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ORIGINAL RESEARCH

ROLE OF HRCT CHEST AS PRIMARY INVESTIGATION TO SCREEN SYMPTOMATIC PRIMARY CONTACTS OF COVID-19

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ABSTRACT:

Background: Chest diagnostic imaging has a primary relevance in the diagnosis and severity assessment of COVID-19 together with clinical manifestations. The present study was conducted to assess HRCT chest to screen symptomatic primary contacts of COVID-19.

Materials & Methods: 48symptomatic primary contacts ofCOVID 19 patientsof both genders were enrolled. All underwent both chest CT imaging and laboratory virus nucleic acid test (RT-PCR assay with Nasopharyngeal swab samples).

Results: Out of 48 patients, males were 28 and females were 20. Breathlessness was present in 12, cough in 32, fever in 26, diarrhoea in 7, sore throat in 13, bronchial asthma in 8 and diabetes in 4 cases. The difference was significant (P< 0.05). The time interval between chest CT scan and RT PCR assay was 2.1 days. Results of RT PCR assay was positive in 30 days and negative in 18 days. Chest CT showed consistent with viral pneumonia (positive) in 40 cases and no CT findings of viral pneumonia in 8 cases. It showed consolidation in 12, ground glass opacityin 24 and reticulation/thickened interlobular septa in 4 cases. The difference was significant (P< 0.05).

Conclusion: Chest CT should be considered for the COVID-19 screening, symptomatic primary contacts of COVID 19 in epidemic areas particularly where access to RT PCR testing is difficult.

Key words: consolidation, ground glass opacity, pneumonia

INTRODUCTION:

In patients with clinical features and epidemiological criteria of COVID-19, the diagnosis is established through viral nucleic acid detection in nasal or throat swabs, sputum and lower respiratory tract secretions with reverse transcription polymerase chain reaction (RT-PCR).[1] Although RT-PCR specificity is high, sensitivity is about 45–70%; the high rate of false negatives is probably due to low viral load or limitations of sample collection.[2]

But the sensitivity of RT-PCR testing ranges from 93% for samples collected at broncho-alveolar lavage to 63% for sputum and just 32% for throat swabs. Sensitivity may be lower if samples are collected sub-optimally or in patients with a low viral load.[3] As a result, there are a significant number of false-negative results, creating diagnostic doubt and the need for additional diagnostic aids to accurately differentiate between patients with and without COVID-19. The Royal College of Radiologists highlights that cases will arise where early CT imaging in patients with suspected COVID-19 will be clinically appropriate.[4]

Chest diagnostic imaging has a primary relevance in the diagnosis and severity assessment of COVID-19 together with clinical manifestations, epidemiological history and laboratory tests. Chest computed tomography (CT) imaging has been demonstrated more sensitive than chest radiography (CR) to identify some of the manifestations of COVID-19 pneumonia.[5]The present study was conducted to assess HRCT chest to screen symptomatic primary contacts of COVID-19.

MATERIALS & METHODS:

The present study comprised of 48symptomatic primary contacts ofCOVID 19 patientsof both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. All underwent both chest CT imaging and laboratory virus nucleic acid test (RT-PCR assay with Nasopharyngeal swab samples). All images were obtained on one CT system with patients in the supine positionwith a slice thickness of 10 mm. All images were classified as positive or negative for COVID-19. The main CT features such as ground-glass opacity, consolidation, reticulation/thickened interlobular septa, nodules), and lesion distribution (left, right, or bilateral lungs) were recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS:

Table I Distribution of patients

Total- 48		
Gender	**Males**	**Females**
Number	28	20

Table I shows that out of 48 patients, males were 28 and females were 20.

Table II Characteristics at presentation

Clinical features	Number	P value
Breathlessness	12	0.01
Cough	32	
Fever	26	
diarrhoea	7	
Sore throat	13	
Bronchial asthma	8	
diabetes	4	

Table II, graph I shows that breathlessness was present in 12, cough in 32, fever in 26, diarrhoea in 7, sore throat in 13, bronchial asthma in 8 and diabetes in 4 cases. The difference was significant (P< 0.05).

