

Spectrum of HRCT in Chest Findings in PCR Positive COVID 19 Patients

Sadaqat Ali*, Muhammad Zakir khan, Mujeeb Ur Rehman, Syed Muhammad Yousaf farooq, Nida Yousaf, Usman arif, Khizra Iqbal, Laiba Shahid, Ayesha Kalsoom, Rabia Aslam

Department of Radiological Sciences, Allama Iqbal Open University, Islamabad, Pakistan

ABSTRACT

BACKGROUND

COVID -19 pandemic is grappling the world with the surge of infection time and again. Clinicians are trying to justify the ethics of public health care. Asymptomatic COVID -19 cases are going undocumented and most of them practice self - isolation.

OBJECTIVE

The object of this study is to determine spectrum of HRCT in chest findings in PCR positive COVID 19 Patients.

METHODOLOGY

This is a cross sectional study, including one hundred fifty one subject (n = 151) aged 7 to 87 years from a Shalimar hospital and Hayat memorial hospital after the approval of ethical committee of Allied health sciences, University of Lahore. Informed consent was taken before including the subjects in the study. An organized questionnaire designed for data collection and focus on consolidations, ground glass opacities, pulmonary related symptoms, lower lobe predominance, RT / LT upper and lower lung zone in COVID - 19 patients and gender in the Performa.

RESULTS

The results showed that ground glass opacities high in COVID - 19 patients than other symptoms frequencies. The ratio of consolidations, peripheral distribution, central distribution, presents in patients more in men with positive COVID - 19 than women but ratio of GGO more in women with positive COVID - 19 than men.

CONCLUSION

The RT / LT Upper lung zone, RT / LT Lower lung zone, Central distribution, Peripheral distribution GGO Consolidations Lower lobe predominance Bronchial wall thickening Pulmonary vessel thickening suggests that asymptomatic COVID - 19 cases should be monitored clinically and radiologically to assess their outcome. The most common HRCT finding in individuals with COVID - 19 lung involvement was ground glass opacities.

KEYWORDS

HRCT, PCR, COVID-19

Corresponding Author:

Sadaqat Ali, Department of Radiological Sciences, Allama Iqbal Open University, Islamabad, Pakistan; Email: sad aqatali@gmail.com

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INTRODUCTION

As of January 3, 2021 there had been a total of 20,346,372 cases of coronavirus disease 2019 (COVID - 19) in the United States with 349, 246 deaths. COVID - 19's long-term effects over a lifetime are unknown at this time; nevertheless, those who only had a slight acute illness, have reported chronic problems and serious sequel.¹

COVID - 19 was declared a pandemic by the World Health Organization on March 11, 2020, since the number of cases outside of China is 13 times higher than in China, with 118,000 cases reported in 114 countries and over 4000 deaths. According to the World Health Organization's most recent figures, there are 67,618,431 confirmed COVID - 19 cases worldwide, with 1,544,985 deaths (WHO 2020b).² The United States, India, Brazil, Russia, France, and Italy currently have the most positive cases. COVID - 19 cases have been quickly growing in Pakistan (76 000) and have resulted in 1621 deaths so far.³ HRCT (high-resolution computed tomography) is a type of Computed Tomography (CT) that improves picture resolution by employing sophisticated procedures. It examines the parenchyma of the lungs and is used to identify a variety of illnesses, the most frequent of which is lung disease.⁴

Using HRCT images, the lungs can be viewed with anatomical accuracy comparable to gross pathological specimens or lung slices. Unlike traditional CT scans, which have slices that are 5–10 mm thick, HRCT scans feature slices that are roughly 1 mm thick.⁵ HRCT scans reveal a wide range of trends in the appearance of normal and diseased tissue.⁶ The most frequent detection method is RT - PCR, which uses RNA extracted. Clinicians are currently using the RT-PCR method to confirm COVID - 19 infection.⁷ While this assay is still the gold standard for COVID - 19 detection, the high rate of false-negative RT - PCR results and the inapplicability of RT-PCR on the early stages of the disease made it difficult to diagnose infected people quickly.⁸ Given that the gold standard for diagnosing COVID-19 is real-time reverse-transcription polymerase chain reaction (RT - PCR) of upper and lower respiratory specimens, it's important to note that, while RT - PCR is highly specific, recent studies have shown that it's only 30 % accurate.⁹ This could be due to a low viral load in the patient, poor sampling, sample timing, or laboratory difficulties. If the specimen contains amplification inhibitors or the number of organisms present is insufficient, false negative results can occur. The terms positive and negative are interchangeable.¹⁰

This study are survey the range of COVID - 19 HRCT findings in asymptomatic patients, but also to

record unexpected results and their effect on clinical decision-making (Figures 1 and 2).

