PLAIN RADIOGRAPHIC FINDINGS IN COVID-19 PNEUMONIA

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ABSTRACT:

Background: Covid 19 pneumonia in patients infected with SARS CoV 2 is very common. Covid 19 pneumonia is a lung infection in which alveoli in lungs filled with pus leading to breathlessness, cough and fever. Covid 19 infection is spread by respiratory droplets, so spread of disease is easy and fast. To prevent transmission early diagnosis is important. Radiographic findings could help suspect patients with symptoms for Covid 19 pneumonia till RT- PCR reports are awaited.

Objective: To identify and analyze the radiographic features of COVID-19 pneumonia. Materials and Methods: Retrospective evaluation of chest X-ray of 80 patients with symptoms and SARS CoV 2 infection was done and were confirmed by RT PCR. This study was conducted in Dhiraj hospital, pipariya from march to may 2021.

Results: Among 80 patients who underwent CXR, 58(72.5%) showed abnormal radiographic findings. Ground-glass opacity was observed in 22/58(38%) patients, consolidation in 36/58(68%). This Lesions were central in 4/58(6.9%), peripheral in 32/58(55%) and both in 22/58(37.9%).

Conclusions: The frequent findings in COVID-19 pneumonia were consolidation and ground-glass opacity. Distribution was bilateral, peripheral, and with lower zone predominance. Normal Chest X-Ray findings were in 22/80(27.5%).

Keywords: COVID 19 pneumonia, ground-glass opacity, consolidation.

I. INTRODUCTION:

The ofcorona virus type 2 became pandemic when the casesofcorona virusdiseasewasreported in Wuhan, China. RT-PCR recommended for the confirmation of COVID-19 by WHO. The pathogen responsible for this pneumonia is coronavirus belongs to family Coronaviridae and was named as the sever acute respiratory syndrome coronavirus -2 (SARS-CoV-2). Respiratory illness caused by this virus is termed as Covid 19. Covid 19 virus is spread from person to person through respiratory droplets when person is in close contact with someone who is actively coughing or sneezing. Infection occurs when these droplets carrying virus come in contact with mucosa surface like eye, nose and mouth of host. The covid 19 pneumonia has similar onset as other pneumonia. The symptoms of COVID 19 pneumonia range from mild respiratory symptoms like fever, body
aches, malaise and cough to ARDS (acute respiratory distress syndrome)\(^6\) \(^7\). Diagnostic tests for SARS-CoV-2 infection uses nucleic acid, antibodies and proteins for diagnosis but viral nucleic acid detection by RT-PCR remains the gold standard.\(^8\) Results from RT-PCR tests are dependent on primers targeting different genome parts, virus RNA sequence variations can give false negative results because of virus evolution.\(^9\) Several studies showed importance of the radiological imaging in detecting early and treatment of COVID-19 pneumonia.\(^10\) Radiographic and molecular based combined can be used to make definitive diagnosis of Covid-19 pneumonia.\(^11\) CT scan shows characteristics multiple ground-glass opacities with consolidation in the peripheral zones of the lungs in Covid-19 pneumonia. CT score is used to evaluate the severity of infection. CT helps in diagnosis of COVID-19 pneumonia when typical findings are present.\(^12\) Laboratory findings in Covid-19 pneumonia are increased C reactive protein, decrease in albumin, decrease eosinophils, increased lactate dehydrogenase. Increase C reactive protein and lactate dehydrogenase is associated with severity of disease.\(^13\) Treatment of Covid-19 pneumonia based on severity of illness or risk factors, antiviral are given in early phase when virus is replicating while anti-inflammatory drugs such as corticosteroids, immunomodulating therapies are given in later stage of illness with hyperinflammatory state.\(^14\) Respiratory system is mainly affected by SARS-CoV-2 but it can affect other systems like Cardiovascular, gastrointestinal tract, renal, hepatobiliary and central nervous system by thrombosis, immune dysregulation, thromboinflammation and renin-angiotensin-aldosterone system dysregulation.\(^15\) Post-Covid-19 pneumonia lung fibrotic changes can be seen in association with older age, acute respiratory distress syndrome, mechanical ventilation, higher CT severity score and long hospital stay.\(^16\)

## II. AIM AND OBJECTIVE:

Our study aimed to identify the type and distribution of plain radiographic finding in COVID-19 pneumonia in Dhiraj Hospital, Piparia, Vadodara.

