

Role of Computed Tomography Scan Chest for Management of COVID-19

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ABSTRACT

Aim: To assess the role of chest computed tomography for management of Covid-19.

Study design: Prospective study

Place and duration of study: Department of Radiology, Peoples University of Medical & Health Sciences for Women, Nawabshah, Shaheed Benazirabad from 1st August 2020 to 30th September 2021.

Methodology: Two hundred patients were enrolled within the age range of 18-70 years. The clinical/medical record of all those patients who were moderately to critically ill assessed in detail. These patients visited the hospital with symptoms of cough, fever, hypoxia, dyspnea, diarrhoea, flu, headache and other related symptoms. All patients underwent chest reverse transcription polymerase chain reaction as well as chest computed tomography scan. The reverse transcription polymerase chain reaction was performed through nasopharyngeal swab.

Results: The mean age of the patients was 64.5±5.6 years with 120 (60%) males and 80 (40%) females. The specificity was 75%, sensitivity 100%, positive predictive value 79%, negative predictive value 66.67% and diagnostic accuracy 75%.

Conclusion: Computed tomography scan imaging is a most reliable with high sensitivity and non-predictive value

Key words: Role, Computed tomography imaging, Management, Covid-19

INTRODUCTION

Coronavirus has been known to the world after the pandemic caused by novel coronavirus resulting into worldwide casualties, morbidities and severe illness. The novel coronavirus was spread from China in December 2019. Its name was introduced as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). In short term it is also termed as Covid-19. It has various lethal variants as was soon known for its mutational characteristics¹.

Covid-19 mainly effect respiratory system of human body, however its variants have proven to multi organ effect and result in multi organ failure causing death. As time advanced more knowledge about this novel type came into production. Soon it was understood that early diagnosis could help in reducing the chances of complications. Medicines and supplementation with steroidal drugs were a positive strategy for its treatment and management. However, early diagnosis requires reliable diagnostic techniques. Reverse transcription Polymerase chain Reaction (RT-PCR) is used for testing Covid-19 positive. Involvement of lungs was a worst outcome predictor of covid-19 and required early staging and treatment initiation²⁻⁶.

In some cases, the RT PCR test gives false negative results causing delay in patient diagnosis and treatment. In such conditions and also to assess the lung involvement computed tomography (CT) scan at high resolution is the best method to diagnose and assess the Covid-19 staging⁷⁻¹⁰. The present study was designed to achieve the aforementioned. This study will assist in understating the role of CT scans in Covid-19 management for better health outcomes and life protection of critically ill patients.

MATERIALS AND METHODS

This prospective study was conducted at Department of Radiology, Peoples University of Medical & Health Sciences for Women, Nawabshah, Shaheed Benazirabad, from 1st August 2020 to 30th September 2021 after IRB permission. The clinical/medical record of all those patients who were moderately to critically ill assessed in detail. These patients visited the hospital with symptoms of cough, fever, hypoxia, dyspnea, diarrhoea, flu, headache and other related symptoms. A total of 200 patients were enrolled within the age range of 18-70 years. These patients were those who underwent chest reverse transcription polymerase chain reaction (RT-PCR) as well as chest computed tomography (CT) scan. The

RT-PCR was performed through nasopharyngeal swab. The transformation of CT positive scan to negative was correlated and compared with the initial CT scan findings. CT scanner was based on Apex Revolution-CT. Pitch 1 with spiral-attainment at low dose and non-contrast CT scan was performed. The rotation time was 0.35 seconds auto k-Vp as well as mA selection. Reconstruction of images with a thickness of slice as 1.25mm was done through usage of deep-learning image reconstruction. Images were stored in PACS system. The CT imaging was read by professionally competent radiologist at radiological setting and was interpreted as positive and negative finding. The results of RT-PCR were not shared with the radiologist to avoid biasness. However clinical information was provided to the radiologist for proper assessment. Demographic details, age and clinical findings were documented. Data was entered and analyzed through SPSS version 25.

RESULTS

The mean age of the patients was 64.5±5.6 years with 120(60%) males and 80(40%) females. The RT-PCR test has identified 60% of the patients to be positive while rest 40% gave negative RT-PCR results. However, on CT scan imaging 89% of the patients were identified as positive for Covid-19 and only 11% were negative in predictive values of both tests (Table 1). The specificity was 75%, sensitivity 100%, positive predictive value (PPV) 75%, negative predictive value (NPV) 66.67% and accuracy of the test 75% (Table 2).

