



## CLINICO-RADIOLOGICAL CORELATION IN COVID 19 (SARS-COV-2) PATIENTS ADMITTED AT INTENSIVE CARE UNIT AT A TERTIARY HEALTHCARE CENTRE DURING SECOND WAVE OF EPIDEMIC.

<b>Suraj Kashid</b>	Junior Resident, Department of Medicine , A.C.P.M. Medical College, Dhule.
<b>Chandrasingh T. Pawar</b>	Assistant Professor, Department of Medicine , A.C.P.M. Medical College, Dhule.
<b>Dattatray B. More</b>	Assistant Professor, Department of Medicine, A.C.P.M. Medical College, Dhule.
<b>Vaishnavi Pande*</b>	Junior Resident, Department of Medicine , A.C.P.M. Medical College, Dhule.*Corresponding Author

**ABSTRACT** **Background:** Coronavirus disease-19 produced by the severe acute respiratory syndrome SARS-CoV-2, had become a global pandemic, giving rise to a serious health threat globally. HRCT chest in COVID-19 patients had a major diagnostic and prognostic importance as positive CT findings were more prominent in symptomatic patients and co-morbid patients. Present study was conducted to find out the clinical and radiological profile and its correlation in covid patient who are admitted in tertiary health care centre in intensive care unit. **Material and Methods:** Present study was single-center, Retrospective Cross-sectional study, conducted from case records of patients with clinical manifestations like fever and pulmonary symptoms and RT-PCR positive for SARS-CoV-2. **Results:** In present study, 50 case-records satisfying study criteria were considered for this study. The mean age of present study of COVID-19 patients was  $59.98 \pm 14.07$  years. Majority cases were male 31(62.0%) and 19(38.0%) were female. There was significant association between CT Score COVID severity and presence of Co-morbidities ( $P < 0.0001$ ). Also there was statistical significant association between CT Score COVID severity and Hypertension ( $P < 0.0001$ ), Diabetes Mellitus ( $P < 0.0001$ ) & Asthma ( $P = 0.043$ ). There was no statistical significant association between CT Score COVID severity and IHD, COPD, Chronic Kidney Disease, CCF and Hypothyroidism. **Conclusion:** HRCT chest in COVID-19 patients has major diagnostic and prognostic importance as positive CT findings were more prominent in symptomatic patients and co-morbid patients. CT severity was also significantly associated with clinical symptoms of patients. CT images are useful to see clinical recovery of patients.

**KEYWORDS :** Coronavirus Disease; Covid-19; HRCT, Radiological.

### Introduction:

Coronavirus disease-19 (COVID-19), produced by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), had become a global pandemic, giving rise to a serious health threat globally [1]. The causative organism is a novel enveloped single-stranded RNA beta coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [2]. Second wave of Covid 19 started since the middle of March 2021. Maharashtra being one of the leading states to face the rapid growth of covid cases [3].

Second wave of covid 19 came with many presentations and many patients were admitted in intensive care unit all across the state with different presentations and clinicoradiological profile [4].

The varied spectra of COVID-19 presentation include fever, cough, shortness of breath, sore throat etc [5]. Other less common symptoms attributable to gastrointestinal tract are anorexia, nausea, vomiting, abdominal pain, diarrhoea and mesenteric ischemia [6]. Symptoms of neurological dysfunction have also been reported with headache, anosmia, dysgeusia, dizziness, altered sensorium and seizures being the commonly reported symptoms [7]. Diabetes mellitus, hypertension, COPD/K-Chest and CAD were found as major comorbid conditions [8]. Symptomatic presentation of COVID-19 was observed to be higher in patients with co-morbid disease, especially if multiple [9].

HRCT chest in COVID-19 patients had a major diagnostic and prognostic importance as positive CT findings were more prominent in symptomatic patients and co-morbid patients [10]. Clinical symptoms of patients directly correlated with CT severity index. CT imaging was found to be useful in predicting clinical recovery of patients or progression of disease [11].

In the second wave, a significantly higher proportion complained of shortness of breath, developed acute respiratory distress syndrome (ARDS), required supplemental oxygen and mechanical ventilation [12].

The second wave of COVID-19 in India was slightly different in presentation than the first wave, with a younger demography, lesser comorbidities, and presentation with breathlessness in greater frequency [13].

