

Chest X-Rays Findings in Patients Positive for COVID 19 at Sheikh Zayed Hospital Lahore

AMMAR ZAHID SHEIKH¹, ZAINAB TARIQ², SABA NOOR³, ASMA AMBREEN⁴, SHOMAILA AWAN⁵, MARYAM AMJAD⁶

¹Department of Radiology, Sheikh Zayed Hospital Lahore

²Department of Surgery, Sheikh Zayed Hospital Lahore

³Department of Neurology, Sheikh Zayed Hospital Lahore

⁴MBBS, FCPS Medicine, FCPS Pulmonology, Assistant Professor Medicine, Foundation University Medical College, Islamabad

⁵MBBS, MRCP (UK), FCPS Pulmonology, Assistant Professor Medicine, Foundation University Medical College, Islamabad

⁶Consultant Radiologist, KRL Hospital, Islamabad

Correspondence to: Dr Ammar Zahid Sheikh, Email Address: ammarzahid69@gmail.com, Cell No. +923224342407

ABSTRACT

Aim: To assess the results of chest x ray radiographs of patients positive for Covid-19, presented at the tertiary care hospital according to the classification by the British Society of Thoracic Imaging (BSTI).

Place and Duration: In COVID-19 Ward (Department of Medicine) Sheikh Zayed Hospital, Lahore for three months duration from January 2021 to March 2021.

Methods: A total of 96 patients were selected. In this observational study, positive COVID-19 patient determined by the reverse transcriptase polymerase chain reaction (RT-PCR) were enrolled for this study above the age of 14 years. CXR results were classified conferring to BSTI documentation and classification in terms of percentage and frequency.

Results: Chest rays of 96 patients who tested positive for Covid-19 by RT-PCR over the age of 14 years were examined. Chest X-rays are classified according to the BSTI Covid-19 X-ray classification. Out of 96 patients, 10 patients (10.41%) had normal chest x-rays, 19 (19.80%) patients had classic bilateral, peripheral and basal consolidation / ground glass opacity (GMO), 60 (62.5%) had unspecified group, 7 (7.29%) patients have poor quality X-ray film. The unilateral involvement was noticed in 15 and bilateral in 49 patients, 12 of the patients had diffuse involvement on chest radiograph and peripheral involvement in 39 patients. According to regional dominance, 41 of the unspecified (42.70%) had middle and lower lung involvement, 7 (7.29%) had only the middle zone, and 8 (8.33%) had involvement of lower zone.

Conclusions: In this study, Covid-19 chest X-rays are usually presented as ground glass opacity, mixed consolidation with GGOs in the middle and lower peripheral areas of the bilateral lung. Chest X-ray BSTI classification is used to classify Covid-19 severity in our patients, thus differentiating in the classic Covid-19 of the middle zone versus low zone involvement.

Keywords: Consolidation, Covid, Ground Glass Opacity, Chest Image.

INTRODUCTION

In December 2019, a novel beta-coronavirus (SARS-CoV-2) was identified that causes acute respiratory syndrome (2019) as the causative agent of coronavirus disease (COVID-19) and the March 11, 2020 pandemic, announced the Global Health Organization¹⁻². Chest X-rays (CXR) studies are the most analytical studies in cases of COVID 19. The Centers for Disease Control and Prevention (CDC) identified a new corona virus on January 7, 2020 from a patient cross-sample that was then named by WHO in 2019 in Wuhan, China³⁻⁴. WHO announced an emergency on January 30 as a public health emergency of international importance; despite measures, the virus continued to feast and the WHO concluded on March 11, 2020 that it was a pandemic⁵⁻⁶. In Pakistan, the COVID-19 first positive patient affirmed by RT-PCR reported on February 26, 2020. Clinical symptoms of COVID-19 can be minor, including somnolence, myalgia, dry cough, shortness of breath and fever⁷⁻⁸. It can also have serious symptoms such as septic shock, acute respiratory distress syndrome (ARDS), acute renal failure and disseminated internal coagulation (DIC). Serious symptoms of the disease occur in older adult men, obesity (body mass index > 40), chronic lung disease, diabetes, chronic kidney disease, chronic liver disease, weakening of the immune system by immunosuppressants⁹⁻¹⁰.

