

# Chest X-Ray Findings in Asymptomatic or Mildly Symptomatic Patients having COVID-19 Infection

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## A B S T R A C T

**Introduction:** Imaging is important in the diagnosis as well as follow up of COVID 19 patients. In this regard CT chest as well as Chest X Ray (CXR) can be used. HRCT is not widely available in developing countries including India moreover not many people can afford it. CXR can be used as an alternative for diagnosis as well as follow of COVID 19 cases. We conducted this study to analyses chest X Ray findings in asymptomatic or mildly symptomatic COVID 19 cases.

**Materials and methods:** The study was a multicentric retrospective study in which X-Ray findings of patients who tested positive for COVID 19 were analyzed by expert radiologists. 80 asymptomatic or mildly symptomatic patients were included in this study on the basis of a predefined inclusion and exclusion criteria. CXR findings of all these patients were analyzed by expert radiologists. Statistical analysis was done using SSPS 21.0 software and p value less than 0.05 was taken as statistically significant.

**Results:** Out of these 80 cases there were 45 (56.25%) males and 35 (43.75%) females with a M:F ratio of 1:0.77. The mean age of male patients was found to be 42.14 +/- 11.34 years whereas mean age of female patients was found to be 44.36 +/- 13.02 years. 39 (48.75%) patients were symptomatic whereas remaining 41 (51.25%) patients were asymptomatic. Common chest X Ray findings were bilateral peripheral consolidation sparing perihilar region (Reverse batwing pattern) which was seen in 25 (31.25%) patients. The other common abnormalities seen on X-ray were Multifocal bilateral consolidation (22.50%), Multifocal lower lobe predominance consolidation (17.50%) and Multifocal unilateral consolidation (17.50%).

**Conclusion:** Chest X Ray abnormalities can be used for diagnosis as well as following up patients with COVID19 particularly in developing countries including India where availability and affordability of HRCT is limited.

**Keywords:** COVID 19, Chest X Ray, Pneumonia, Consolidation

## INTRODUCTION

Coronavirus disease 19 can be defined as illness caused by novel corona virus also named as Severe acute respiratory distress syndrome coronavirus 2 (SARS-CoV-2). The virus was first identified in Wuhan city china where a cluster of patients with atypical pneumonia causing respiratory distress was found.<sup>1</sup> In March 2020 world health organization has declared it a global pandemic. Following this outbreak there was a widespread dissemination of infection throughout the globe and hardly there is any country which has been spared by COVID 19. Though the case fatality rate of covid 19 is low, the fact that human beings do not possess any immunity against this novel virus makes it dangerous since it has the potential to infect everyone who is exposed to the virus by direct contact or in the form of fomites or droplets.<sup>2</sup> The range of incubation period of Covid-19 is 2days to 2 weeks and the mean incubation time was found to be 5.1 days. Almost all patients (>97%) developed symptoms within 12

days of infection.<sup>3</sup>

The common presenting features of COVID-19 include but is not limited to fever, cough, dyspnea, breathlessness, extreme fatigue and tiredness, body ache, sore throat and running nose.<sup>4</sup> One of the characteristic symptoms reported in many cases is anosmia which is found to be an interesting presenting complaint in many cases. Gastrointestinal symptoms such as vomiting and diarrhea may also be present in these cases.<sup>5</sup>

The diagnosis of COVID-19 pneumonia depends upon identification of viral protein by reverse transcriptase-Polymerase chain reaction test popularly known as RT PCR.<sup>6</sup> Rapid antigen test is another option for diagnosis but lacks sensitivity and hence is not recommended in symptomatic patients. The value of rapid antigen test is for using it in mass screening rather than diagnosis in symptomatic individuals.<sup>7</sup> The imaging has got an important place in the diagnosis of COVID-19 pneumonia and role of high-resolution

computerized tomography in the early diagnosis of COVID-19 can't be overemphasized. It is one of the recommended methods of diagnosis as per the guidelines issued by various health authorities including World health organization.<sup>8</sup> Even chest X-Ray can be used as a helpful tool in the management of patients infected with COVID-19 particularly when the availability of diagnosis by RT-PCR is limited. IN developing countries of south east Asia including India X-Ray Chest can be used as a first line investigation to know the pattern and severity of pneumonia in patients of COVID-19. The common X-Ray Findings reported in patients with COVID infection include Reticular-nodular opacities, Ground glass opacities, Consolidation, nodular pattern, pleural effusion and in some cases pneumothorax.<sup>9</sup> Those all these findings are non-specific, carry low sensitivity and specificity for COVID 19 and can be seen in any other pneumonia their importance lies in following up these x-rays for improvement or worsening of pneumonia in RT-PCR confirmed cases of COVID 19 disease.<sup>10</sup>