Mortality also was significantly increased in the second wave in all age groups except in below 20 years [14]. The correlation between clinical and radiological profile was beneficial for early diagnosis and prompt management of the covid patients. Study is conducted to find out the clinical and radiological profile and its correlation in covid patient who are admitted in tertiary health care centre in intensive care unit.

### Aims and Objectives:

- To know clinical and radiological features in covid 19 patients.
- To study correlation between clinical and radiological features.

### Materials and Methods:

Study Setting: Study will be conducted in Department of General Medicine at Medical College and tertiary health care institute.

**Duration of Study:** April 2021 to June 2021

**Study Population:** All RTPCR positive covid patients of more than 14 yrs of age of either sex admitted in Intensive Care Unit in covid care centre was included in the present study.

**Study Design-** Retrospective Cross Sectional Study.

**Sample Size:** 50

Formula for sample size calculation:  $n = Z^2 P(1-P) / d^2$   
n- sample size

Z is the statistic corresponding to level of confidence (level of confidence is 95%)(1.96) P is expected prevalence (0.3) d is precision corresponding to effect size = margin of error =  $10\% = 0.1$

### Eligibility Criteria:

#### Inclusion criteria:

Patients tested positive for COVID 19 virus by RT-PCR diagnostic method and who have undergone Chest x-ray and CT SCAN (radiological testing) admitted at intensive care unit of our hospital. Patients whose Spo2 is below 90%

#### Exclusion criteria:

Patients less than 14 yrs of age.

### Methodology:

The study was conducted in Department of General Medicine in a tertiary care center and medical college. Detailed history was taken,

clinical findings were noted, and chest x-ray and CT scan reports were noted. The bio data, detailed clinical history was noted in pre- designed case proforma in the present study.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.05 was considered as statistically significant.

**Results:**

**Table 1- Demographic profile of patients**

Characteristics	No. of patients	Percentage
Age groups (in years)		
30-39	03	6.0%
40-49	06	12.0%
50-59	10	20.0%
60-69	19	38.0%
>70	12	24.0%
Mean age (mean±SD)	59.98 ± 14.07 years	
Gender		
Male	31	62.0%
Female	19	38.0%
Area of Living		
Rural	18	36.0%
Urban	32	64.0%

In present study, case-records satisfying study criteria were considered for this study. Majority of cases i.e. 19(38.0%) were from age-group of 60-69 years followed by 12(24.0%) from age-group of >70 years, 10(20.0%) from age-group of 50-59 years, 06(12.0%) from age group of 40-49 years and 03(6.0%) were from age-group of 30-39 years. The mean age of present study of COVID-19 patients was 59.98 ± 14.07 years. Majority cases were male 31(62.0%) and 19(38.0%) were female. Majority of patients i.e 32(64.0%) were from urban area and 18(36.0%) were from rural area.

**Table 2: Chief Complaints in patients**

Chief Complaints	No. of patients	Percentage
Anorexia	06	12.0
Fatigue	09	18.0
Dyspnoea	48	96.0
Dry Cough	40	80.0
Diarrhoea	04	8.0%
Fever	41	82.0
Other	04	8.0

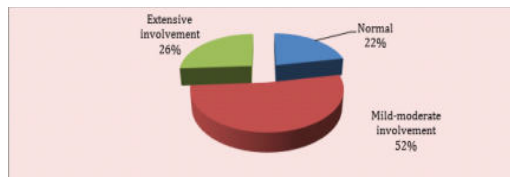
In present study, 48(96.0%) patients were having dyspnoea, 41(82.0%) patients were having fever and 40(80.0%) were having dry cough. 09(18.0%) , 06(12.0%) of patients were reported to have fatigue and anorexia respectively. 04(8.0%) patients were reported to have diarrhoea and 04(8.0%) of patients were having other complaints.

**Table 3: Co-morbidities in patients**

Co-morbidities	No. of patients	Percentage	
Co-morbidities	Present	39	78.0
	Absent	11	22.0
Present Co-morbidities	Hypertension	26	52.0
	Diabetes Mellitus	28	56.0
	IHD	07	14.0
	Asthma	06	12.0
	COPD	02	4.0
	Chronic Kidney Disease	03	6.0
	CCF	01	2.0
	Hypothyroidism	03	6.0
	Other	04	8.0

Majority of patients i.e 39(78.0%) were having co-morbidities and 11(22.0%) were not having co-morbidities. Maximum 28(56.0%) and 26(52.0%) patients were having diabetes mellitus and hypertension

respectively. 06(12.0%) of patients were reported with asthma, 03(6.0%) of patients were having Chronic Kidney Disease and hypothyroidism.



