

**ORIGINAL RESEARCH**

# Assessment of role of chest radiography in management of COVID- 19 pneumonia

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**ABSTRACT**

**Background:** The pandemic related to the coronavirus is now considered one of the deadliest epidemics. The present study was conducted to assess the role of chest radiography in management of COVID- 19 pneumonia. **Materials & methods:** 54 patients who tested rtPCR positive for SARS COV2 of both genders were included. Chest x-rays were taken in all patients. **Results:** Age group 20-30 years had 5, 30-40 years had 6, 40-50 years had 19, 50-60 years had 10 and >60 years had 14 patients. The difference was significant ( $P < 0.05$ ). Normal x- ray were observed in 20 patients, abnormal x- ray in 35, x-ray showing only peripheral opacities in 12, x-ray showing both central and peripheral opacities in 34, x-ray showing haziness (GGO) in 10, x-ray showing consolidation in 7. Left lung involvement was seen in 12, right lung involvement in 14 and bilateral lung involvement in 28 patients. Total HRCT was done in 30, out of which abnormal HRCT was seen in 16, abnormal x-ray abnormal HRCT in 6 and normal x-ray abnormal HRCT in 8. The difference was significant ( $P < 0.05$ ). **Conclusion:** Chest x-ray is an important diagnostic aid in the detection and management of COVID- 19 positive patients.

**Key words:** Chest x-ray, CT scan, Pneumonia

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**INTRODUCTION**

The pandemic related to the coronavirus is now considered one of the deadliest epidemics.<sup>1</sup>The numbers of cases exponentially increased with no specific treatment or promising vaccine in sight, creating havoc for the health and financial systems of the world.<sup>2</sup>

The chest X-ray is usually the initial and often only investigation required in the evaluation of diseases of the chest.<sup>3</sup>Not all patients with SARS COV -2 virus infection develop pneumonia. No fixed definition of covid-19 pneumonia exists.<sup>4</sup>Like other pneumonias, covid-19 pneumonia causes the density of the lungs to increase. This may be seen as whiteness in the lungs on radiography which, depending on the severity of the pneumonia, obscures the lung markings that are normally seen; however, this may be delayed in appearing or absent.<sup>5</sup>When lung markings are partially obscured by the increased whiteness, a ground glass pattern (ground glass opacity) occurs.<sup>5</sup> This can be subtle and might need confirmation with a radiologist. Peripheral, coarse, horizontal white lines, bands, or reticular changes which can be described, as linear

opacities may also be seen in association with ground glass opacity. When lung markings are completely lost due to the whiteness, it is known as consolidation which is usually seen in severe disease.<sup>6</sup>The present study was conducted to assess the role of chest radiography in management of COVID- 19 pneumonia.

**MATERIALS & METHODS**

The present study consisted of 54 patients who tested rtPCR positive for SARS COV2 of both genders. This study is conducted in the Department of Radiodiagnosis Varun Arjun Medical College & Rohilkhand Hospital, Banthra Shahjahanpur UP. India from January 2022 to December 2022. All gave their written consent for the study participation.

Data pertaining to patients such as name, age, gender etc. was recorded. All were subjected to chest radiographs. The initial radiograph was assessed as negative or positive, if positive the type of abnormality, its location, distribution, any other features such as cavitation, mediastinal adenopathy, pleural effusion was recorded. CT findings if

performed at time of initial x-ray, whether positive or negative was also noted. Complications such as ARDS, barotrauma, type of barotrauma, ventilator-

associated pneumonia were recorded. Results were subjected for statistical analysis. P value less than 0.05 was considered significant.