Keeping this background in mind we undertook this study to analyse the patterns of Chest X-Ray findings in asymptomatic or mildly symptomatic out patient department patients with positive RT-PCR COVID -19 test.

## MATERIAL AND METHODS

The study was a multicentric retrospective study in which X-Ray findings of patients who tested positive for COVID 19 were analyzed by expert radiologists. Informed consent was obtained from all the patients about including imaging data for research purpose. Chest X RAYS of total 80 patients who were either confirmed cases of COVID 19 or later turned out be COVID 19 by RT PCR were analyzed by expert radiologist for presence of X-Ray findings. The cases were included in the study on the basis of a predefined inclusion and exclusion criteria.

The demographic details such as age, gender and address of

the patients were recorded. The signs and symptoms of the disease were also recorded in a proforma. The patients were divided into asymptomatic and mildly symptomatic cases having symptoms such as fever, sore throat, cough and body ache. The chest X-Ray PA view was analyzed for presence of and type of abnormalities. The X-Ray patterns were mainly divided into 6 categories.

The statistical analysis was done using SSPS 21.0 software and p value less than 0.05 was taken as statistically significant.

### Inclusion criteria

1. Positive RT-PCR COVID-19 test
2. Patients with abnormal x ray chest findings only.
3. Age 18 to 65 yrs.
4. Patients with no comorbidity
5. O2 saturation => 94%
6. Patients having mild symptoms such as Fever, sore throat, cough, and body ache etc.

### Exclusion Criteria

1. Those who refused consent.
2. Patient with negative RT\_PCR.
3. Patients with normal Chest X Ray.
4. Patients with co-morbidities which were likely to interfere with interpretation of Chest X Ray Findings such as those having COPD, tuberculosis or interstitial lung disease etc.
5. Patients with SpO2 less than 94%.
6. Patients having severe symptomatic COVID such as severe breathlessness, dyspnea etc.

## RESULTS

In this study a total of 80 X-rays of COVID patients were analyzed for presence of abnormal patterns. Out of these 80 cases there were 45 (56.25%) males and 35 (43.75%) females with a M:F ratio of 1:0.77.

The analysis of age of the studied cases showed that the

	X-Ray Pattern
1	Unilateral isolated round or focal segmental pneumonia.
2	Bilateral peripheral consolidation sparing perihilar region. (Reverse batwing pattern).
3	Multifocal lower lobe predominance consolidation.
4	Multifocal bilateral consolidation
5	Peribronchial consolidation
6	Multifocal unilateral consolidation

**Table-1:** Pattern of X-Ray Findings on Chest X-Ray.

Age in years	Males		Females	
	No of Patients	Percentage	No of Patients	Percentage
18-30	5	6.25%	2	2.50%
31-40	7	8.75%	12	15.00%
41-50	19	23.75%	14	17.50%
51-60	12	15.00%	6	7.50%
> 60	2	2.50%	1	1.25%
Total	45	56.25%	35	43.75%
Mean Age	42.71 +/-10.31 years		40.85 +/- 8.92 years	
P = 0.3989 (95% CI= -6.2251 to 2.5051) – Not Significant				

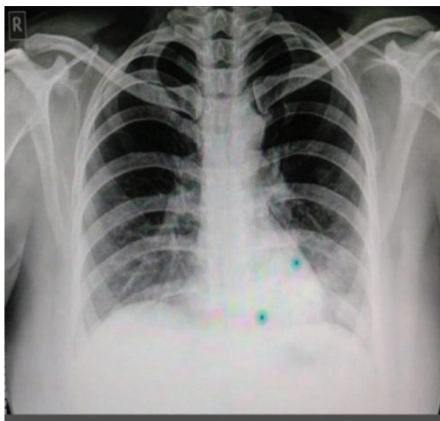
**Table-2:** analysis of age of the studied cases

