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Analysis of Radiological features and inflammatory markers in Covid-19 Cases in Tertiary care centre

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Abstract

Introduction: Corona virus disease 2019 (COVID-19) spread rapidly across the world with very high human to human transmission rate. It spread all over the world with approximately 66.4 crore cases, 64.40 crore recoveries and 67.1 lakh deaths till now. In India there were 4.46 crore cases of which 4.41 crore recovered and there were 5.30 lakh deaths till now (CSSE COVID-19 Data)[1] . **Aims and objective:** To study the Clinical, Radiological profile and inflammatory markers in Covid-19 patients **Materials and method**: The study was carried out in the Department of Respiratory Medicine of R.D. Gardi Medical College, Ujjain (MP). **Result:** A total of 107 patients with COVID-19 disease were evaluated, the patients had a median age of 52 years and a mean age of 50.79±16.81 years. The most common clinical presentation were the fever which was seen in 80(74.8%) cases, breathlessness in 84(78.5%), cough in 71(66.4%), weakness in 27.1%, loss of smell in 31.8% and loss of taste in 29.9%. The most common co-morbidity present in the study group was diabetes mellitus, which was present in 51(47.7%) cases. The chest radiograph of the patients revealed consolidation in 51(47.7%), GGOs in 29(27.1%), GGO with consolidation in 3(2.8%) and 23(21.5%) cases had normal pattern. Severity of disease was significantly associated with age of the patient. The typical findings of chest CT in the case of COVID-19 pneumonia include "bilateral, peripheral, and basal predominant ground-glass opacities with or without consolidation and broncho-vascular thickening, In addition, atypical findings are "cavitations, central upper lobe predominance, nodules, masses, tree-in bud sign and lymphadenopathy. A significant statistical correlation was found between CT severity score. In our study, out of 107 cases, 80.4% had raised CRP level, 69.2% had raised D-dimer level, 67.3% cases had raised LDH level and 55.1% had raised S.Ferritin level. **Conclusions:** Chest imaging played a very important part in the diagnosis and management of covid 19 patients during the pandemic. The typical presentation of chest radiographs and HRCT thorax helped in diagnosing cases even when the RTPCR, Rapid antigen tests were negative or not available along with clinical features and inflammatory markers especially the CRP, LDH, D-dimer and S.Ferritin.

Keywords: COVID-19, CT severity score, Pandemic, Clinical

INTRODUCTION:

Corona virus disease 2019 (COVID-19) cases were first reported from Wuhan, Hubei province of China towards the end of 2019 and spread rapidly across the world with human to human transmission. The infection is transmitted through respiratory droplets (aerosols size of < 5μm) over a short distances (of even 1.5–2 m) when patients cough, speak or sneezes and also through contaminated hands. However there can be a COVID 19 infection even from an asymptomatic patient or from the people during the incubation period of the disease [2,4]. The causative organism is a enveloped single-stranded RNA beta-corona virus known as severe acute respiratory syndrome corona virus (SARS-CoV-2). COVID-19 infection can manifest as a mild, moderate, or severe illness including severe pneumonia, acute respiratory distress syndrome (ARDS), sepsis and septic shock or the patient can remain asymptomatic. The incubation period ranges from 4-7 days to a maximum of 12-14 days.

METHODS:

Study design: A prospective observational study was carried out in the Department of Respiratory Medicine at R.D. Gardi Medical College, after approval of the ethics committee. The presumptive and confirmed covid cases were evaluated Clinically, Radiologically and inflammatory markers were studied. The cases were from OPD and IPD of the Covid care facility and a total of 107 patients were included in the study.

Inclusion Criteria

- Patient who give consent and willing to participate in the study.
- All Covid 19 positive patients presented to IPD
- Patients who were admitted as Covid suspects.

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Exclusion Criteria

- Patient with preexisting interstitial lung disease.
- Patient with illness that may cause lung fibrosis .

RESULT

In this study, out of total 107 patients it was found that all age groups are affected by the COVID-19, however it tends to affect older persons more than younger individuals. The patients in our study had a median age of 52 years. Out of the total cases 78 (72.9%) were men, and 29 (27.1%) were women. Among the symptoms , fever was seen in 74.8% cases, breathlessness in 78.5%, cough in 66.4%, weakness in 27.1%, loss of smell in 31.8% and loss of taste in 29.9%. In this study, out of total 107 cases typical features were seen in 84(78.5%) cases, however 23(21.5%) had no symptoms but having contact history with covid positive patients and got themselves evaluated. On auscultation of chest most of the patients had bilateral Crepitations.