**RESULTS**

**Table 1: Distribution of patients**

Age groups (years)	Number	P value
20-30	5	0.05
30-40	6	
40-50	19	
50-60	10	
>60	14	

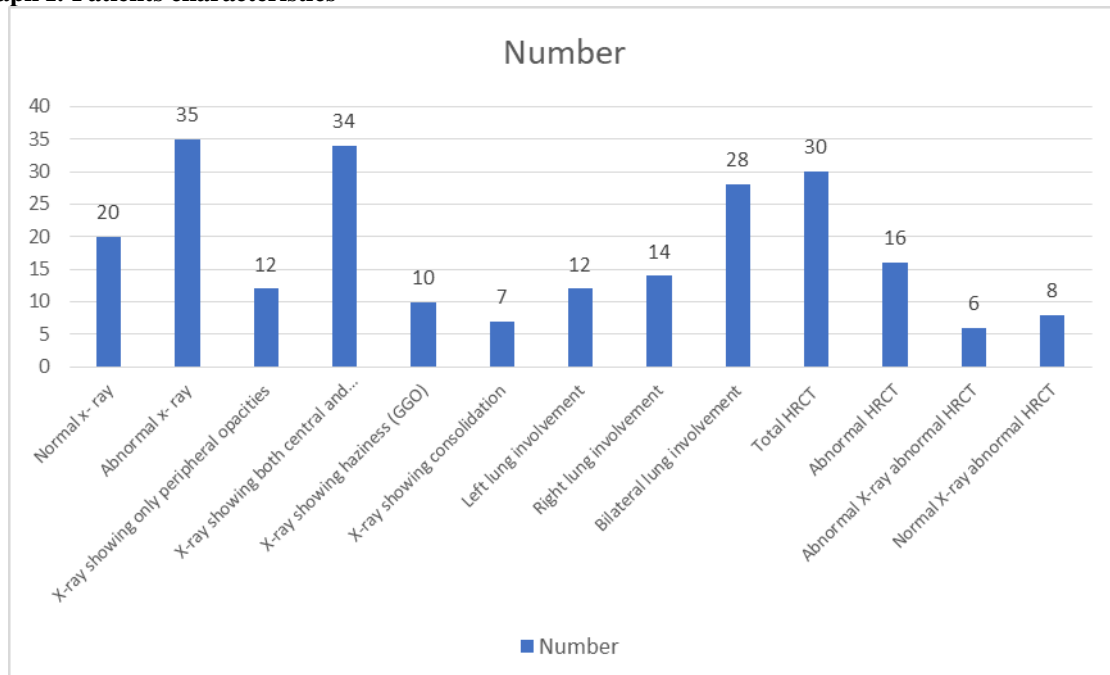
Table I shows that age group 20-30 years had 5, 30-40 years had 6, 40-50 years had 19, 50-60 years had 10 and >60 years had 14 patients. The difference was significant (P< 0.05).

**Table 2: Patients characteristics**

Characteristics	Number	P value
Normal x- ray	20	0.05
Abnormal x- ray	35	
X-ray showing only peripheral opacities	12	0.01
X-ray showing both central and peripheral opacities	34	
X-ray showing haziness (GGO)	10	0.82
X-ray showing consolidation	7	
Left lung involvement	12	0.04
Right lung involvement	14	
Bilateral lung involvement	28	
Total HRCT	30	0.05
Abnormal HRCT	16	
Abnormal X-ray abnormal HRCT	6	
Normal X-ray abnormal HRCT	8	

Table II, graph I shows that normal x- ray were observed in 20 patients, abnormal x- ray in 35, x-ray showing only peripheral opacities in 12, x-ray showing both central and peripheral opacities in 34, x-ray showing haziness (GGO) in 10, x-ray showing consolidation in 7. Left lung involvement was seen in 12, right lung involvement in 14 and bilateral lung involvement in 28 patients. Total HRCT was done in 30, out of which abnormal HRCT was seen in 16, abnormal x-ray abnormal HRCT in 6 and normal x-ray abnormal HRCT in 8. The difference was significant (P< 0.05).

