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DIAGNOSTIC ACCURACIES OF HRCT CHEST IN COMPARISON WITH RT-PCR IN DIAGNOSIS OF CORONAVIRUS DISEASE (COVID-19) IN A TERTIARY CARE HOSPITAL.

Internal Medicine

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ABSTRACT

Objective:- To compare the diagnostic accuracies of HRCT chest and RT-PCR results in diagnosis of coronavirus disease (COVID-19) in a tertiary care hospital in Kolar. **Methodology** This was a prospective study approved by Ethical Review Committee of R L JALAPPA Hospital. From Dec 2021 to May 2022, a total of 48 CT chest were performed in this hospital. Patients aged above 18 years, irrespective of gender, who were clinically suspected of COVID-19 with at least one RT-PCR test and HRCT chest done, individuals with close contact history and admitted patients were included. Patients with interval of more than seven days between HRCT chest acquisition and first PCR sampling, patients with pulmonary and extra pulmonary lung malignancy, chest trauma, previous chest surgery were excluded. For those patients with negative first PCR but suspicious clinical symptoms suggesting COVID-19, a second PCR was conducted within 3 days after the first, the result of which was taken as diagnostic gold standard. For patients with only a single RT-PCR test, the test result was taken as the diagnostic gold standard **Results:-** Sensitivity of HRCT in diagnosing Covid 19 was 86.49%, Specificity of HRCT in diagnosing Covid 19 was 27.27%, Positive Predictive Value of HRCT in diagnosing Covid 19 was 80.00%, Negative Predictive Value of HRCT in diagnosing Covid 19 was 37.50% and Accuracy of HRCT in diagnosing Covid 19 was 72.92%.

KEYWORDS

HRCT, COVID 19 , RT PCR

INTRODCUTION

The World Health Organization (WHO) has recently declared Coronavirus disease 2019 (Covid19) a public health emergency of international concern.[1] The etiology for this outbreak is a Novel Beta-Coronavirus named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2).[2]Due to emerging mutant strains of SARS-COV-2, the false positive PCR results are raising, making this pandemic to spread more due to lack of early diagnosis and isolation. There are limitations like sample collection, transportation, kit performance and financial burden as well[3] Although the symptoms of the disease may be similar to those of other viral infections, differences in imaging findings can facilitate the differential diagnosis [4]. Imaging techniques such as radiography and computed tomography (CT) have gained importance for disease detection[5]

Hence keeping in view the health of general public, the diagnostic value which favors early detection and prevention of spread of Virus in the community during the times of pandemic and prognostic relevance of follow up CT THORAX in RTPCR NEGATIVE patients in second wave of Covid 19 and categorization of patients who will need critical care and definitive management protocol is essential.[6]

OBJECTIVE:-

To compare the diagnostic accuracies of HRCT chest and RT-PCR results in diagnosis of coronavirus disease (COVID-19) in a tertiary care hospital in Kolar

MATERIALS AND METHODS

It was a prospective observational study done in the department of General Medicine at R L Jalappa hospital, Kolar.

Study Design: Prospective study

Study Area: Sri Devraj Urs Medical college and Hospital

Period of study: DEC 2021- MAY 2022

Source of data: RTPCR negative and HRCT Covid 19 positive patients admitted in RLJH Hospital.

Inclusion Criteria:

Patients aged above 18 years, irrespective of gender, who were clinically suspected of COVID-19 with at least one RT-PCR test and HRCT chest done, individuals with close contact history and admitted patients as a part of preoperative workup, were included

Exclusion Criteria:

Patients with interval of more than seven days between HRCT chest acquisition and first PCR sampling, patients with pulmonary and extra pulmonary lung malignancy, chest trauma, previous chest surgery.

Methodology

This was a prospective study approved by Ethical Review Committee of R L JALAPPA Hospital. From Dec 2021 to May 2022, a total of 48 CT chest were performed in this hospital. Patients aged above 18 years, irrespective of gender, who were clinically suspected of COVID-19 with at least one RT-PCR test and HRCT chest done, individuals with close contact history and admitted patients were included.