Graph I Characteristics at presentation

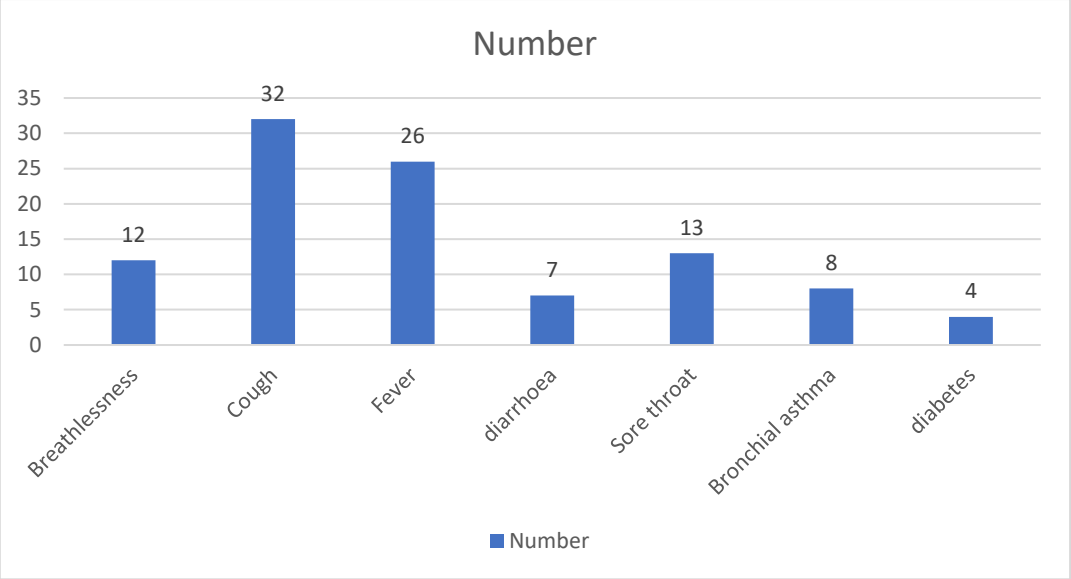


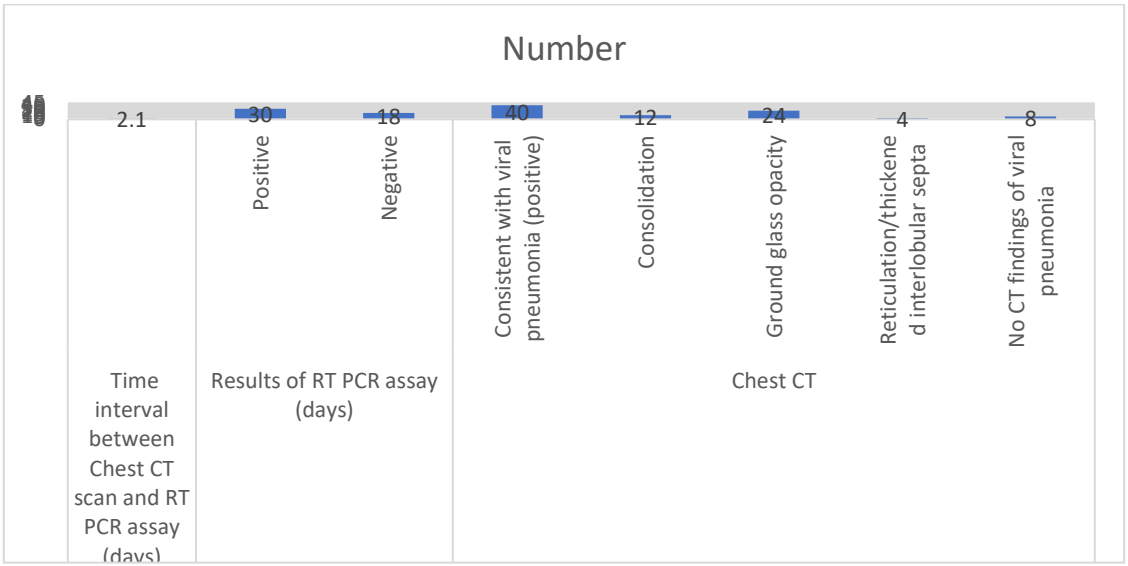
Table III CT manifestations

Variables	CT parameters	Number	P value
Time interval between Chest CT scan and RT PCR assay (days)		2.1	-
Results of RT PCR assay (days)	Positive	30	0.04
	Negative	18	
Chest CT	Consistent with viral pneumonia (positive)	40	-
	Consolidation	12	0.01
	Ground glass opacity	24	
	Reticulation/thickened interlobular septa	4	
	No CT findings of viral pneumonia	8	

Table III, graph II shows that time interval between chest CT scan and RT PCR assay was 2.1 days. Results of RT PCR assay was positive in 30 days and negative in 18 days. Chest CT showed consistent with viral pneumonia (positive) in 40 cases and no CT findings of viral

pneumonia in 8 cases. It showed consolidation in 12, ground glass opacity in 24 and reticulation/thickened interlobular septa in 4 cases. The difference was significant (P< 0.05).