Symptoms in studied cases	No of patients	Percentage
Asymptomatic	41	51.25%
Altered Taste /Smell	12	15.00%
Fever	37	46.25%
sore throat	35	43.75%
cough	23	28.75%
body ache	31	38.75%

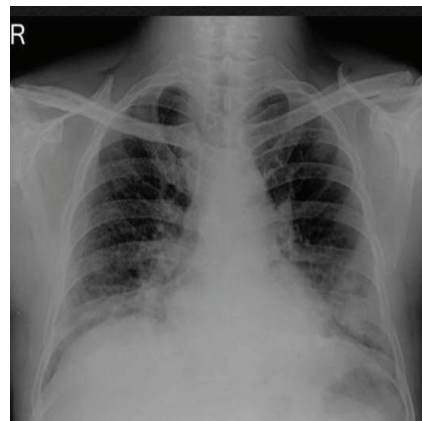
**Table-3: Symptoms in studied cases**

X-Ray Pattern	No of Patients	Percentage
Unilateral isolated round or focal segmental pneumonia.	4	5.00%
Bilateral peripheral consolidation sparing perihilar region. (Reverse batwing pattern).	25	31.25%
Multifocal lower lobe predominance consolidation.	14	17.50%
Multifocal bilateral consolidation	18	22.50%
Peribronchial consolidation	5	6.25%
Multifocal unilateral consolidation	14	17.50%
Total	80	100%

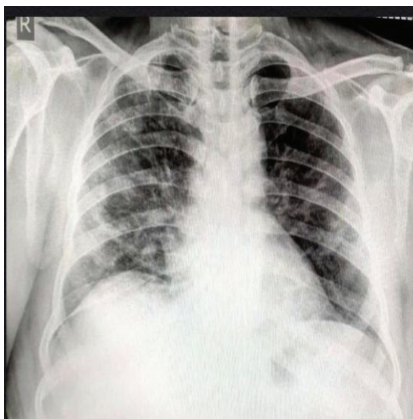
**Table-4: Abnormal X-Ray Patterns in studied cases.**



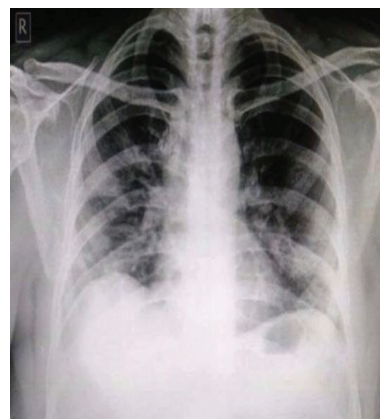
**Figure-1:** Unilateral isolated round or focal segmental pneumonia.



**Figure-3:** Multifocal lower lobe predominance consolidation.



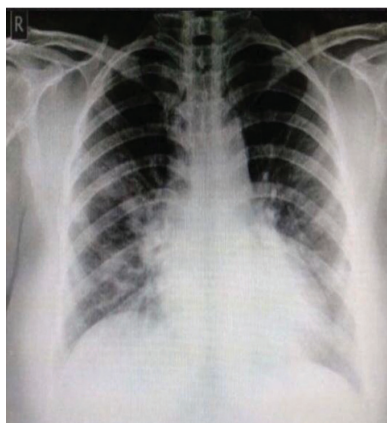
**Figure-2:** bilateral peripheral consolidation sparing perihilar region. (Reverse batwing pattern).



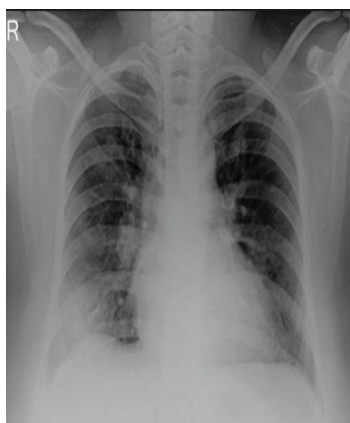
**Figure-4:** Multifocal bilateral consolidation

most common affected age group amongst males as well as females was between 41-50 years of age. The mean age of male patients was found to be 42.14 +/- 11.34 years whereas mean age of female patients was found to be 44.36 +/- 13.02 years. The mean age of male and female patients was found to be comparable with no statistically significant difference

in the age group of the studied cases (table-1). Out of 80 Patients whose X-Rays were analyzed, 39 (48.75%) patients were symptomatic whereas remaining 41 (51.25%) patients were asymptomatic. Table-2 shows symptoms of studied cases. The X-ray abnormalities were divided into 6 broad categories on the basis of type of lung involvement. The most common