## III. MATERIAL AND METHOD:

Patients included in this study were patients positive for COVID-19 pneumonia, in which the SARS-CoV-2 infection was confirmed by reverse transcription polymerase chain reaction (RT-PCR) according to WHO guidelines. The onset of COVID-19 pneumonia was found linked with cough, dyspnea, fever (>37.5 °C) and patients without symptoms were not included in study. Patients with HIV infection, Neutrogena secondary to chemotherapy or patients on immunosuppressants, or known cases of chronic lung disease were not included in the study. This is retrospective type of study and included adult patients who underwent Chest Xray. Chest imaging was done before treatment was started for Covid 19 pneumonia. All chest X-rays taken in posteroanterior (PA) view which is standard frontal chest projection performed in standing position in full inspiration with patient hugging the detector to move scapula laterally and in anteroposterior (AP) view which is an alternative frontal view, it is performed with patient sitting in bed using portable X-ray units with usual local protocols and were taken as computed radiographs. This study was conducted in dhiraj hospital pipariya from march 2021 to may 2021. Chest X-ray findings like consolidation, ground-glass opacities, reticulated pattern, lymphadenopathy and Pleural effusion where evaluated. Readers of chest X-ray also evaluated the pattern of distribution of consolidation and ground-glass opacity in upper or lower zones, and central or peripheral zones. Consolidation is defined as alveolar air spaces filled with pus or fluid causing airspace opacification with air bronchograms within it while ground-glass was defined as mildly increased attenuation with preserved bronchial and vascular marking giving hazy lung opacity on chest xray. In lymphadenopathy in hilar region is increase in hilum size compared to contralateral hilum. Pleural effusion is accumulation of fluid in pleural cavity causing bunting of costophrenic angle or meniscus sign. Pathology on chest xray were located by zones. Upper zone is between clavicle and cardiac silhouette while lower zone are lung bases. Central zones are in perihilar regional and peripheral zone in subpleural region.

## IV. RESULTS

80 patients chest xray were evaluated in this study. RT-PCR study was established in all patient for daignosis of Covid-19. Among all cases of Covid-19 infected patients 58 patients showed findings on chest X-ray, which is 72.5 % of Covid 19 pneumonia patients with chest X-ray showed atleast one finding. 22 patient with positive RT-PCR for covid 19 infection showed no findings on chest X-ray which is only 27.5% of chest X-rays taken.

Table 1 show characteristics findings of Covid 19 pneumonia patients. Of all Chest X-rays with positive findings consolidation was most common findings seen in about 36 patients which is 62% of X-rays with findings studied followed by ground-glass opacities. Ground-glass opacity was present in 22 patients X-rays were studied, that is about 38% of X-ray with positive findings showed Ground glass opacity. Pleural effusion is

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not a common finding in Chest Xray of Covid 19 pneumonia patients, it is found in only 2 out of 80 patients X-ray studied for Covid 19 pneumonia that is about 3.4% of X-rays with positive findings.

Table 1 X ray findings

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Negative chest</td>
<td>22/80</td>
</tr>
<tr>
<td>Positive chest</td>
<td>58/80</td>
</tr>
<tr>
<td>Consolidation</td>
<td>36 (62%)</td>
</tr>
<tr>
<td>Ground- glass opacity</td>
<td>22 (38%)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>2 (3.4%)</td>
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</tbody>
</table>

Table 1 shows pattern of distribution of consolidation and ground glass opacities on Chest X-ray in Covid-19 pneumonia patients. Of 58 Chest X-rays with positive findings for Covid19 pneumonia lower zone involvement was seen most commonly involved .Lower zone involvement was seen in about 38 patients ( 55% of total Xray with positive findings ) . Predominantly Upper zone involvement was not seen in single X-ray of Covid-19 pneumonia patient. 20 Chest X-ray showed no predominant distribution of consolidation or ground-glass opacities. Peripheral distribution of consolidation or ground-glass was seen in 38 Chest X-rays ( 55% of Chest X-rays with positive findings) while central distribution of lung involvement is seen in only 4 X-rays studied ( 6.9% of Chest Xrays with positive findings ). Both Central and peripheral involvement with any predominant zone involvement was seen in 22 chest X-rays studied for Covid19 pneumonia (37.9 % of chest Xrays with positive findings).