The British Thoracic Imaging Society (BSTI) has classified the CXR results among patients living in Europe. Our local population varies in habitats and disease patterns; therefore, the model of the CXR conclusions could be observed in our COVID 19 positive patients¹¹. CT scanning is a priority study for the diagnosis and observation of the disease, but it is not possible to practice it for purpose of screening due to availability, cost-effectiveness and strict disinfectants that require a lot time¹². CXR is the first-choice imaging method for the assessment of acute respiratory disease. The purpose of this research was to analyze the results of the chest X-ray according to our patients based on the British Chest Imaging Society classification and to evaluate the disease model for any abnormalities or similarities.

METHODS

This is a retrospective study conducted in COVID-19 Ward (Department of Medicine) Sheikh Zayed Hospital, Lahore for three months duration from January 2021 to March 2021. It has been approved by a research organization and an ethics committee. Informed and written consent was included on all topics in this study. The study was completed within 3 months. The research sample consisted of routine diagnostic radiographs of patients admitted to our organization in the COVID ward. No subject was treated

without reason. A radiation hygiene decorum was followed in all images for all subjects. In this study, 96 RT-PCR positive patients over the age of 14 were admitted to the medicine department of Covid-19. Chest radiography results of confirmed Covid-19 patients were analyzed and classified according to BSTI documentation and classification in terms of percentages and proportion. Criteria for evaluating chest radiographs was according to the British Society of Thoracic Imaging chest radiography. SPSS version 21.0 was used for data compilation and statistical analysis.

RESULTS

Chest rays of 96 patients who tested positive for Covid-19 by RT-PCR over the age of 14 years were examined. Chest X-rays are classified according to the BSTI Covid-19 X-ray classification. Out of 96 patients, 10 patients (10.41%) had normal chest x-rays, 19 (19.80%) patients had classic bilateral, peripheral and basal consolidation / ground glass opacity (GMO), 60 (62.5%) had unspecified group, 7 (7.29%) patients have poor quality X-ray film. The unilateral involvement was noticed in 15 and bilateral in 49 patients, 12 of the patients had diffuse involvement on chest radiograph and peripheral involvement in 39 patients (Figure 1). According to regional dominance, 41 of the unspecified (42.70%) had middle and lower lung involvement, 7 (7.29%) had only the middle zone, and 8 (8.33%) was involved of lower zone.

Among all patients X-rays 5(5.21%) patients had pleural effusion, 4 (4.16%) had cavitation changes or pneumothorax, 3 (3.13%) had bilateral hereditary lymphadenopathy, 3 had calcified granulomas, respectively. (Table 1, 2 and 3 and Figures 1, 2 and 3)

Table-1 shows the X-ray findings

Findings	No. of Patients	%
Normal	10	10.41
Indeterminate	60	62.5
Classic/Probable	19	19.8
Poor Quality Film	7	7.29

Table-2 shows the distribution of lungs involvement and zonal predominance

Location:		
Bilateral	49	51.04
Unilateral	15	15.63
C) Distribution		
Peripheral	39	40.62
Diffuse	12	12.5
Zonal Predominance		
Only Lower Zone	8	8.33
Only Middle Zone	7	7.29
Middle and Lower Zone	41	42.7
Non Covid-19	11	11.46

Table-3 shows the other clinical features other than Covid-19

A) Pleural Effusion	5	5.21
B) Pneumothorax/Cavitating Lesion	4	4.16
C) Old Healed Calcific Granuloma	3	3.13
D) Bilateral Hilar Lymphadenopathy	4	4.16



Fig 1: Bilateral non homogenous Showing diffuse opacities in middle and lower lobe



Fig 2: Bilateral non homogenous Showing diffuse opacities in lower lobe

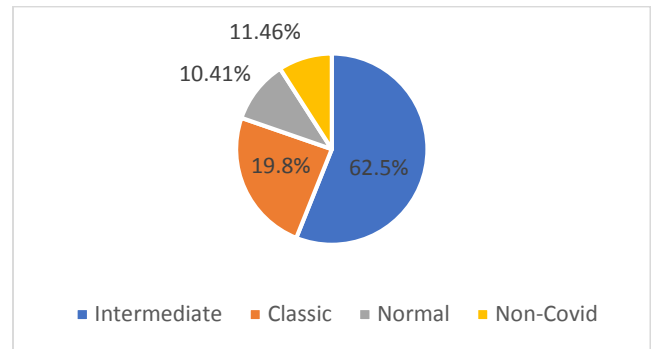


Fig 3: The patient's distribution conferring to X-Ray finding.