In this study, out of 107 cases, 47.7% cases had Diabetes mellitus, 27.1% cases had hypertension, 13.1% had chronic obstructive pulmonary disease (COPD), 4.7% had coronary artery disease (CAD), 1.9% had hypothyroidism.

In this study , the chest radiograph of the patients revealed consolidation in 51(47.7%), GGO in 29(27.1%), GGO with consolidation in 3(2.8%), reticular pattern in one case and 23(21.5%) cases had normal pattern. Among abnormal CXR cases 59(70.2%) cases had bilateral and 25(29.8%) had unilateral involvement. Out of 85 cases with lung involvement, 36(42%) had diffuse lung involvement and 49(58%) had peripheral lung involvement.

In our study out of total cases, 59(55.1%) cases had mild (1-2) chest x-ray score, 20(18.7%) had moderate (3-4) score, 4(3.7%) had severe (5-6) score and one case had very severe (7-8) score (RALES scores).

In our study out of total cases 106 cases had abnormal HRCT Chest findings out of which 99(92.5%) had bilateral abnormality and 7(6.5%) had unilateral abnormality.
In our study on the basis of chest CT scan Severity Score (CT-SS) out of total 107 cases, 32(29.9%) cases had severe disease, 53(49.5%) cases had moderate disease, 15(14.0%) had mild disease and 7(6.5%) had normal Chest CT findings.

In total 107 cases, 91(85.0%) cases had raised NLR, 86(80.4%) had raised CRP level, 74(69.2%) had raised D-dimer level, 72(67.3%) cases had raised LDH level and 59(55.1%) had raised S.Ferritin level.

In this study there was significant mean difference was observed in CRP level between mild, moderate and severe cases with $p<0.05$. Mean CRP level was significantly increase in mild, moderate to severe cases with mean CRP 47.6±69.73, 101.26±107.34 and 134.03±106.49 respectively. There was significant mean difference was observed in D-dimer level between mild, moderate and severe cases with $p<0.05$. Mean D-dimer level was significantly increase in mild, moderate to severe cases respectively with mean D-dimer 1.02±1.48, 1.79±2.26 and 3.20±3.20respectively.

In this study there was significant mean difference was observed in LDH level between mild, moderate and severe cases with $p<0.05$. Mean LDH level was significantly increase in mild, moderate to severe cases with mean LDH 484.80±792.2, 513.38±341.48 and 872.38±829.75 respectively.

a) Bilateral Heterogenous opacities in the mid and lower zones in covid patient

(b) B/L pneumothorax in covid19 patient

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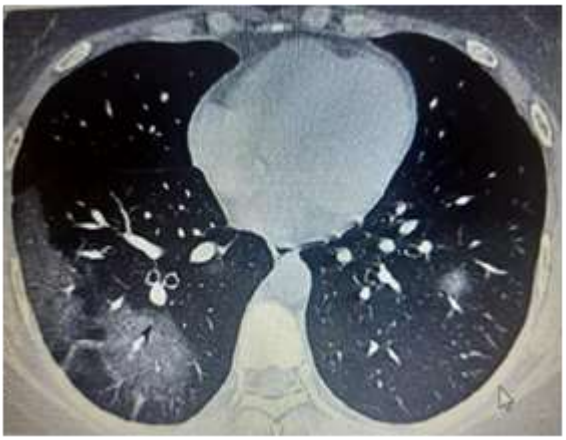
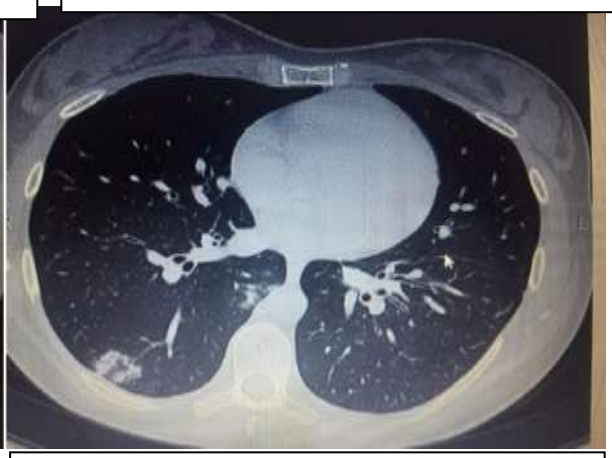
(a) Ground glass opacity (GGO) with septal thickening in patients

