

Original Article

The efficiency of HRCT for Assessing Severity in COVID-19 Patients

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ABSTRACT

The COVID-19 pandemic's impact resulted in countless deaths. In addition to RT-PCR, the HRCT technique is gaining popularity for determining severity. The primary aim of the research is to determine the accuracy of HRCT in determining the severity of covid-19 patients. This cross-sectional study was carried out at a tertiary medical hospital from September 2020 to October 2021. A total of 100 confirmed cases of COVID-19 pneumonia were admitted to hospitals and underwent HRCT chest included in the study. In the research, 56% of patients were between the ages of 20 and 40, 14% of patients were under the age of 20, and only 30% of patients were above the age of 40. About 35% of the patients had a history of smoking, 55% had diabetes, and 40% had HTN status. Thirty percent developed a cough and fever, followed by twenty percent who had only a cough, twenty-five percent who had a cough, fever, and body ache, and fifteen percent who had respiratory symptoms. All five

lobes of the lungs were involved in 96% of the cases, with the right lower lobe being involved in 91% of the cases and the right middle lobe being the least frequent location of involvement. Additionally, 31%, or the majority of patients, had a total severity score ranging from 1 to 5. Among others, the sequential distribution of total severity scores ranges from 6 to 10 (24 %), 11 to 15 (22 %), 16 to 20 (17%), and 0 (4%). In terms of total percentage of lung involvement, the highest number of patients (30%) was found in the 1-25 percent range, while the highest proportion of lung involvement (76–100 percent) was found in (18 percent). For COVID-19 patients, an HRCT scan of the chest is an excellent diagnostic and therapeutic tool for COVID-19 patients. It is an important predictor of future outcomes. When RT-PCR results are inconclusive, HRCT may be a viable option in symptomatic individuals. It is vital for radiologists and physicians to be familiar with the varied CT presentations. It will assist in the care of the patient.

Keywords: COVID-19, HRCT, RTPCR.

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INTRODUCTION

COVID-19, a novel virus, produced severe respiratory infectious illness, mostly inflammatory lesions in the lungs, and rapidly spread to other areas of world.¹ A new coronavirus was isolated from infected people's airway epithelial cells by pathogenic laboratory investigation. The most common mode of transmission is by respiratory droplets and close contact, with the potential of aerosol transfer, and the incidence rate is high.² Clinical symptoms, contact record, imaging diagnosis, and nucleic acid testing are now used to identify COVID-19 pneumonia.¹ The sensitivity of RTPCR has fluctuated from 60-70 percent to 95-97 percent, despite the fact that it is often considered to be highly specific. Consequently, false negatives are an important therapeutic concern.³⁻⁶ Chest high-resolution computed tomography (HRCT) is becoming acknowledged more as valid evidence for early diagnosis due to the possibility that imaging abnormalities may occur before clinical symptoms. COVID-19 may be diagnosed with the use of HRCT scans.⁷ In this study our main aim is to assess the efficiency of HRCT for assessing severity in COVID-19 patients.

OBJECTIVE

- To evaluate the efficiency of HRCT for assessing severity in COVID-19 patients.

METHODOLOGY

This cross sectional study was conducted at tertiary medical hospital, from September 2020 to October 2021. A total of 100 patients admitted to the hospital with confirmed cases of COVID-19 pneumonia who had HRCT chest imaging were included in the research. The distribution and patterns of lung involvement were studied. Each of the five lung lobes was visually examined for degree of involvement and classified as none (0%), minimal (1-25%), mild (26-50%), moderate (51-75%), and severe (76-100 %).

All data were taken using a data collection form that had been pre-designed.

The data was acquired from CT reports and then placed into a data sheet specially designed for this procedure.

The data were analyzed using Microsoft Excel and IBM's statistical package for the social sciences (SPSS) version 25.

RESULTS

The Table 1 shows the distribution of patients by age and gender, with more than fifty percent (56.0 %) of patients in the age range 20-40 years, 14% in the age group 20 and below, and only 30% in the age group over 40 years. The following table is given below in detail:

Table-1: Distribution of the patients according to age and gender

Age group, years	%
20 and below	14%
20-40 years	56%
above 40 years	30%
Gender	%
Male	52%
Female	48%

In table-2 shows distribution of respondents by occupation. More than one fourth of the respondents were housewife (28.0%) and 24.0% of the respondents were students and day laborer while 14.0% of the respondents were employee. The following table is given below in detail:

Table 2 Distribution of respondents by occupation

Occupation	Percentage
Housewife	28%
Students	24%
Day laborer	24%
Employee	14%
Businessman	6%
Unemployed	2%
Retired	2%

In figure-1 shows distribution of respondents by residence. 60% of the respondents resided in the urban area and 40% were in the rural. The following figure is given below in detail:

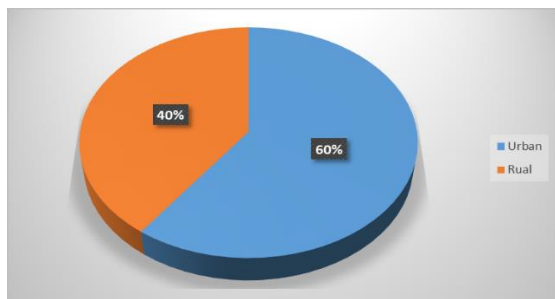


Figure-1: Distribution of respondents by residence

In table-3 shows distribution of respondent's by comorbidities. About 35%

In figure-1 shows clinical manifestation of the patients where 30% developed cough and fever both followed by 20% had only cough, 25% had cough, fever and body

ache, 15% had respiratory symptoms. The following figure is given below in detail:

Table 3 Distribution of respondents by comorbidities

Smoking history	Percentage
Yes	35%
No	65%
Diabetes Mellitus	Percentage
Yes	55%
No	45%
HTN	Percentage
Yes	40%
No	60%

ache, 15% had respiratory symptoms. The following figure is given below in detail:

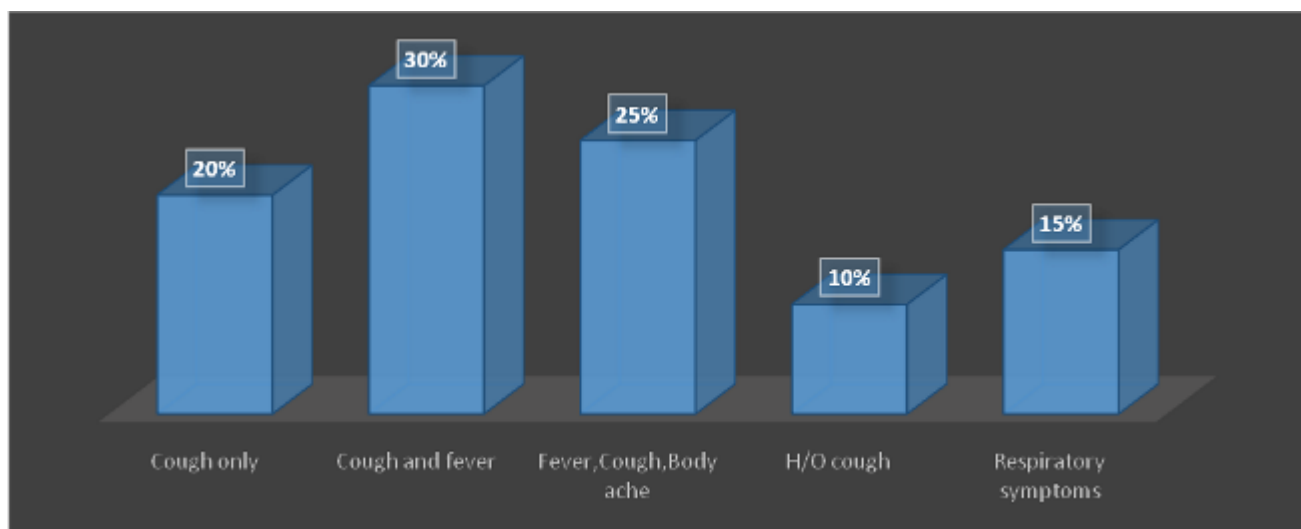


Figure-1: Clinical manifestation of the patients

Table-4 presents HRCT results, with the most frequent consistent finding being GGO in the peripheral and posterior distributions (30%). The following table is given below in detail:

Table-4: HRCT findings

HRCT findings	%
Only GGO	20%
GGO with consolidation	30%
Crazy paving patterns	25%
Reverse halo sign	12%
Tricked vessel	8%
Enlarged mediastinal LN	5%

The distribution of patients according to HRCT chest findings and lobar involvement is shown in Table 5. All five lobes were involved in 96% of cases, four lobes were involved in 11% of cases, three lobes were involved in 7% of cases, two lobes were involved in 3% of cases, and only one lobe was involved in 2% of cases. The right lower lobe was engaged in the majority of instances (91%), whereas the right middle lobe was the least often affected. The following table is given below in detail:

Table-5: Distribution of the patients according to findings of HRCT chest along with lobar involvement and distribution

Number of Lobe involvements	%
0	1%
1	2%
2	3%
3	7%
4	11%
5	76%
Prevalence of lobar involvement	%
Right upper lobe	80%
Right middle lobe	70%
Right lower lobe	91%
Left upper lobe	80%
Left lower lobe	89%
Distribution of involvement	%
Central	1%
Peripheral	44%
Diffuse predominantly peripheral	55%

The distribution of patients according to severity score and lung involvement is shown in Table-6. While 31% of patients had a total severity score of 1-5. Among others, the sequential distribution of total severity score spans from 6 to 10 (24%), 11 to 15 (22%), 16 to 20 (17%), and 0 (4%). In terms of overall lung involvement, the largest proportion of patients (30%) was in

the range of 1-25 percent, while the maximum lung involvement (76-100%) was seen in (18%). The following table is given below in detail:

Table-6: Distribution of the patients according to severity score and lung involvement

Distribution on the basis of total severity score	%
0	4%
1-5	31%
6-10	24%
11-15	22%
16-20	17%
Total percentage of lung involvement	%
0%	5%
1-25%	30%
26-50%	22%
51-75%	23%
76-100%	18%

DISCUSSION

A 96.9% sensitivity rate for HRCT chest was obtained in our research, which is almost same to previous studies' results for the diagnosis of COVID-19 pneumonia.⁷⁻⁸

Whereas the association between chest CT and RT-PCR testing in Corona virus disease 2019 in China indicated that HRCT has a sensitivity of 97% for detecting COVID-19.⁹

One research showed that HRCT chest had a sensitivity of 93%.¹⁰ These HRCT pictures may be critical in the early detection and evaluation of COVID-19 and may be used as a standard tool for rapid treatment. Male patients (52%) were found to be more prevalent than female patients (48%) in this study, which was similar to earlier research.¹¹

In our research, 31% of patients had a total severity score ranging from 1 to 5. Among others, the sequential distribution of total severity score ranges from 6 to 10 (24%), 11 to 15 (22%), 16 to 20 (17 percent), and 0 (4%). The severity of lung involvement was significantly less severe between 1 to 7

days after the beginning of symptoms than between 8 and 14 days after the onset of symptoms, as indicated by the summation of the CT scores for all lobes of both lungs. After 14 days, the effects are the mildest. Which is consistent with findings from previous investigations.^{12-14?}

CONCLUSION

For COVID -19 patients, an HRCT scan of the chest is a suitable method for diagnosis and therapeutic response. It is a key predictor of future prognosis. When RT-PCR results are negative, HRCT may be a viable alternative to RT-PCR in symptomatic patients if facilities are available. It is essential for radiologists and clinicians to be familiar with varied CT appearances. It will help in the treatment of these patients.

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