Table 1: Demographic detail of enrolled patients (n=200)

Variable	n	%age
Age (years)	64.5±5.6	
Gender		
Male	120	60.0
Female	80	40.0
PCR Report		
Positive	120	60.0
Negative	80	40.0
CT Report		
Positive	178	89.0
Negative	22	11.0

At baseline when test was performed 4 days post covid-19 initiation negative RT-PCR was observed in seven (3.5%) patients, however at day six symptoms onset presented multiple focal ground-glass opacities (GGO) with linear inter as well as intralobular septal-thickening in the upper-lobes young patients as well as old. In other patients bilateral as well as predominant

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peripheral consolidative patterns were also presented bilaterally (Fig. 1). In elderly patient's peripheral and subpleural mixed GGO in lower as well as upper lobes was found peripherally post seven days of onset of symptoms while at tenth day of symptoms onset predominant diffused consolidations were presented (Fig. 2).

Table 2: Overall performance of CT scan

CT Scan	RT-PCR		Total
	Positive	Negative	
Positive	90	30	120
Negative	20	60	80
Total	110	90	200

Sensitivity = 100% Specificity = 75%, Positive predictive value = 75%
 Negative predictive value = 66.67% Diagnostic accuracy = 75%

Fig. 1: GGO (A) and consolidation pattern (B) seen in Covid-19 patients

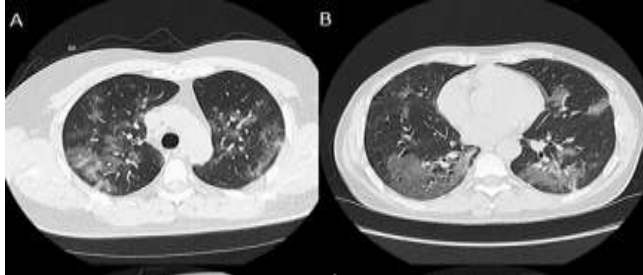
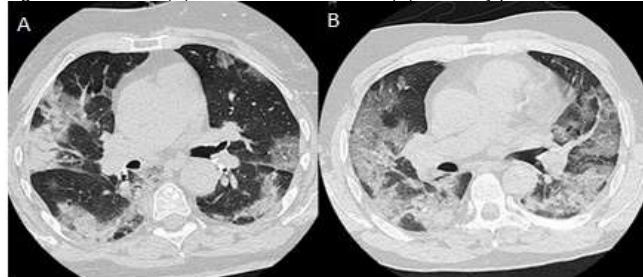


Fig. 2: Mixed GGO (A) diffused consolidations (B) in elderly patients



DISCUSSION

Early diagnosis of Covid-19 results in reduction in critical staging of this disease by starting of early treatment as required. The present study showed that mean age of the patients suffering from severe Covid-19 is around late fifties or sixties. The reason behind this could be due to lack of immunity and increased comorbidities within this age group. Further a high frequency of males is registered with moderate to severe covid-19 presentation. Males are more prone towards outdoor influx and have higher chances to develop pandemics like covid-19 especially in developing countries where male working class dominates female working class. Similar results have also been reported by another study which elaborated similar age and gender findings¹².

Current available test which is commonly used in covid-19 diagnosis is based on RT-PCR. However within recent reports the specificity of this test have been reported much lower with so many patients left undiagnosed in timely manner and suffer the consequences of late treatment initiation and also are a source of disease spread. Various studies have proved that CT scan has higher reliability and accuracy than RT-PCR and also provide specific ground glass opacities which are specific to Covid-19 infection¹³⁻¹⁶.

The results of the current study are in similarly with the above-mentioned studies. In the current study, 75% accuracy was observed. Another study reported similar results where accuracy was also 72%¹⁷. A meta-analysis as well as other studies also

reported similar findings with high accuracy of CT scan in comparison to RT-PCR test¹⁸⁻²¹.

CONCLUSION

Chest computed tomography scan is a most reliable with high sensitivity and non-predictive value. It can be applied as a main screening test in areas of high Covid-19 alert.

Conflict of interest: Nil

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