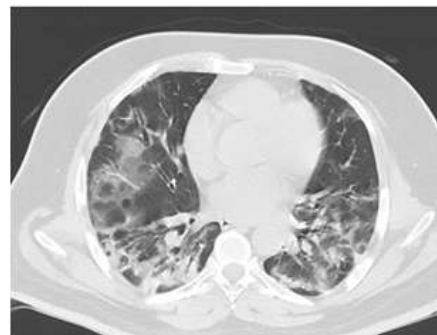


Figure 1. Axial slice of Lungs shows of Consolidation on both sides.

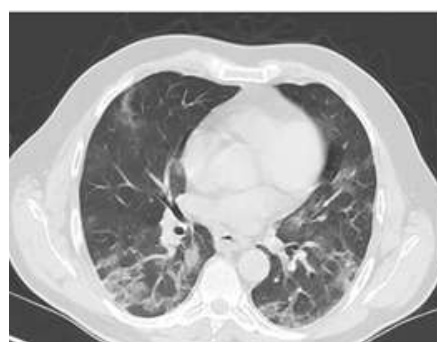


Figure 2. Axial slice of Lungs Shows Ground Glass appearance.

MATERIAL AND METHODS

A Cross sectional work was directed at Hayat memorial Hospital and Shalimar hospital, Lahore. The period of study was 4 month. Data was collected according to age and on the basis of PCR positive. The total sample size on the basis of PCR was 151 patients confirmed PCR Positive. Among them 81 males and 70 were females. The Inclusion criteria of SARS-COV-2 infection was confirmed in patients with symptoms such as Fever, Cough, Exhaustion, Sore throat and Pneumonia with RT - PCR. The Exclusion criteria of SARS-COV-2 infection were confirmed in asymptomatic patients with RT - PCR.

RESULTS

In current study total fifty (n = 151) patients were including that presented in Hayat memorial Hospital and Shalimar hospital with chest pain. Among them 81 were male and 70 females (Table 1).

			GGO		Total
			NO	YES	
Gender	F	Count	11	59	70
		% within Gender	15.70 %	84.30 %	100.00 %

M	Count	13	68	81
	% within Gender	16.00 %	84.00 %	100.00 %
Total	Count	24	127	151
	% within Gender	15.90 %	84.10 %	100.00 %

Table 1. Frequency of Ground Glass Opacities in COVID - 19 Patients with Respect to Gender

The ratio of GGO presents in patients more in women (84.3 %) with positive COVID - 19 than men (84.0 %). But the ratio GGO was low in non COVID - 19 patients both in men and women but in negative COVID - 19 patients the ratio of men (16.0 %) was greater than women (15.7 %) (Table 2).

			Peripheral distribution		Total
			NO	YES	
Gender	F	Count % within Gender	52 74.30%	18 25.70%	70 100.00%
	M	Count % within Gender	49 60.50%	32 39.50%	81 100.00%
Total		Count % within Gender	101 66.90%	50 33.10%	151 100.00%

Table 2. Frequency of Peripheral Distribution in COVID - 19 Patients with Respect to Gender.

The ratio of peripheral distribution presents in patients more in men (39.5 %) with positive COVID - 19 than women (25.7 %). But the ratio Peripheral distribution was more in non COVID-19 patients both in men (60.5 %) and women (74.3 %) but in negative COVID - 19 patients the ratio of women was greater than men (Table 3).

			Central distribution		Total
			NO	YES	
Gender	F	Count % within Gender	65 92.90 %	5 7.10 %	70 100.00 %
	M	Count % within Gender	68 84.00 %	13 16.00 %	81 100.00 %
Total		Count % within Gender	133 88.10 %	18 11.90 %	151 100.00 %

Table 3. Frequency of Central Distribution in COVID-19 Patients with Respect to Gender.

The ratio of central distribution presents in patients more in men (16.0 %) with positive COVID - 19 than women (7.1 %). But the ratio central distribution was more in non COVID - 19 patients both in men (84.0 %) and women (92.9 %) but in

negative COVID - 19 patients the ratio of women was greater than men (Table 4).

			Pulmonary vessel thickening		Total
			NO	YES	
Gender	F	Count % within Gender	69 98.60%	1 1.40%	70 100.00%
	M	Count % within Gender	81 100.00%	0 0.00%	81 100.00%
Total		Count % within Gender	150 99.30%	1 0.70%	151 100.00%

Table 4. Frequency of Pulmonary Vessel Thickening In COVID-19 Patients with Respect to Gender.

The ratio of central distribution presents in no patients with positive COVID - 19. But the ratio central distribution was more in non COVID - 19 patients both in men (100 %) and women (98.6 %) but in negative COVID-19 patients the ratio of men was greater than women (Table 5).

			Bronchial wall thickening		Total
			NO	YES	
Gender	F	Count % within Gender	70 100.00 %	0 0.00 %	70 100.00 %
	M	Count % within Gender	80 98.80 %	1 1.20 %	81 100.00 %
Total		Count % within Gender	150 99.30 %	1 0.70 %	151 100.00 %

Table 5. Frequency of Bronchial wall Thickening in COVID-19 Patients with Respect to Gender.

The ratio of central distribution presents in no patients with positive COVID - 19. But the ratio central distribution was more in non COVID - 19 patients both in women (100 %) and men (98.8 %) but in negative COVID - 19 patients the ratio of women was greater than men (Table 6).

			Lower lobe predominance		Total
			NO	YES	
Gender	F	Count % within Gender	70 100.00 %	0 0.00 %	70 100.00 %
	M	Count % within Gender	81 100.00 %	0 0.00 %	81 100.00 %
Total		Count % within Gender	151 100.00 %	0 0.00 %	151 100.00 %

Table 6. Frequency of Lower lobe.

Predominance in COVID-19 Patients with Respect to Gender.

The ratio of lobe predominance presents in no patients with positive COVID - 19. But the ratio central distribution was more in non COVID - 19 patients both in women (100 %) and men (100 %) (Table 7).

			GGO		Total
			NO	YES	
Age Group	Jul-17	Count	0 (0.0 %)	1 (100.0 %)	1 (100.0 %)
	18-27	Count	0 (0.0%)	4 (100.0 %)	4 (100.0 %)
	28-37	Count	0 (0.0 %)	8 (100.0 %)	8 (100.0%)
	38-47	Count	2 (8.3 %)	22 (91.7 %)	24 (100.0%)
	48-57	Count	11 (24.4 %)	34 (75.6%)	45 (100.0 %)
	58-67	Count	7 (15.9 %)	37 (84.1 %)	44 (100.0 %)
	68-77	Count	4 (21.1 %)	15 (78.9 %)	19 (100.0 %)
	78-87	Count	0 (0.0 %)	6 (100.0 %)	6 (100.0 %)
	Total	Count	24 (15.9 %)	127 (84.1 %)	151 (100.0 %)
	Table 7. Percentage of Age Group in Ground Glass Opacities in COVID - 19 Patients.				

The GGO ratio was high in age group 48-57.

DISCUSSION

We did a study at the Shalimar Hospital and Hayat Memorial hospital to analyse disease patterns in our population. More common symptoms include bronchiectasis and consolidation with an air bronchogram. In a smaller number of instances, pleural effusion and septal thickening were found. The presence of pulmonary nodules is a rare phenotype.

According investigations, the most common HRCT patterns for each patient with severe pneumonia. There results showed more ratios in men than women.¹¹ The lesion distribution was detected as a large central and peripheral zone. An HRCT score system based on the region in question was used to determine the severity of pulmonary anomalies.¹² Our results showed that GGO were found to be more common in COVID - 19 individuals than other symptoms. Patients with positive COVID - 19 had a higher ratio of consolidations, peripheral distribution, and central distribution, but women with positive COVID - 19 have a higher ratio of GGO.

The current study found that the COVID - 19 sickness recovery and healing process had less consolidative alterations than those discovered by

Pan F, et al. (40 % compared to 75 %). The eventual removal the primary follow-up result in this study.¹³ But in our results COVID-19 pneumonia recovery pathway; nevertheless, secondary fibrosis on top of GGOs was detected in 33.3 % of patients in the current study, with one patient even having secondary bronchiectasis changes on top. The findings of RT - PCR testing typically take several hours to arrive, and its sensitivity is insufficient to reliably rule out COVID - 19 due to variables such as sample or laboratory errors. Individuals with a persistent clinical suspicion of COVID - 19 infections should have their RT - PCR tests redone. Overall, RT - PCR testing is time-consuming and inefficient for quickly triaging patients.¹⁴

Ground-glass opacities or peripheral curvilinear consolidative opacities were found in the secondary pulmonary lobule, along with central nodular opacity (corresponding to a per lobular pattern with central involvement in the secondary pulmonary lobule) surrounding the centrilobular arteriole, in three RT-PCR-confirmed COVID - 19 patients undergoing HRCT at our facility.¹⁵ GGOs can be detected earlier using High-Resolution Computed Tomography (HRCT). According to a study with a large sample size (3665 verified instances of the disease), pneumonia was diagnosed in 95.5 percent of patients.¹⁶

This study has the benefit of tracing the impact on clinical decision-making not only through CT features but also through long-term follow-up of recovered patients; however, it is limited by the small number of patients and a lack of information about the long-term clinical outcome for asymptomatic patients after the isolation period ends.

CONCLUSION

According to the current findings, asymptomatic COVID - 19 cases should be clinically and radio logically evaluated to determine their outcome. GGO was the most common HRCT finding in people with COVID - 19 lung involvement. The bulk of the time these ground glass opacities were seen posteriorly and peripherally, affecting numerous lobes of both lungs. Consolidation accompanied with an air bronchogram and bronchiectasis are two more typical findings.

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