Graph II CT manifestations



DISCUSSION:

Early diagnosis of 2019 novel coronavirus disease (COVID-19) is crucial for disease treatment and control. Although the diagnosis of COVID-19, in terms of a positive or negative test, is primarily based on laboratory tests, chest imaging modalities, including chest X-ray (CXR) and computed tomography (CT), are routine diagnostic approaches used to detect abnormal lung changes.[6] This is due to the fact that coronavirus diseases mainly cause respiratory tract infections as seen in severe acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS), although other organs, including the gastrointestinal tract and cardiovascular system, can also be affected.[7] However, chest abnormalities associated with COVID-19 are different from those associated with SARS and MERS to some extent, and they are also related to the disease extent and clinical symptoms; thus, the recognition of both common and uncommon imaging findings on chest CT examinations is clinically important.[8]The present study was conducted to assess HRCT chest to screen symptomatic primary contacts ofCOVID-19.

We found that out of 48 patients, males were 28 and females were 20. Pilli et al[9] in their study 70 patients (mean age, 48±13 years; 74% [52/70] men) were available for analysis. Of seventy patients, 43 had positive and 27 had negative RT-PCR results with a positive rate of 61.4% (43/70) (95% confidence interval [CI]. Of forty-three patients with positive RTPCR results, 93% (40/43) had positive chest CT scans. Of 27 patients with negative RT-PCR results, 74% (20/27) had positive chest CT scans. The median time interval between the paired chest CT exams and RTPCR assays was 2 days (range of 0-7 days). Eighty-six percent (60/70) (95% CI) of patients had positive chest CT findings. The main chest CT findings were ground-glass opacity (63% [38/60]) consolidations (38% [23/60] and Reticular/Thickened interlobular septa (31% [19/60]).

We found that breathlessness was present in 12, cough in 32, fever in 26, diarrhoea in 7, sore throat in 13, bronchial asthma in 8 and diabetes in 4 cases. Gaia et al[10] assessed the potential role of chest CT in the early detection of COVID-19 pneumonia and to explore its role in patient management in an adult Italian population. Patients were classified as COVID-19 negative and COVID-19 positive according to RT-PCR results, considered as a reference. Images were independently evaluated by two radiologists blinded to the RT-PCR results and classified as "CT positive" or "CT negative" for COVID-19, according to CT findings. According to RT-PCR results, 152 patients were COVID-19 negative (48%) and 162 were COVID-19 positive (52%). We found substantial agreement between RT-PCR results and CT findings (p

We found that time interval between chest CT scan and RT PCR assay was 2.1 days. Results of RT PCR assay was positivein 30 days and negative in 18 days. Chest CT showed consistent with viral pneumonia (positive) in 40 cases and no CT findings of viral pneumonia in 8 cases. It showed consolidation in 12, ground glass opacity in24
andreticulation/thickened interlobular septa in 4 cases. In a study conducted in China during the first 2 months of outbreak, no CR or CT abnormality was found in 17.9% patients with non-severe disease and in 2.9% patients with severe disease.[11] Sun et al[12] CT was used in 52 studies for the diagnosis of COVID-19, whereas in the study by Arentz et al[13], CXR was the only imaging modality used in diagnosing all patients. Another study by Wong et al[14] analyzed CXR findings in 64 COVID-19 patients with 69% sensitivity with reverse transcription-polymerase chain reaction (RT-PCR sensitivity 91%) as the gold standard. Although CXR resembles CT findings (in 28 patients) in these common abnormal lung findings, it is less sensitive than CT in detecting the abnormalities. A total of 36 studies (65.5%) reported details regarding bilateral or unilateral lung involvement; of which 17 studies reported a higher percentage of bilateral lung involvement (78.22%, 95% CI: 45–100%) than unilateral lung involvement (20.23%, 95% CI: 9.90–30%). These studies consistently reported that the involvement of the bilateral lungs was much higher than that of the unilateral lung in patients with COVID-19, or bilateral involvement was more frequently observed in severe or emergency cases.

CONCLUSION:

Authors found that chest CT should be considered for the COVID-19 screening, symptomatic primary contacts of COVID 19 in epidemic areas particularly where access to RT PCR testing is difficult.

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