

# HRCT Chest in Patient of COVID-19 Pneumonia at a tertiary College of Medical Sciences, Bharatpur, Nepal

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## ABSTRACT

### Introduction

COVID19 pneumonia is caused by novel corona virus. The HRCT chest is helpful in identification of COVID-19 Pneumonia. CT chest play a crucial role in assessing the pattern of manifestation and severity of lung involvement in COVID-19. The objective of this study is to described high resolution computed tomography (HRCT) chest findings in COVID-19 patients in college of medical sciences Bharatpur Nepal.

### Methods

A prospective, HRCT Chest findings were analysed in 375 patients. Patients with high CORADS score and suspicious for COVID-19 pneumonia were further tested positive in PCR examination. The study was done for a year period of time.

### Results

A total 375 patients suspected for COVID-19 pneumonia in HRCT, 341 were PCR positive. The mean age affected by viral pneumonia was 51.9(51-60 year group). The male were 240 and female were 135. Ground glass opacities is noted in 188 patients, followed by GGO and consolidation in 177, consolidations only in 7 and others findings chest findings in 3 patients.

### Conclusions

HRCT chest can help in early detection of COVID-pneumonia. It can also asses the percentages of lung involvement and severity of disease that can guide physician.

**Keywords:** COVID-19 pneumonia; consolidation; ground glass opacities; HRCT chest; lung.

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## INTRODUCTION

The first case of COVID-19 was noticed on December 2019 in wuhan city of China. Within 2 month, the virus spread from wuhan to whole china and 33 countries.<sup>1</sup> COVID 19 pneumonia is caused by Novel corona virus. SARS-COVID-2 was known to cause the COVID infection, which has been highly infectious. Its pandemic and was declared global health emergency by WHO on February.<sup>2,3</sup> This virus is highly contagious, people are infected all over the globe and also in Nepal. The first case was confirmed in Nepal on January 2020 on 21 year old student who had return to Kathmandu from wuhan.<sup>4</sup> Till the 1<sup>st</sup> week of October 2022, total number of infected cases are 999742, 986720 were recovered and 12018 death.<sup>5</sup> COVID-19 patients mostly present with complaints of fever, cough, shortness of breath and body pain. In severe cases the patient present with acute shortness of breath with pulmonary involvement needing for oxygen supports. Rapid oxygen demand and ventilations support is needed for serious patients. Nasopharyngeal swab RTPCR is gold standard for diagnosing of COVID-19 infection however its sensitive is low around 60%. Rapid antigen test also play crucial role in diagnosis of disease.<sup>6,7</sup> Radiological investigation are chest x ray, USG and CT chest. Chest x ray has limited ability to detect early infection, however in late phase multifocal peripheral patchy radioopaque opacities are reported.<sup>8</sup> HRCT Chest can early detect disease early and give idea of lung involvement.<sup>9</sup> A studies revealed that HRCT has higher sensitivity 97.41% and specificity 80%.<sup>7</sup> Other imaging modalities includes point of care ultrasound (POCUS) that is cost effective however limited role due to lack of expertise and chances of reinfection. CT pulmonary angiography is also performed for case of pulmonary embolism.<sup>10</sup>

COVID -19 pandemic second wave was terrifying and subsequent waves are seen less impacting. Due to vaccination and public awareness there is decreased in cases. PCR shows less sensitivity, HRCT play crucial role in diagnosis and management of disease

## METHODS

This is the prospective observational study conducted in radiodiagnosis department of college of medical sciences bharatpur Nepal from 3/2022 to 3/2022.

The patients that were having pneumonia symptoms admitted in COVID screening wards were presented for HRCT chest. 375 patients were evaluated for COVID-19 pneumonia findings like ground glass opacities, consolidation, crazy paving, interlobular septal thickenings and pleural effusions. Patients with history of PTB, ILD and chronic chest illness were excluded in our study.

