



CHEST X RAY SCORE AND CLINICAL SEVERITY IN COVID-19 PATIENTS

General Medicine

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ABSTRACT

INTRODUCTION: Various chest X-ray scoring systems have been discovered and are employed to correlate with clinical severity, outcome and progression of diseases. With the coronavirus outbreak, few chest radiograph classification were formulated, like the BSTI classification and the Brixia chest X-ray score. Brixia CXR scoring is used for assessing the clinical severity and outcome of COVID-19. This study aims to compare the Brixia CXR score with clinical severity of COVID-19 patients.

MATERIAL & METHODS: This was a retrospective study in which medical records of patients aged 18 years or above, who tested for RTPCR or Rapid Antigen Test (RAT) for COVID positive from 1st February 2021 to 31st July 2021 (6 months) were taken. These subjects were stratified into mild, moderate and severe patients according to the ICMR guidelines. Chest X Rays were obtained and lesions were classified according to Brixia scoring system.

RESULTS: Out of these 375 patients, 123 (32.8%) were female and 252 (67.2%) were male subjects. The average brixia score was 11.12. Average Brixia CXR score for mild, moderate and severe diseased subjects were 5.23, 11.20, and 14.43 respectively.

DISCUSSION: The extent of chest x-ray involvement is proportional to the clinical severity of the patient. Although, a perplexing finding was that the average Brixia score of the female subjects were slightly higher than their male counterparts in the same clinical groups.

CONCLUSION: Brixia CXR score correlates well with the clinical severity of the COVID-19.

KEYWORDS

CXR score, Brixia score, COVID-19, Severity

INTRODUCTION:

X-ray was discovered by Wilhelm Conrad Rontgen in December 1895. Physicians and physicists began to use X-rays on patients to investigate the bones and subsequently the lung and other organs from as early as January 1896[1]. Various chest X-ray scoring systems have been discovered and are employed to correlate with clinical severity, outcome and progression of diseases[2,3]. On December 31st 2019, a cluster of cases of pneumonia were reported from Wuhan, China. Soon, WHO classified the outbreak as a coronavirus disease (COVID-19) pandemic on 11th March 2020[4]. 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 pneumonia, obscures the normal lung markings, although, these may be delayed in appearance or may not appear at all[5]. With the coronavirus outbreak, few chest radiograph classification were formulated, like the BSTI classification and the Brixia chest X-ray score[6,7]. BSTI classification is used for diagnosis or screening of COVID-19 pneumonia. Brixia CXR scoring is used for assessing the clinical severity and outcome of COVID-19 [8–11]. Indian Council of Medical Research (ICMR) COVID-19 national task force provides clinical guidance for management of COVID-19 in India and classifies the COVID-19 patient in mild, moderate and severe disease categories[12]. This study aims to compare the Brixia CXR score with clinical severity of COVID-19 patients.

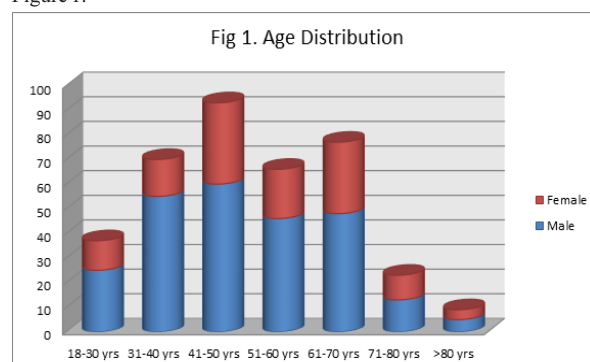
MATERIAL AND METHODS:

This was a retrospective study in which medical records of patients aged 18 years or above, who tested for RTPCR or Rapid Antigen Test (RAT) for COVID positive from 1st February 2021 to 31st July 2021 (6 months) were taken. The study was conducted at a tertiary care centre in the foothills of Himalayas. These subjects were stratified into mild, moderate and severe patients according to the ICMR guidelines[12]. Chest X Rays were obtained and lesions were classified according to Brixia scoring system[7]. Brixia scoring system divided the lungs into six regions. There were 2 lines dividing the lungs into six regions; the first line was drawn at the level of the inferior wall of the aortic arch and the second line at the level of the right inferior pulmonary vein. Pulmonologists or Radiologists rate each region from 0 to 3 based on the severity of the lesion. Score 0 assigned for no lung abnormalities, 1 for interstitial infiltrates, 2 for interstitial and alveolar infiltrates (interstitial dominant), and 3 for interstitial and alveolar infiltrates

(alveolar dominant). The score ranges from 0 to 18. Other findings, such as pleural effusion and pulmonary vessel enlargements, were not included in Brixia scoring system. Chest X ray findings were then compared with the clinical severity of the patient.