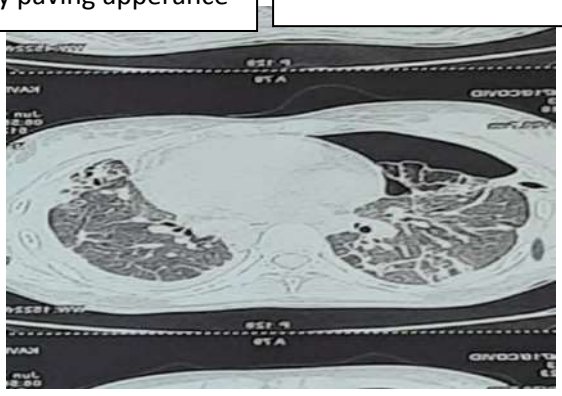


(b) Consolidation

(c) Patchy GGO with Crazy paving apperance



d) Reverse Halo sign in covid 19 patient



(e) Pneumothorax in covid19

DISCUSSION

All age groups are affected by the COVID-19 pandemic, however it tends to afflict seniors more than younger individuals. The patients in this study had a median age of 52 years and a mean age of 50.79±16.81 years. Out of total patients, there were males 78 (72.9%) and 29 (27.1%) was females . This was also seen in other studies like **Sudhir Bhandari *et al*.[5] 2020),** which revealed that the mean age of the patients was 50.40 years.

In this study, out of 107 cases, fever was seen in 80(74.8%) cases, breathlessness (SOB) in 84(78.5%), cough in 71(66.4%), weakness in 29(27.1%), loss of smell in 34(31.8%) and loss of taste in 32(29.9%).Similar results were also seen in other studies , **Anant Mohan *et al*[6].(2020) .**

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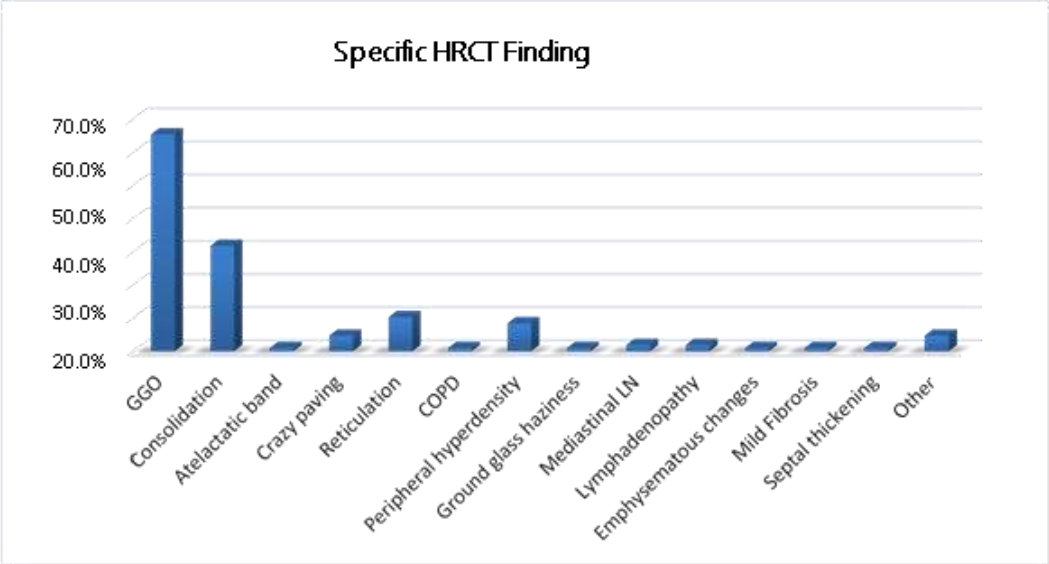
In this study according to chest imaging of the patients, consolidation was seen in 51(47.7%), GGO in 29(27.1%), GGO with consolidation in 3(2.8%), reticular pattern in one case and 23(21.5%) cases had normal pattern. Among abnormal Chest xray cases 59(70.2%) cases had bilateral and 25(29.8%) had unilateral location. **Liqa A.Rousan *et al*[8].(2020) showed** that the most common chest x-ray finding in their patients was GGO in a peripheral distribution with bilateral lung involvement, there was a lower lobe predilection of the opacities, with the right lower lobe more common than the left lower lobe (70% vs. 50%).

In this study out of 107 cases, 106 cases had abnormal HRCT findings out of which 99(92.5%) had bilateral abnormality and 7(6.5%) had unilateral abnormality and 7 had normal HRCT finding. Similar finding was also observed in **Lingli Li *et al*[9].(2020) showed out of** total of 175 chest CT scans were scored in this study. A total of 140 (80%) chest CT scans demonstrated bilateral infiltrates, and 31 (18%) chest CT scans showed unilateral infiltrates, whereas 4 (2%) chest CT scans had no abnormal findings.