DISCUSSION

A virus of the Coronaviridae family causes acute respiratory distress syndrome (SARS) and the Middle East respiratory syndrome (MERS) in 2003. The COVID 19 virus has emerged newly and is still a mystery. Many research works around the world done and shares his knowledge¹³. Portable chest radiography is the utmost accomplished radiological study of cost effectiveness and feasibility in established republics¹⁴. In a corona hospital, chest X-ray is the best means for radiographical evaluation of Covid-19.

Due to the limited number of RT-PCR and late results up to 2-days, patients with high clinical doubt with a positive CXR result are set aside in isolation¹⁵. CXR has low sensitivity and it is hard to differentiate COVID 19 from other viral pneumonia based on CXR results alone. CT scanning is the ideal method of imaging for the early detection of disease and complications, but its use has been limited due to contamination risk, due to cost effectiveness and profitability in developing countries such as Pakistan. In the study by HY Yoon et al. 33% of patients had abnormal initial radiographic changes as compared to this analysis with 5 of abnormal chest changes¹⁶. Abnormal baseline chest findings in SARS were 78.3-82.4% and 83.6% in MERS10 cases, respectively¹⁷. The British Chest Imaging Society classified COVID-19 chest X-rays as a collaborative RT-PCR study, with classic studies, having numerous peripheral, bilateral basal opacities more in both sides of lungs than on one side, indeterminate that does not fit into non-COVID descriptors or classical and Non COVID-19 X-rays having pleural effusion, cavitating, healed calcific granulomas or pneumothorax¹⁸. Radiological results were reported in accordance with the Fleischner Society Glossar for imaging of thoracic region. The ground glass opacities were distinct as large opacity of the lung parenchyma that did not clog blood vessels or bronchi¹⁹. The lung parenchyma consolidation has been described as homogeneous opacification that clogs blood vessels and bronchi. We placed all CXRs in the accordance with classification of BSTI and institute that most patients had bilateral GGO and consolidation as predictable in universal studies²⁰. There may also be extensive involvement in lungs with periaipical infiltrates, indicating the severity of the disease course. This study exhibited that only 19 patients (19.80%) had the classic BSTI picture as COVID-19 ground glass haze/ basal consolidation in the peripheral region on both sides. Most of the patients were in an indeterminate group due to bilateral peripheral lung involvement, multifocal middle and lower regions of the lung involvement²⁰⁻²¹. This means that the radiographic exhibition of our cases was more intense. This consolidation pattern had a variable presentation in terms of density and shape. Smooth homogeneous consolidation was noticed in few patients and most have a peripheral distribution in the form of homogeneous, crescent-shaped or partially nodular opacities²²⁻²³. The Indeterminate group considered the radiological characteristics of COVID-19, the unique occurrence of tuberculosis, the seasonal occurrence of allergic chest disease, and hypersensitivity pneumonitis in our residents²⁴. Interstitial pneumonia, drug-induced pneumonia and Pulmonary edema can also induce COVID-19 associated pneumonia in patients at risk of immunity. Rare images, such as lymphadenopathy and pleural effusion, listed in international studies, were also not uncommon in our population²⁵.

Limitations of our study: Lack of serial CXR to control disease progression, presentation variables, and outcomes in our population.

CONCLUSION

COVID-19 chest radiography is the first-choice imaging method to evaluate pneumonia because it is less expensive, feasible, portable, less time consuming, and

has a lower risk of infection. In this study, Covid-19 chest x-rays are shown as a ground glass opacity spectrum mixed with GMOs to settle in the peripheral middle and lower peripheral areas of the lungs. Chest X-ray BSTI is used to classify Covid-19 in our patients, thus centralizing participation in the classic Covid-19 criteria versus low region involvement.

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