RESULTS:

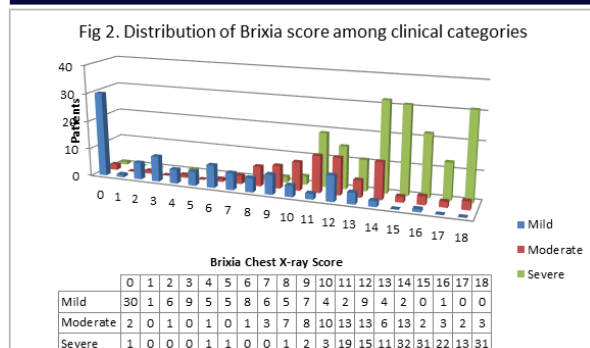
A Total of 375 patients were COVID RTPCR positive from 1st February to 31st July 2021. Out of these 375 patients, 123 (32.8%) were female and 252 (67.2%) were male subjects. The mean age of the subjects was 50.4 years. The youngest subject was 18 years of age while the most elderly subject was 92 years old. Age wise distribution is shown in Figure 1.



The patients were classified clinically into mild, moderate and severe categories. Out of the 375 patients, 104 (27.73%) patients had mild disease, 88 (23.47%) patients had moderate severity and 183 (48.8%) patients had severe disease. Brixia scoring of chest X-ray of each patient was done. The average brixia score was 11.12 for the 375 patients. The average brixia score for each clinical category is shown in Table 1.

Clinical category	Male	Female	Total
Mild	4.93	6.00	5.23
Moderate	11.03	11.53	11.20
Severe	14.32	14.64	14.43

Table 1. Mean Brixia chest x-ray score (out of 18) for each clinical category



Clubbing Brixia CXR score 0-6, 7-12 and 13-18 and comparing these to clinical mild, moderate and severe category patients. Sensitivity and specificity of the CXR scoring system is depicted in table 2.

Brixia CXR scoring (Category)	Sensitivity (%)	Specificity (%)
0-6 (Mild)	61.54	97.05
7-12 (Moderate)	61.36	74.56
13-18 (Severe)	84.70	81.25

Table 2. Comparing Brixia CXR score (clubbed) with clinical classification of COVID

DISCUSSION:

As shown in results, the mean age of the subjects was 50.4 years. This older mean age signifies that younger patients are asymptomatic or mildly symptomatic and hence rarely show to the hospital for ruling out COVID-19. 48.8% patients had severe disease, this is due to the fact that the hospital is a tertiary care centre where there is availability of ventilators and intensive care units, and hence majority of severe patients are referred to our hospital. Brixia scoring of chest X-ray of each patient was done and compared with the clinical severity. Average Brixia CXR score for mild, moderate and severe diseased subjects were 5.23, 11.20, and 14.43 respectively. This finding clearly demonstrates that the extent of chest x-ray involvement is proportional to the clinical severity of the patient. Although, a perplexing finding was that the average Brixia score of the female subjects were slightly higher than their male counterparts in the same clinical groups. A separate study with a larger sample size might be required to compare the brixia score between male and female COVID-19 patients and its significance. When, a chart of comparison of Brixia score with clinical severity was plotted, it was seen that Brixia score 0-6 were prominently mild clinical diseased, 7-12 moderate and 13-18 had mostly severely diseased subjects. Hence, Brixia CXR score was clubbed in 3 categories comprising of scores 0-6, 7-12 and 13-18 and these categories were compared with the clinically mild, moderate and severe groups respectively. Sensitivity and specificity of each group was calculated. The sensitivity for mild (61.54%) and moderate (61.36%) groups was poor, while sensitivity for severe group (84.70%) was good. The specificity for mild group (97.05%) was excellent, good for severe group (81.25%) and fair for moderate category (81.25%). Thus, the Brixia CXR score is fairly specific for categorization into clinically mild, moderate or severe COVID-19 patients but is not so sensitive for such classification.

CONCLUSION:

Brixia CXR score correlates well with the clinical severity of the COVID-19. More studies with even larger sample size are required to further research on the correlation of Brixia chest X-ray score with clinical severity of the COVID-19.

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