**Graph I: Patients characteristics**



## DISCUSSION

The world is engrossed by a pandemic caused by SARS COV -2 virus which results in a lower respiratory tract viral pneumonia termed as Covid-19 pneumonia.<sup>7</sup> The clinical symptoms of the disease are nonspecific presenting with influenza-like illness (ILI) with fever >38 degrees C, cough associated with malaise, generalised myalgia, headache and breathlessness.<sup>8</sup> However, patients with severe acute respiratory infection (SARI) are advised hospitalisation as per WHO recommendation. Real-time polymerase chain reaction (RT-PCR) is the standard accepted test in the diagnosis of COVID-19 to detect the nucleic acid of the virus.<sup>9</sup> Initial chest radiography may be normal but patients may later develop clinical or radiological signs of covid-19 pneumonia—ie, early radiographs may be negative. With further progression in alveolar cell apoptosis the exudation may result in denser opacities on the X-ray appearing as consolidations.<sup>10</sup> These consolidations do not incite sympathetic effusions or internal cavitation as may occur with bacterial pneumonias. Occasionally reticular opacities may be seen on the X-ray as linear bands due to septal/alveolar thickening due to inflammation. The distribution of abnormalities is usually in the lung bases as well as in the periphery.<sup>11</sup> The present study was conducted to assess the role of chest radiography in management of COVID-19 pneumonia.

We found that age group 20-30 years had 5, 30-40 years had 6, 40-50 years had 19, 50-60 years had 10 and >60 years had 14 patients. Kohli et al<sup>12</sup> assessed the patterns of radiological findings on chest radiograph (CXR) for suspected and confirmed COVID-19 patients. 756 RT-PCR confirmed COVID-19 patients were included. 510 (67.46%) of our patients with positive initial RT-PCR showed abnormal baseline CXR. The abnormal findings were described as haziness akin to ground glass opacities (GGO) on CT, peripheral opacities, patchy parenchymal opacities and consolidation. Peripheral opacities and lower zone distribution were the commonest pattern of CXR abnormalities with bilateral involvement. The severity of findings on serial CXR and radiographic regression was studied along with follow-up to assess response to treatment. Forty-six patients showed features of acute lung injury (ALI). Complications and new CXR findings were reported for patients who were given ventilator support.

We observed that normal x-ray were observed in 20 patients, abnormal x-ray in 35, x-ray showing only peripheral opacities in 12, x-ray showing both central and peripheral opacities in 34, x-ray showing haziness (GGO) in 10, x-ray showing consolidation in 7. Left lung involvement was seen in 12, right lung involvement in 14 and bilateral lung involvement in 28 patients. Total HRCT was done in 30, out of which abnormal HRCT was seen in 16, abnormal x-ray abnormal HRCT in 6 and normal x-ray abnormal

HRCT in 8. Rodriguez- Morales et al<sup>13</sup> in their study found that covid-19 pneumonia changes are mostly bilateral on chest radiographs (72.9%) and have ground glass opacity in 68.5% of cases; however, these data are pooled so it is not possible to link the radiographic findings to the duration of disease or severity.

Yasin et al<sup>14</sup> evaluated the COVID-19 disease course and severity using chest X-ray (CXR) scoring system and correlate these with patients' age, sex, and outcome. There were 350 patients proven with positive COVID-19 disease; 220 patients (62.9%) had abnormal baseline CXR and 130 patients (37.1%) had normal baseline CXR. During follow-up chest X-ray studies, 48 patients (13.7%) of the normal baseline CXR showed CXR abnormalities. In abnormal chest X-ray, consolidation opacities were the most common finding seen in 218 patients (81.3%), followed by reticular interstitial thickening seen in 107 patients (39.9%) and GGO seen in 87 patients (32.5%). Pulmonary nodules were found 25 patients (9.3%) and pleural effusion was seen in 20 patients (7.5%). Most of the patients showed bilateral lung affection (181 patients, 67.5%) with peripheral distribution (156 patients, 58.2%) and lower zone affection (196 patients, 73.1%). The total severity score was estimated in the baseline and follow up CXR and it was ranged from 0 to 8. The outcome of COVID-19 disease was significantly related to the age, sex, and TSS of the patients. Male patients showed significantly higher mortality rate as compared to the female patients. Also, the mortality rate was higher in patients older than 40 years especially with higher TSS.

## CONCLUSION

Authors found that chest x-ray is an important diagnostic aid in the detection and management of COVID-19 positive patients.

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