Table 2 shows pattern of distribution of consolidation and ground glass opacities on Chest X-ray in Covid-19 pneumonia patients. Of 58 Chest X-rays with positive findings for Covid19 pneumonia lower zone involvement was seen most commonly involved .Lower zone involvement was seen in about 38 patients ( 55% of total Xray with positive findings ) . Predominantly Upper zone involvement was not seen in single X-ray of Covid-19 pneumonia patient. 20 Chest X-ray showed no predominant distribution of consolidation or ground-glass opacities. Peripheral distribution of consolidation or ground-glass was seen in 38 Chest X-rays ( 55% of Chest X-rays with positive findings) while central distribution of lung involvement is seen in only 4 X-rays studied ( 6.9% of Chest Xrays with positive findings ). Both Central and peripheral involvement with any predominant zone involvement was seen in 22 chest X-rays studied for Covid19 pneumonia (37.9 % of chest Xrays with positive findings).

Table 2

<table>
<thead>
<tr>
<th>Lung field involvement</th>
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<tbody>
<tr>
<td>Upper zone</td>
<td>0/58</td>
</tr>
<tr>
<td>Lower zone</td>
<td>38/58 (65%)</td>
</tr>
<tr>
<td>No zonal predominance</td>
<td>20/58 (35%)</td>
</tr>
<tr>
<td>Zone involvement</td>
<td></td>
</tr>
<tr>
<td>Peripheral</td>
<td>38/58(55%)</td>
</tr>
<tr>
<td>Both</td>
<td>22/58(37.9%)</td>
</tr>
<tr>
<td>Central</td>
<td>4/58(6.9%)</td>
</tr>
</tbody>
</table>

V. DISCUSSION:-

In this study Chest x-ray finding of patients infected with SARS Co 2 where studied. The most important finding was consolidation and ground-glass opacities in lung field and their pattern of distribution in lung fields. This findings are most commonly found in Covid-19 pneumonia patients Chest X-rays. Predominant Lower zone involvement is also seen in most of the chest X-rays studied for Covid19 pneumonia. Peripheral zones of distribution was also seen commonly in this studies. Peripheral and lower zone involvement with consolidation and ground glass opacities in chest X-ray of patients with symptoms like cough, breathlessness, fever and malaise highly suspect Covid-19 pneumonia. Huang et al reported consolidation as predominant radiographic finding in intensive care unit while ground glass opacities in rest of patients. Ground glass opacities and there peripheral distribution was most common finding on CT with lung cavitation, nodules, Pleural effusion and lymphadenopathy were absent in other studies. Histological features in Covid -19 pneumonia with hypoxic respiratory failure from acute respiratory distress syndrome are diffuse alveolar damage with extensive
thrombosis and vascular damage. This study is to systematically describe the CXR findings in COVID-19 pneumonia patients. Patients which are RT-PCR positive and having symptoms of respiratory tract infection like where studied to evaluate chest X-ray findings in this patients of Covid -19 pneumonia. Among the total of 80 patients, 22 patients (27.5%), Chest x-ray was negative without any findings. Chest X-rays with atleast one finding was 58/80 patients (72.5%), ground-glass opacity was present in 11/29 (38%) patients and combination was present in 36/80 (62%) patients. A relatively higher rate of involvement of the lower zones was observed compared to the middle and upper zones. The exclusive involvement of the peripheral zones and the involvement of both peripheral and central zones was significantly more frequent than the only central zones involvement. Pleural effusion was observed less frequently. Most common finding in chest CT in adult Covid 19 patients was bilateral, peripheral posterior ground-glass opacities with or without consolidation with lower lobe predominance. Other studies that had shown similar observations. The limitation of present study is Chest x-ray is less sensitive in early stage of disease but it can be useful for monitoring progression of disease. Chest X-ray when compared with CT scan, CT scan has better sensitivity than chest x-ray in Covid -19 pneumonia. According to centre for disease control and prevention the symptoms of Covid-19 can appear in 2 day post exposure or can take 2 week after exposure. Findings can be obscured by lack of inspiration, breast predominance and poor positioning of patient, limitation in xray technique in portable xray machines.

Fig.1 Shows chest radiography finding:

A)Ground-glass opacity in right lung field
B) consolidation involving peripheral zones
C)consolidation involving lower zones.

VI. CONCLUSION:
The main purpose of the study was to know Chest X-ray findings in COVID-19 pneumonia patients, there pattern of distribution and characteristics. The results indicates that consolidation and ground-glass opacities were most common finding on Chest X-ray in patients with Covid -19 pneumonia. Predominant peripheral and lower zones were involved in disease. The presence of consolidation or ground glass opacities predominally affection lower zones and peripheral/subpleural zones on chest X-ray highly suspects Covid19 Pneumonia. However absence of this findings does not exclude the presence of disease. Chest X-ray is useful for suspecting patients for covid 19 pneumonia.
REFERENCES: