



## Correlation of Chest Ct Severity Score with Clinical Outcome in Patients with Covid-19.

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### ABSTRACT:

**BACKGROUND:** coronavirus disease 2019 is a global health crisis. findings of high-resolution computed tomography (hrct) compliment the clinical findings in the management of covid-19. This study aims to correlate the clinical outcome of patients with covid-19 with the 25-point ct severity score.

**MATERIALS AND METHODS:** Retrospective hospital-based study conducted after ethical clearance. All COVID positive patients above the age of 18 years admitted in COVID ICU with HRCT were included in the study. Details of comorbid conditions, mode of oxygen requirement, laboratory parameters, CT score on day 1 ICU admission were analysed using SPSS version 28.

**Results:** Out of the 106 patients, 60 (56.6%) were male and 46(43.4%) female. Mean age was 59.62±18.48 years. 57 (53.8%) each had diabetes mellitus and hypertension, 10 (9.4%) ischaemic heart disease, 6(5.7%) COPD, 5(4.7%) Chronic Liver Disease, 4 (3.8%) each had thyroid dysfunction and acute kidney injury. 15 (14.2%) had upto 3 comorbidities. Mode of oxygen administration - 48 (45.3%) were on invasive ventilation, 21(19.8%) on HFNC, 13(12.3%) on NRBM, 13(12.3%) on Facemask, 6(5.7%) on Non-invasive ventilation (NIV) and 5(4.7%) on Venturi facemask. Of the 48 on invasive ventilation 30(62.5%) succumbed, of which 9 (30%) died due to Ventilator Associated Pneumonia (VAP), 17(56.6%) septic shock and 4(13.3%) other causes. Mean CT score was higher among those who died (15.29±4.395) compared to the patients who recovered (10.19±5.661). This association was statistically significant (p value<0.0001). Also significant association between mode of oxygen delivery and outcome was found. Mortality observed among 69.2% who received NRBM. There was no correlation between laboratory findings and CT score. None of the radiological findings had significant association with D-dimer levels.

**Conclusion:** Mean CT score higher (15.29±4.395) in the mortality group compared to the patients who

recovered (10.19±5.661). Statistically significant - p value<0.0001.

**Keywords:** Chest CT severity score, COVID-19, RT-PCR, Oxygen

### I. INTRODUCTION

Coronavirus disease 2019(COVID-19) is a lower respiratory tract infection caused by severe acute respiratory coronavirus 2 (SARS-COV-2) which was first reported in Wuhan, China in the month of December 2019. <sup>1</sup> The virus has then spread rapidly worldwide creating a public health emergency of international concern. SARS-COV-2 infection is associated with frequent thrombotic events, at the micro and macro-vascular level due to the perpetuation of state of hyper coagulopathy. <sup>2</sup> 'COVID-19 associated coagulopathy' represents a key aspect in the genesis of organ damage in these patients. Thrombotic events affect one-third of patients and are associated with greater disease severity and increased mortality. <sup>3</sup> The nasopharyngeal swab RT-PCR test has been the diagnostic test used as standard for confirmation. A non contrast high resolution CT (HRCT) chest imaging plays an essential role in the early disease detection particularly in patients with false-negative RTPCR results. <sup>4</sup> Moreover the disease severity can be analysed from the imaging findings, supporting the clinicians in their clinical judgement and management. Also the severity of inflammation may directly be related to the hypercoagulable state in COVID-19 patients. Chest computed tomography (CT) involvement is the most visual parameter that reflects the severity of inflammation. Prognosis can also be affected by the disease severity in the critically ill patients allowing appropriate selection of early involvement of the intensive care.

### II. MATERIALS AND METHODS

**Source of Data:** Confirmed cases with epidemiological history, clinical manifestations and microbiological evidence by Real time reverse transcription polymerase chain reaction (RT-PCR) assay along with chest High resolution Computed



tomography (HRCT) who were admitted in Father Muller Medical College Hospital, Mangalore, Karnataka.

**Study Design:** Retrospective record based study

**Study Duration:** Over a period of two months (September 2021-October 2021) after getting clearance from the Ethics committee.

**Sample Size:**106

**Study population:** Patients admitted during the above-mentioned period.

**Selection criteria:**

**Inclusion criteria:**

1) Age above 18 years of either gender admitted to hospital with confirmed RT-PCR and chest HRCT.

**Exclusion criteria:**

1) Pregnant patients.