**Figure-5:** peribronchial consolidation



**Figure-6:** Multifocal unilateral consolidation

abnormality on chest x-ray was found to be presence of bilateral peripheral consolidation sparing perihilar region (Reverse batwing pattern) which was seen in 25 (31.25%) patients. The other common abnormalities seen on X-ray were Multifocal bilateral consolidation (22.50%), Multifocal lower lobe predominance consolidation (17.50%) and Multifocal unilateral consolidation (17.50%). Least common X ray finding was found to be Unilateral isolated round or focal segmental pneumonia which was seen in 4 (5%) patients (table-3; figure-1-6).

## DISCUSSION

COVID-19 usually present with dry cough fever, myalgia, fatigue, anosmia and breathlessness. Its signs and symptoms are similar to any other pneumonia. Chest imaging is one of the important components in the evaluation of these patients. High resolution computerized tomography (HRCT) is highly sensitive for the diagnosis of COVID and may show Multifocal ground-glass opacities and consolidation.<sup>11</sup> Though HRCT is highly sensitive, its availability is limited in developing countries including in India. Chest X-RAY can be used as an alternative to HRCT in areas where HRCT is not available.

Additionally, the speed with which the people are getting infected with COVID makes it imperative that patients having severe symptoms should get priority for undergoing HRCT and in patients who are mildly symptomatic or asymptomatic CXR can be done to assess the severity of lung abnormalities. CXR can also be used for following up patient

and see whether there is improvement or deterioration in lung abnormalities. CXR has an advantage of being affordable and quick method of assessment in COVID patients who are either asymptomatic or mildly symptomatic.<sup>12</sup>

Durrani M et al conducted a study to analyze Chest X-ray findings in COVID 19 positive patients. For this purpose, all RT-PCR COVID-19 positive patients were screened by CXR at corona filtration center. The authors found that Mean age of the patients was 44 years. Presenting complaints were cough 20 (67%), fever 18 (60%), shortness of breath 11 (37%), sore throat six (20%), loss of sense of taste and smell four (13%). Main co-morbid was hypertension six (20%). Two (7%) patients had normal and seven (23%) had classical COVID CXRs. 21 (70%) patients were in indeterminate group with only one (3%) having unilateral lung disease. Three (10%) patients had diffuse lung involvement and 18(60%) had peripheral lung involvement. Majority of patients 19 (63%), had bilateral middle and lower zonal involvement. The mean age of the patients in this study was found to be similar to our study (Males= 42.71 +/-10.31 years females= 40.85 +/- 8.92 years).<sup>13</sup> Similarly in the study conducted Li H et al the age of COVID-19 patients ranged from 0.5 to 97 years, with a mean of 45.2 years. The mean age of COVID 19 patients in this study was also found comparable to our study.<sup>14</sup>

The common chest X-Ray patterns in COVID patients in our study were found to be bilateral peripheral consolidation sparing perihilar region (Reverse batwing pattern) followed by Multifocal bilateral consolidation and Multifocal lower lobe predominance consolidation. In a study conducted by Wong HYF et al the authors found that Consolidation was the most common finding (30 of 64; 47%) followed by ground-glass opacities (21 of 64; 33%).<sup>15</sup> Abnormalities at chest radiography had a peripheral distribution (26 of 64; 41%) and lower zone distribution (32 of 64; 50%) with bilateral involvement (32 of 64; 50%). Pleural effusion was uncommon (two of 64; 3%). This was similar to our study in which we found the most common chest X-ray abnormality to be Bilateral peripheral consolidation sparing perihilar region which was seen in 31.25% cases.

## CONCLUSION

Chest X-Ray abnormalities in COVID-19 pneumonia may consist of variable forms of consolidation and focal segmental pneumonia. The abnormalities can be used to not only for knowing the severity of lung involvement at the time of diagnosis but also can be used to follow up patients for improvement or deterioration of lung involvement.

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