**Figure 1: Chest X-ray findings of patients**

**Table 4: Radiological outcome on HRCT-chest**

	No. of patients	Percentage
Opacity Distribution (Axial )		
No Axial	02	4.0%
Central	06	12.0%
Peripheral	22	44.0%
Both	11	22.0%
CT Severity Index		
0	11	22.0%
1-5	12	24.0%
6-10	08	16.0%
11-15	10	20.0%
16-20	06	12.0%
21-25	03	6.0%
Involvement of surface of lungs		
Anterior	04	8.0
posterior	22	44.0
both	14	28.0
CT Characteristics		
Typical	29	58.0
Indeterminant	08	16.0
Atypical	04	8.0
Absent	09	18.0
lobe involvement		
Right Upper Lobe	34	68.0
Right Middle Lobe	30	60.0
Right Lower Lobe	37	74.0
Left Upper Lobe	35	70.0
Left Lower Lobe	31	62.0
No. of lobes affected		
0	09	18.0
1-2	17	34.0
>2	24	48.0%

In present study, 22(44.0%) of patients reported Peripheral Opacity Distribution (Axial), followed by 11(22.0%) were reported with both and 06(12.0%) were reported with Central Opacity Distribution (Axial). 11(22.0%) of patients were having CT score 0, 12(24.0%) of patients were reported with CT score between 01-05, 08(16.0%) with CT score 06-10 and 19(38.0%) of patients were having CT score more than 10. Majority of 22(44.0%) of patients were found to have involvement of posterior surface of lungs, 14(28.0%) were having both and 04(8.0%) were having Anterior involvement. 29(58.0%) of patients were found to have Typical CT Characteristics, 08(16.0%) of patients were found to have Indeterminant CT characteristics, 04(8.0%) had Atypical CT characteristics. Majority of the patients i.e. 37(74.0%) were having right lower lobe involvement, 35(70.0%) of patients were having left upper lobe involvement, 34(68.0%) of patients were found to have Right Upper Lobe involvement. Maximum patients i.e. 24(48.0%) were having more than 2 lobes affected, 17(34.0%) were having 1-2 lobes affected.

**Table 5: Respiratory Support in patients**

Respiratory Support	No. of patients	Percentage
Supplemental Oxygen	23	56.0%
HFO2	10	20.0%
Non Invasive Ventilator	11	22.0%
Mechanical Ventilation	05	10.0%

23(56.0%) of patients required Supplemental Oxygen and 10(20.0%) of covid-19 patients were on HFO2. 05(10.0%) were on Mechanical Ventilation and 11(22.0%) were on Non Invasive Ventilator.

**Table 06: Covid Severity and outcome of patients**

COVID severity	No. of patients	Percentage
Mild	09	18.0%
Moderate	25	50.00%
Severe	16	32.0%
Clinical outcome		
Discharged	44	88.0%
Death	06	12.0%

In present study, maximum 25(50.0%) of patients were having moderate Covid followed by 16(32.0%) were having severe covid. 06(12.0%) patients died in ICU.

**Table 7: Association between Co-morbidities and COVID severity using CT Score in patients**

		COVID severity using CT Score				P-value
		Mild (n=09)	Moderate (n=25)	Severe (n=16)	Total	
Co-morbidities	Present	03	22	14	39	P<0.0001 S
	Absent	06	03	02	11	
Present Co-morbidities	Hypertension	03	12	11	26	P<0.0001 S
	Diabetic Mellitus	02	12	14	28	P<0.0001 S
	IHD	01	04	02	07	P=0.129 NS
	Asthma	01	02	03	06	P=0.043 S
	COPD	00	01	01	02	P=0.732 NS
	Chronic Kidney Disease	00	02	01	03	P=0.831 NS
	CCF	00	01	00	01	P=0.973 NS
	Hypothyroidism	00	03	00	03	P=0.317 NS
Other	01	01	02	04	P=0.317 NS	

There was significant association between CT Score COVID severity and presence of Co-morbidities (P<0.0001). Also there was statistical significant association between CT Score COVID severity and Hypertension (P<0.0001), Diabetes Mellitus (P<0.0001) & Asthma (P=0.043). There was no statistical significant association between CT Score COVID severity and IHD, COPD, Chronic Kidney Disease, CCF and Hypothyroidism.