Data pertaining to patients fulfilling the above selection criteria based on history, laboratory parameters like D-dimer, CRP, LDH, Ferritin, creatinine, Albumin, along with patient demographics and comorbid conditions including Diabetes Mellitus, hypertension, Ischaemic heart disease, liver disease, pulmonary disease. This along with chest HRCT score, mode of oxygen delivery like High flow nasal cannula, Non-invasive ventilation, Invasive ventilation on Day 1 of illness was documented.

**Statistical analysis:**

- The data was analysed using SPSS version 28.
- Chi square test
- Independent sample t test/Mann Whitney U test used to compare CT severity score and clinical outcome
- P value <0.05 was considered to be statistically significant.

**Procedure Methodology:**

**Data collection:**

### III. RESULT

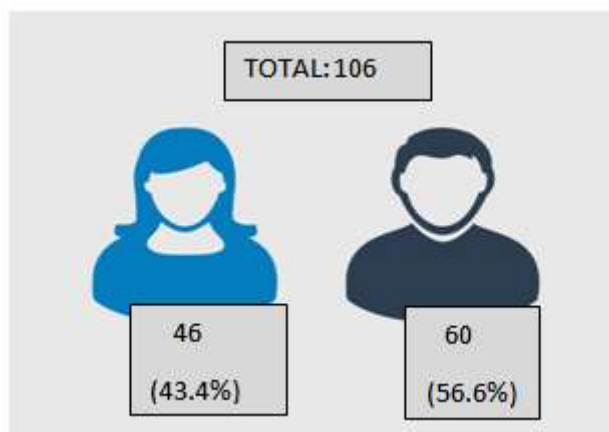


FIGURE 1: Gender Distribution

Figure 1 shows: Of the 106 patients, 60(56.6%) were male and 46(43.4%) female. Minimum age was 18 years, with a maximum age of 99 years. Mean age was 59.62±18.48 years.

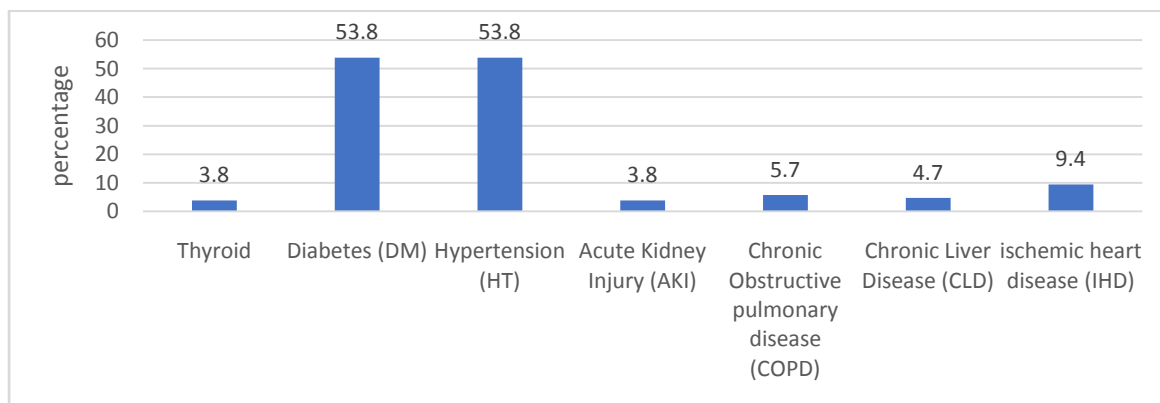
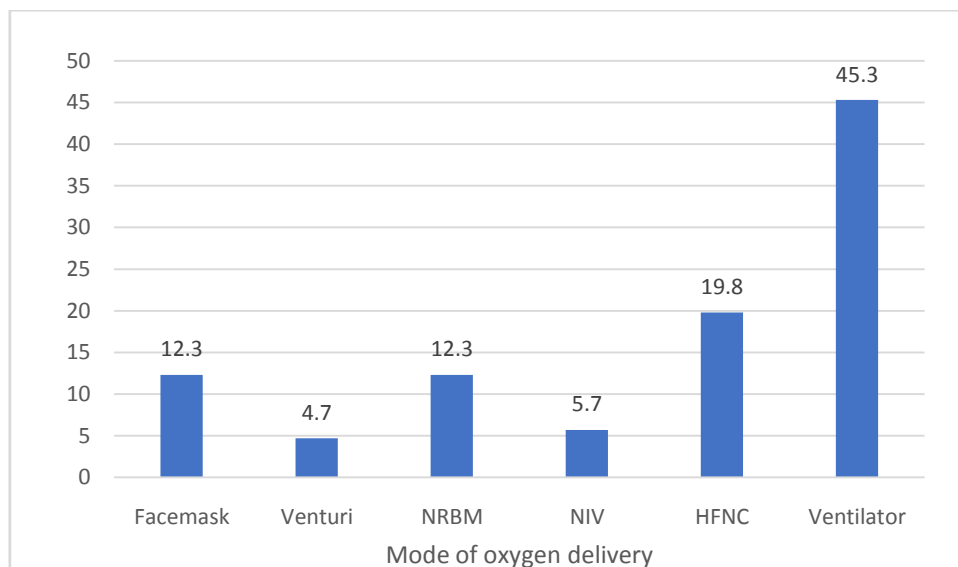


