-19) posed a pandemic in the form of severe acute respiratory syndrome (SARS)-which led to a major health disaster all over the world.

The major histopathological findings seen in autopsy cases of lungs are diffuse alveolar damage (DAD), chronic interstitial pneumonia and organizing pneumonia (OP).

This study is carried out to diagnose the probable missed COVID pneumonic cases which led to death. It was also noted the significant pathological findings in lungs in routine autopsy reporting unlike unremarkable morphology in earlier years.

### AIM AND OBJECTIVES:

To study the pathological changes in lungs in case of death in COVID pandemic.

To study the pathological changes in lung probably due to COVID which were undiagnosed or misdiagnosed.

### MATERIAL AND METHODS:

A one year descriptive study was carried out in the Department of Pathology at tertiary care centre in south India with secondary data obtained from January 2020 to December 2020.

The autopsy specimens of lungs received in the Department of Pathology were examined for histopathological evidence of Diffuse alveolar damage (DAD), Organizing pneumonia (OP), Chronic interstitial pneumonia.

**Inclusion criteria:** All autopsy specimens of lung.

**Exclusion criteria:** known case of COVID were excluded from the study.

## RESULTS:

In the present study we examined a total of 118 cases out of which 82 were male and 36 were female whose age ranged from 18 to 75 years. On microscopic examination 31 cases were unremarkable, 07 cases showed Diffuse Alveolar damage, 44 cases showed organising Pneumonia, 08 cases showed chronic interstitial Pneumonia and 28 cases showed other pathological findings like pulmonary edema, Aspergillosis, congestion etc.

## CONCLUSION:

The Pathological changes in the lungs of death during COVID pandemic needs further study with viral IHC markers for confirmatory diagnosis.

**Key words:** Histomorphology of lungs, COVID pandemic, DAD, organising Pneumonia, Chronic interstitial Pneumonia

## INTRODUCTION:

The diagnosis and treatment of a new disease always pose a challenge due to lack of knowledge and available data regarding its morphology and clinical behaviour. In December 2019 such a new disease outbreak happened worldwide which later named as COVID 19. It was first reported in China. COVID 19 was declared as pandemic by WHO on March 11 2020. [1]

The Coronaviridae viral family typically causes respiratory disease in human are enveloped virus comprising single-stranded RNA. [2,3] Coronavirus disease 2019 (COVID-19) posed a pandemic in the form of severe acute respiratory syndrome (SARS)-which led to a major health disaster all over the world. [4]

Earlier there were six coronaviruses which were enveloped with single-stranded RNA and known to cause pulmonary, neurological, hepatic and intestinal disease in humans. The zoonotic “Middle East respiratory syndrome coronavirus” (MERS-CoV) and the zoonotic “severe acute respiratory syndrome coronavirus” (SARS-CoV) can be fatal but the remaining four viruses causes mild respiratory symptoms [1]. SARS-CoV-2 attaches to the angiotensin-converting enzyme 2 (ACE 2) receptor which are present on the surface of pulmonary alveolar cells, causing respiratory symptoms [1].

Clinically majority of the patients presents with mild respiratory symptoms like cough, cold and fever which may last for one to two weeks. The patients with other co-morbidities like hypertension, Diabetes mellitus, Immunosuppression and Chronic respiratory failure lands up with severe illness with increased Case fatality rate. Though the clear cause of death is not fully understood, it was assumed that the massive alveolar damage leading to progressive respiratory failure is major Pathogenic mechanism. [5,6]

Since the beginning of the disease SARS-CoV-2 reverse transcriptase polymerase chain reaction (RT-PCR) is used routinely for confirmatory diagnosis. However, few articles highlights the poor performance in terms of sensitivity [7,8]

The major histopathological findings seen in autopsy cases of lungs are diffuse alveolar damage (DAD), chronic interstitial pneumonia and organizing pneumonia (OP). [9,10]

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### **AIM AND OBJECTIVES:**

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### **RESULTS:**

In the present study we examined a total of 118 cases out of which 82 were male and 36 were female whose age ranged from 18 to 75 years.[Figure- 1]

On microscopic examination 31 cases were unremarkable, 07 cases showed Diffuse Alveolar damage, 44 cases showed organising Pneumonia, 08 cases showed chronic interstitial Pneumonia and 28 cases showed other pathological findings like pulmonary edema, Aspergillosis, congestion etc. [Figure -2]

### **DISCUSSION:**

The pathogenesis and pathological manifestations of COVID-19 is not well understood. The Autopsy plays a major role in improving our knowledge regarding the same, which will help in the diagnosis and treatment of COVID cases effectively.

COVID 19 being a primary respiratory virus it may manifest clinically in other systems too. The spectrum of respiratory manifestation ranges from mild flu to Pneumonia, respiratory failure and death. [4,5]

Patients presents clinically with systemic manifestation such as fever with elevated C reactive protein, ferritin, LDH and D dimer with cytokines storm will lead to the local manifestations in Respiratory system like Diffuse Alveolar Damage, Organising Pneumonia and Chronic interstitial Pneumonia. [11]

Infection progresses to Acute respiratory distress syndrome (ARDS)

31–41.8% of COVID-19 patients with mortality rate of 52.5–93% [12]. Most of the patients with ARDS have a histological features of Diffuse Alveolar Damage (DAD). DAD leads to exudative phase progressing to proliferative phase which deranges the gas exchange in alveoli. In 1-3 weeks we can see the proliferation of fibroblasts, type 2 pneumocytes which will further progress to fibrosis.

Elevate cytokine with prothrombotic effect suggests thromboembolic phenomenon with endothelial injury as a pathogenic mechanism in Organising Pneumonia and Chronic interstitial Pneumonia.[11]

Other Pathological features like pulmonary edema & congestion are not specific to any particular disease except Aspergillosis.

The histopathological demonstration of all these changes in lungs in case of COVID is needed to expand our knowledge on Pathogenesis of COVID 19.

Though the all these Pathological features are not specific to COVID 19 we can just suspect that the pulmonary manifestation obtained were may be due to COVID 19 as these cases happened in the time of epidemic outbreak. However a further detailed study with IHC marker of COVID 19 is needed to confirm the definitive etiology.

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**Conflicting Interest (If present, give more details):** Nil

**CONCLUSION:**

The Pathological changes in the lungs of death during COVID pandemic needs further study with viral IHC markers for confirmatory diagnosis.

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