### Discussion:

The role of CXR in clinical monitoring of these patients, especially in ICU, is still debated: Fleischner Society does not recommend daily CXR in stable intubated patients, but it is also true that the disease can progress very quickly [15]. From this present study it can be concluded that the radiological imaging should be always associated with clinical and laboratory parameters when monitoring the disease course, waiting for readily effective therapies. Obviously, every hospital in the world has its own "radiological" organization and management of the patient with SARS-CoV-2 infection, but it is always necessary to maintain a balance between the safety of health professionals and the diagnostic resources that we can use in this pandemic [15].

The main CT sign of severity is the extent of parenchymal abnormalities. In present study we found that, there was significant association between CT Score COVID severity and presence of Co-morbidities (P<0.0001). Also there was statistical significant association between CT Score COVID severity and Hypertension (P<0.0001), Diabetes Mellitus (P<0.0001) & Asthma (P=0.043). There was no statistical significant association between CT Score COVID severity and IHD, COPD, Chronic Kidney Disease, CCF and

Hypothyroidism. Numerous studies report a correlation between the extent of lesions and clinical severity [16]. On the other hand, R. Yang et al., had found that the individual scores in each lung and the total score were higher in severe COVID-19 compared with mild cases [17]. Some teams use other severity criteria, in particular, parenchymal density (quantified by scintigraphy), pleural effusions and early architectural deformities [18]. A Chinese series by K li et al. also suggests that an initial involvement of the upper lobes may be a marker of poor prognosis [19].

Apart from clinical factors, radiology can give an indication of the evolution of the patients status. Thanks to a certain number of parameters, namely the quantification of the extension of the lesions via a severity score, the diameter of the pulmonary artery and sometimes the patterns of the CT abnormalities and the lesion associations. The presence of diabetes is being constantly documented as a risk factor for mortality among COVID-19 patients. In this study, of those who expired, 4 (66.7%) had diabetes. The data on hypertension as a risk factor in COVID-19 patients is conflicting. In the study done by Li G et al., [20], they did not find hypertension to increase the risk of death among COVID-19 patients while in the study done by Albitar O et al., [21] they found hypertension as an independent risk factor for mortality among COVID-19 patients.

### Conclusion:

In this study, the majority of COVID-19 patients had presentation with fever, cough, dyspnoea, fatigue and anorexia, diarrhoea etc. Diabetes mellitus, hypertension, COPD were found to be major co-morbid conditions. HRCT chest in COVID-19 patients has major diagnostic and prognostic importance as positive CT findings were more prominent in symptomatic patients and co-morbid patients. CT severity was also significantly associated with clinical symptoms of patients. CT images are useful to see clinical recovery of patients. This study could help for identifying the high risk patients, allowing for timely initiation of treatment, currently available against SARS-CoV-2 infection. Present study has major limitations and is retrospective in nature and there is lack of a non-COVID-19 control group in the study.