FIGURE2: Comorbidities among the patients



Among the study population, 57 (53.8%) each had diabetes mellitus and hypertension, 10 (9.4%) ischaemic heart disease, 6 (5.7%) COPD,

5 (4.7%) chronic liver disease, 4 (3.8%) each had thyroid dysfunction and acute kidney injury. 15 (14.2%) had up to 3 comorbidities.



**FIGURE 3: Distribution of oxygen delivery**

FIGURE 3 depicts mode of oxygen administration-48 (45.3%) were on invasive ventilation, 21 (19.8%) on HFNC, 13 (12.3%) on

NRBM, 13 (12.3%) on Facemask, 6 (5.7%) on Non-invasive ventilation (NIV) and 5 (4.7%) on Venturi facemask.

**TABLE 1: Modes of oxygen delivery and outcome**

MODE OF OXYGEN DELIVERY	OUTCOME		FISCHERS EXACT VALUE	P VALUE
	DEAD (N=48)	RECOVERED (N=58)		
			21.805	<0.001*
FACE MASK	1 (7.7)	12 (92.3)		
VENTURI	1 (20.0)	4 (80.0)		
NRBM	9 (69.2)	4 (30.8)		
NIV	1 (16.7)	5 (83.3)		
HFNC	6 (28.6)	15 (71.4)		
VENTILATOR	30 (62.5)	18 (37.5)		

Significant association between mode of oxygen delivery and outcome. Mortality 69.2% in NRBM group.

Of the 48 on invasive ventilation 30 (62.5%) succumbed, of which 9 (30%) died due to

Ventilator Associated Pneumonia (VAP), 17 (56.6%) septic shock and 4 (13.3%) other causes.

CT SCORE	OUTCOME		INDEPENDENT SAMPLE T TEST	P VALUE
	DEAD (N=48)	RECOVERED (N=58)		
			5.099	<0.0001*
	15.29±4.395	10.19±5.661		

**TABLE 2: Outcome-25 point CT severity score**

Mean CT score higher (15.29±4.395) in the mortality group compared to the patients who recovered (10.19±5.661). Statistically significant - p value < 0.0001.



LABORATORY PARAMETERS	CT	
	SCORE	P VALUE
	<b>CORRELATION COEFFICIENT</b>	
<b>Ddimer</b>	<b>0.109</b>	<b>0.284</b>
<b>CRP</b>	<b>0.157</b>	<b>0.120</b>
<b>LDH</b>	<b>0.134</b>	<b>0.189</b>
<b>FERRITIN</b>	<b>0.161</b>	<b>0.116</b>
<b>CREATININE</b>	<b>0.022</b>	<b>0.823</b>
<b>ALBUMIN</b>	<b>0.077</b>	<b>0.440</b>

**TABLE 3: Association between laboratory parameters and CT score**

It was found that there was no correlation between laboratory parameters and CT score.

#### IV. CONCLUSION

When RT-PCR testing is unavailable or there is a clinical suspicion of COVID-19 despite initial negative RT-PCR testing, the WHO recommends using chest imaging as part of the diagnostic workup for COVID-19 disease. When assessing the severity of a patient's disease, a CT scan can be helpful as it serves to be a crucial tool for creating management strategies and serve as an indicator for severity of disease and potential outcomes. In our study, the patients had a positive RT-PCR report and HRCT which displayed association with clinical outcome. No association between laboratory findings and CT score. None of the radiological findings had significant association with D-dimer levels. The study helped aid in predicting the outcome and oxygen requirement during the second wave of COVID-19. The utility of chest CT for prognostication in COVID-19 disease, including correlation with patient prognosis, needs to be further explored.

#### V. LIMITATIONS

Need for a larger multicentre cohort to increase the accuracy of the findings. Secondly, the

fact that the assessment of disease severity on CT scans can be subjective.

#### REFERENCES

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