HRCT chest was done by 168 slice Toshiba CT Scan, with 1mm slice thickness extended from to dome of diaphragm. Patient was placed supine position for scan.

Each patient HRCT chest were evaluated for findings like ground glass opacities, consolidation, crazy paving, interlobular septal thickenings and pleural effusions by trained radiologist. We further made the format for each patients including lung involvement, severity score, gradings and CORADS.

Total score is 25, for five lobes, each lobe having 5 score according to percentage of involvements (i.e <5% =1, 5-25%=2, 25-50%=3, 50-75%=4 and >75%=5). It was further divided in mild (<9), moderate (9-16) and severe (>16) as CT severity score

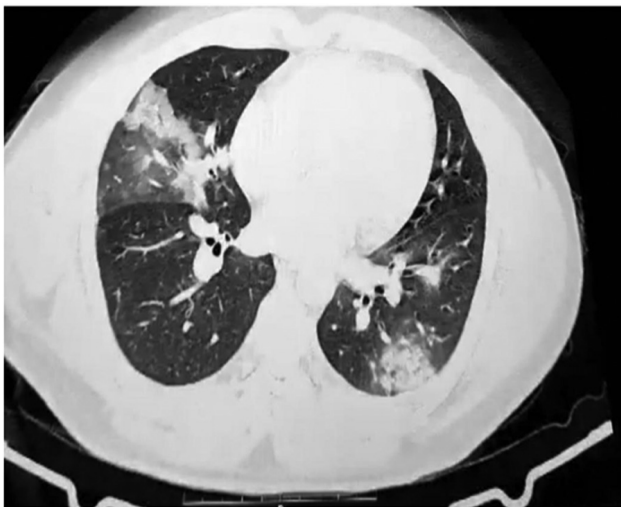
Patients are also divided by level of suspicious to COVID-19 infection<sup>11</sup>

|            |              |
|------------|--------------|
| CO -RADS 1 | No           |
| CO-RADS 2  | Low          |
| CO-RADS 3  | Intermediate |
| CO-RADS 4  | High         |
| CO-RADS 5  | Very high    |
| CO-RADS 6  | PCR+ve       |

Patients were further traced for PCR report, as PCR reports were take 24-48hr, while CT report were send within hour.

Diagnosed and Follow up patients were also noted according to HRCT changes over time.<sup>11</sup>

| Early stage       | 0-4 days   | GGO, crazy paving                        |
|-------------------|------------|--|
| Progressive stage | 5-8 days   | extension of GGO, increased crazy paving |
| Peak stage        | 10-13 days | consolidation                            |
| Absorptive stage  | >14days    | gradual resolution                       |



**Figure 1.** 26 Y/M, HRCT chest showing peripheral consolidation with surrounding GGO.



**Figure 2.** 50Y/F, HRCT chest showing extensive GGO with septal thickening and minimal pleural effusion.

## RESULTS

This study included 375 patients from age group, 11 to 90 year old, those were presented to hospital with COVID-19 pneumonia symptoms

**Table 1.** Age group and sex group.

| Age group | Number of patients (n = 375) |
|-----------|------------------------------|
| 11-20     | 4                            |
| 21-30     | 38                           |
| 31-40     | 62                           |
| 41-50     | 75                           |
| 51-60     | 76                           |
| 61-70     | 61                           |
| 71-80     | 41                           |
| 81-90     | 18                           |
| sex       |                              |
| M         | 240                          |
| F         | 135                          |

The mean age of patient was 51.98 at 51-60 age group.