In our study according to HRCT Chest findings, GGO was seen in 70(65.4%) cases, consolidation in 34(31.8%), atelectatic band in 1(0.9%), crazy paving in 5(4.7%) cases, reticulation in 11(10.3%) cases, Peripheral hyper density in 9(8.4%), mediastinal LN and lymphadenopathy 2(1.9%) cases respectively, 1(0.9%) case with COPD, ground glass haziness, emphysematous changes, mild Fibrosis and septal thickening respectively. Similar findings observed in Sudhir Bhandari *et al*119 . (2020) showed that in early phase of disease (10 days), among radiologically positive patients (8 out of 15) 12.50% patients had GGO, 75.00% patients had both GGO and consolidation while remaining 12.50% patients had only consolidation in imaging of HRCT chest.

In our study on the basis of CT scan Severity Score (CT-SS) out of 107 cases, 32(29.9%) cases had severe disease, 53(49.5%) cases had moderate disease, 15(14.0%) had mild disease and 7(6.5%) had normal HRCT Chest findings. Similar results were seen in other studies also, **Swati Sharma *et al*[10]**.(2022) revealed that, CT severity score was graded as mild (grade 1) (15). 58% of sample population had grade 3 severity followed by moderate severity in 27.3% patients.



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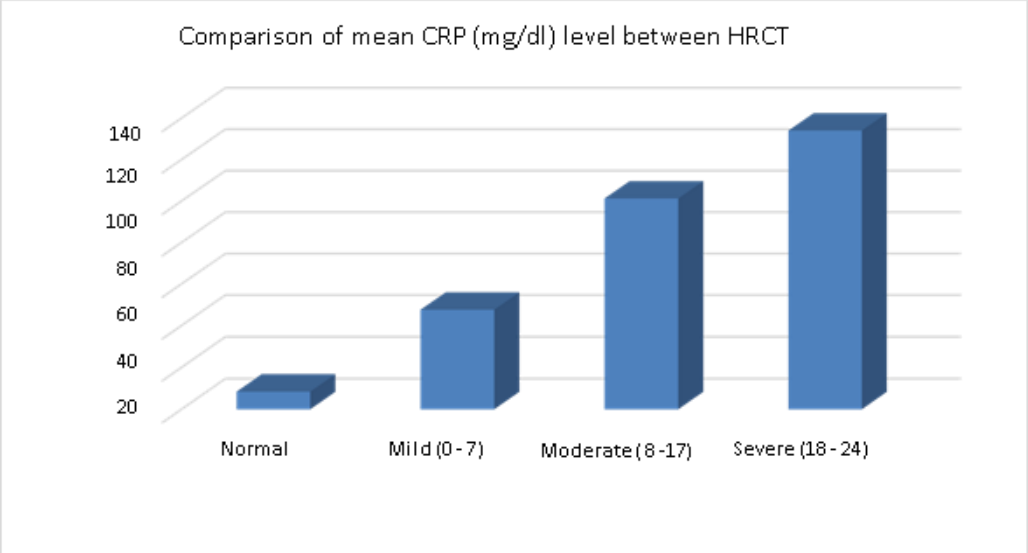

Chest x-ray score	HRCT				Total
	Nill	Mild (0 - 7)	Moderate (8 - 17)	Severe (18 - 24)	
Nill	7	11	5	0	23
	30.4%	47.8%	21.7%	0.0%	100.0%
Mild (1 - 2)	0	4	47	8	59
	0.0%	6.8%	79.7%	13.6%	100.0%
Moderate (3 - 4)	0	0	1	19	20
	0.0%	0.0%	5.0%	95.0%	100.0%
Severe (5 - 6)	0	0	0	4	4
	0.0%	0.0%	0.0%	100.0%	100.0%
Very severe (7 - 8)	0	0	0	1	1
	0.0%	0.0%	0.0%	100.0%	100.0%
Total	7	15	53	32	107
	6.5%	14.0%	49.5%	29.9%	100.0%
Chi-square= 123.611, p= 0.000					

CONCLUSION

The Chest imaging played a very crucial role in the diagnosis and management of Covid 19 patients . The typical presentation of chest xray and HRCT thorax helped in diagnosing Covid 19 cases even when RTPCR, Rapid antigen tests were negative or not available. In conclusion, Chest CT severity score of Covid 19 patients along with inflammatory markers especially the CRP, LDH, D-dimer and S.Ferritin was very useful as a predictor of disease severity and prognosis.

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