### REFERENCES

- Chan JF, To KK, Tse H, Jin DY, Yuen KY. Interspecies transmission and emergence of novel viruses: lessons from bats and birds. *Trends Microbiol.* 2013 Oct;21(10):544-55.
- Lei J, Kusov Y, Hilgenfeld R. Nsp3 of coronaviruses: Structures and functions of a large mul domain protein. *An viral Res.* 2018 Jan;149:58-74.
- Chan JF, Kok KH, Zhu Z, Chu H, To KK, Yuan S, Yuen KY. Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia a ervising Wuhan. *Emerg Microbes Infect.* 2020;9(1):221-236.
- Huang C, Huang L, Wang Y, Li X, Ren L, Gu X, Kang L, Guo L, Liu M, Zhou X, Luo J, Huang Z, Tu S, Zhao Y, Chen L, Xu D, Li Y, Li C, Peng L, Li Y, Xie W, Cui D, Shang L, Fan G, Xu J, Wang G, Wang Y, Zhong J, Wang C, Wang J, Zhang D, Cao B. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *Lancet.* 2021 Jan 16;397(10270):220-232.
- Stokes EK, Zambrano LD, Anderson KN, Marder EP, Raz KM, El Burai Felix S, Tie Y, Fullerton KE. Coronavirus Disease 2019 Case Surveillance - United States, January 22-May 30, 2020. *MMWR Morb Mortal Wkly Rep.* 2020 Jun 19;69(24):759-765.
- Azouz E, Yang S, Monnier-Cholley L, Arrivé L. Systemic arterial thrombosis and acute mesenteric ischemia in a patient with COVID-19. *Intensive Care Med.* 2020 Jul;46(7):1464-1465. [PMC free article] [PubMed]
- Toscano G, Palmerini F, Ravaglia S, Ruiz L, Invernizzi P, Cuzzoni MG, Francio A D, Baldan F, Daturi R, Postorino P, Cavallini A, Micieli G. Guillain-Barré Syndrome Associated with SARS-CoV-2. *N Engl J Med.* 2020 Jun 25;382(26):2574-2576.
- Zhou X, Cheng Z, Luo L, Zhu Y, Lin W, Ming Z, Chen W, Hu Y. Incidence and impact of disseminated intravascular coagula on in COVID-19 a systema c review and meta-analysis. *Thromb Res.* 2021 May;201:23-29.
- Coopersmith CM, Antonelli M, Bauer SR, Deutschman CS, Evans LE, Ferrer R, Hellman J, Jog S, Kesecioglu J, Kisssoon N, Mar-n-Loeches I, Nunnally ME, Presco HC, Rhodes A, Talmor D, Tissieres P, De Backer D. The Surviving Sepsis Campaign: Research Priorities for Coronavirus Disease 2019 in Critical Illness. *Crit Care Med.* 2021 Apr 01;49(4):598-622.
- Gandhi RT, Lynch JB, Del Rio C. Mild or Moderate COVID-19. *N Engl J Med.* 2020 Oct 29;383(18):1757-1766
- Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Presco HC. Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *JAMA.* 2020 Aug 25;324(8):782-793.
- Berlin DA, Gulick RM, Mar nez FJ. Severe Covid-19. *N Engl J Med.* 2020 Dec 17;383(25):2451- 2460
- Ferrando C, Suarez-Sipmann F, Mellado-Ar gas R, Hernández M, Gea A, Arru E, Aldecoa C, Mar nez-Palli G, Mar nez-González MA, Slutsky AS, Villar J. COVID-19 Spanish ICU Network. Clinical features, ventilatory management, and outcome of ARDS caused by COVID-19 are similar to other causes of ARDS. *Intensive Care Med.* 2020 Dec;46(12):2200-2211.
- Gebhard C, Regitz-Zagrosek V, Neuhauser HK, Morgan R, Klein SL. Impact of sex and gender on COVID-19 outcomes in Europe. *Biol Sex Differ.* 2020 May 25;11(1):29
- Rubin GD, Ryerson CJ, Haramati LB et al. The role of chest imaging in patient management during the COVID-19 pandemic: a multinational consensus statement from the Fleischner Society. *Radiology.* 2020.
- Li K, Wu J, Wu F, Guo D, Chen L, Fang Z. The Clinical and Chest CT Features Associated with Severe and Critical COVID-19 Pneumonia. *Invest Radiol.* 2020; 55: 327-331.
- Yang R, Li X, Liu H, Zhen Y, Zhang X, Xiong Q. Chest CT Severity Score: An Imaging Tool for Assessing Severe COVID-19. *Radiol Cardiothoracic Imaging.* 2020; 2: e200047.

18. Shi H, Han X, Jiang N, Cao Y, Alwalid O, Gu J, et al. Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study. *Lancet Infect Dis.* 2020; 20: 425-434.
19. Li LQ, Huang T, Wang YQ, Wang ZP, Liang Y, Huang TB, et al. COVID-19 patients' clinical characteristics, discharge rate, and fatality rate of metaanalysis. *J Med Virol.* 2020; 92: 577-583.
20. Li G, Deng Q, Feng J, Li F, Xiong N, He Q, et al. Clinical characteristics of diabetic patients with COVID-19. *J Diabetes Res.* 2020; 1652403.
21. Albitar O, Ballouze R, Ooi JP, Ghadzi SM. Risk factors for mortality among COVID-19 patients. *Diabetes Res Clin Pract.* 2020; 166: 108293