The male to female ratio is 1.77

| Table 2. Patients chest findings.        |                    |            |
|--|--------------------|------------|
| HRCT Findings                            | Number of patients | Percentage |
| Ground glass opacities                   | 188                | 50.0       |
| Ground glass opacities and consolidation | 177                | 47.2       |
| Consolidation                            | 7                  | 1.9        |
| others                                   | 3                  | 0.9        |

Most common HRCT chest findings in this study were ground glass opacities, followed by ground glass opacities and consolidation, consolidation only and others findings likely crazy paving, interseptal thickening and pleural effusion

| Table 3. CT severity score. |      |        |         |
|-----------------------------|------|--------|---------|
| CT severity score           | Male | Female | (n=375) |
| Mild (<9)                   | 95   | 43     | 138     |
| Moderate (9-16)             | 90   | 50     | 140     |
| Severe (>16)                | 55   | 42     | 97      |

Patients with severe CT Severity score findings were 97, moderate findings were 140 and mild were 138.

| Table 4. PCR report correlation. |     |
|----------------------------------|-----|
| PCR Positive                     | 341 |
| PCR Negative                     | 34  |
| Total                            | 375 |

Out of 375 patient PCR positive were 341 and PCR negative were 34.

## DISCUSSION

In this study total number of patients suspected for COVID -19 pneumonia by HRCT were 375, out of which 341 seems to have PCR positive. This study revealed that the most affected age group from COVID 19 Pneumonia in our hospital were 51-60 age group. The male are affected more compare to female by ratio 1.75. The mean age of patient infected were 61+- 18 standard deviation, involving wider ranges.<sup>12</sup> Abdul et al. conducted study in pakistan revealed that HRCT

has higher sensitivity 97.41%, specificity 80%, positive predictive value of 99.12% and negative predictive value of 57.14%.<sup>7</sup> Tao ai et al. study about the correlation of chest CT and RT-PCR testing in COVID-19 pneumonia in wuhan china revealed that only 59% had positive RT-PCR, in which 88% were positive in CT-Chest with sensitivity of 97%. 413 patients showing negative RT-PCR, 308(75%) positive in CT-Chest.<sup>13</sup> In this study most of the patients HRCT shows ground glass opacities only 50%. Ground glass opacities with consolidative changes seen in 47%. Consolidation only seen in 1.9 % and others finding like pleural effusion and crazy paving seen.

Haque s et al al also revealed similar findings with ground glass opacities 96.09%, in which GGO plus consolidation 63%, GGO only 32.8% followed by crazy paving.<sup>3</sup> Abdul rashid qureshi et al revealed that, subpleural consolidation were common followed by consolidation with airbronchogram, crazy paving and pleural effusion.<sup>7</sup>

Bernhein et al. conducted retrospective study, chest CT scans from 121 symptomatic patients infected with corona virus the hallmarks of COVID-19 infection on images were bilateral, peripheral ground-glass and consolidate changes.<sup>13</sup> With a longer time after the onset of symptoms, CT findings were more frequent, including consolidation, bilateral and peripheral opacities, followed by linear opacities, crazy-paving pattern, and the reverse halo sign.

Bilateral lung involvement was observed in 10 of the 36 early patients (28%), 25 of the 33 intermediate patients (76%), and 22 of the 25 late patients (88%).<sup>14</sup> Ground glass opacities usually are multifocal, peripheral situated and predominantly involving basal segments.<sup>13-15</sup> In this study also GGO are usually bilateral and peripheral. Most of the patients that are commonly affected with moderate CT severity, followed by mild and severe severity score. In our study the patients affecting from CORADS 5

are more and positive for PCR test.

## CONCLUSIONS

HRCT chest can identify COVID-19 pneumonia. It also shows lung involvement with severity of pneumonia. Due to its fast scan, interpretation and reporting, physician and patients both get benefit in early detection and management of COVID-pneumonia, how ever PCR still remain gold standard for diagnosis of COVID-19 pneumonia.

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**Citation:** Acharya R, Chhetri P, Prasad V, Akhtar K, Thapa K, Mishra M. HRCT Chest in Patient of COVID-19 Pneumonia at College of Medical Sciences, Bharatpur, Nepal. JCMS Nepal. 2022; 18(3); 269-74.