Patients with interval of more than seven days between HRCT chest acquisition and first PCR sampling, patients with pulmonary and extra pulmonary lung malignancy, chest trauma, previous chest surgery were excluded. For those patients with negative first PCR but suspicious clinical symptoms suggesting COVID-19, a second PCR was conducted within 3 days after the first, the result of which was taken as diagnostic gold standard. For patients with only a single RT-PCR test, the test result was taken as the diagnostic gold standard

Statistical analysis:

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation. Diagnostic accuracies, sensitivity, specificity, positive predictive value, negative predictive value of HRCT chest and RT-PCR were calculated by constructing 2x2 frequency table.MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers NY, USA) was used to analyze data

RESULTS

In our study we have included 48 subjects. 33.3% of the subjects were female and 66.7% of the subjects were Male. Majority of the subjects 50% were in the age group 51-60yrs followed by 31.3% of the subjects were in 61-70yrs age group, 10% of the subjects were in 41-50yrs age group and only 8.3% of the subjects were >70yrs.

Table 1:- Demographical profile of the study population

	Frequency	Percent
Age group		
41-50yrs	5	10.4
51-60yrs	24	50.0
61-70yrs	15	31.3
>70yrs	4	8.3
Sex		
Female	16	33.3
Male	32	66.7

Table 2:- Distribution of subjects according to HRCT and RT PCR

	Frequency	Percent
RT PCR		
Negative	11	22.9
Positive	37	77.1
HRCT		
Negative	8	16.7
Positive	40	83.3

Table 3:- Diagnostic accuracy of HRCT chest

Statistic	Value	95% CI
Sensitivity	86.49%	71.23% to 95.46%
Specificity	27.27%	6.02% to 60.97%
Positive Predictive Value	80.00%	73.16% to 85.45%
Negative Predictive Value	37.50%	14.50% to 67.97%
Accuracy	72.92%	58.15% to 84.72%

There were 32/37 patients true positive having positive RT-PCR results and typical HRCT findings of COVID -19, while 5 were false positive having positive RT-PCR and normal HRCT.

Out of 11 RT PCR negative patients, 8 (72.8%) were false positive with positive HRCT chest findings and 3 (27.2%) were true negative having negative HRCT chest findings.

Sensitivity of HRCT in diagnosing Covid 19 was 86.49%, Specificity of HRCT in diagnosing Covid 19 was 27.27%, Positive Predictive Value of HRCT in diagnosing Covid 19 was 80.00%, Negative Predictive Value of HRCT in diagnosing Covid 19 was 37.50% and Accuracy of HRCT in diagnosing Covid 19 was 72.92%.

DISCUSSION

Existing serological tests including RT-PCR swab test, rapid antigen, and antibody tests each have their limitations. In particular, the dangers of a false-negative result have been highlighted previously.[7] RT-PCR has a turnaround time of at least 24–48 h. For an asymptomatic individual in the infectious period, however, these 24–48 h can be crucial as she/he can still spread the infection to close contacts. Thus, the need for fast turn-around time for an accurate test is crucial. Also, the invasive nature of the test, social taboo increasingly associated with the testing are deterrents especially for asymptomatic individuals to get themselves tested.

Especially in places where prevalence is high, a fast, non-invasive, accurate, and inexpensive test for screening and diagnosis is essential. The sensitivity of HRCT, when compared with RT-PCR, has been previously studied and was shown to be higher than RT-PCR.[8]

In our study Sensitivity of HRCT in diagnosing Covid 19 was 86.49%, Specificity of HRCT in diagnosing Covid 19 was 27.27%, Positive Predictive Value of HRCT in diagnosing Covid 19 was 80.00%, Negative Predictive Value of HRCT in diagnosing Covid 19 was 37.50% and Accuracy of HRCT in diagnosing Covid 19 was 72.92%.

Similar results were observed by Ai and co-workers who conducted a study in 1,014 patients in Wuhan, China with sensitivity, specificity, NPV, PPV and diagnostic accuracy of CT chest was 97%, 25%, 68%, 83% and 65%, respectively.[9]

RT-PCR is believed to be reference standard for COVID-19 pneumonia, but recently sensitivity of this test is proved to be significantly low. Fang et al., who also reported a low sensitivity of RT-PCR as compared to CT, i.e. 71% and 98%, respectively among 51 patients in China.[10] There are many reasons for increase in false negative results including faulty sampling technique, improper kit performance, low patient viral load at initial stage, quality of sample collection, and sample collection from upper respiratory tract as compared to lower.[11,12]

Li et al. also reported a high number of individuals, 63% in his study with negative first RT-PCR results, while positive rate of second RT-PCR was 12.5%, high in comparison to only 1.8% in this study.[14]

CONCLUSION

On the our result basis we recommended that the patients with negative first RTPCR should undergo repeat PCR HRCT chest should also be done simultaneously in these patients as the typical findings of bilateral peripheral ground glass opacities, multifocal areas of sub-pleural consolidation, which are hallmark of COVID-19 are seen.

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Declarations

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