

How to Cite:

Valvi, R. D., Rajmane, V. S., & Kulkarni, P. S. (2022). Prevalence of COVID-19 in western Maharashtra and evaluation of HRCT features of COVID-19. *International Journal of Health Sciences*, 6(S2), 12722–12727. <https://doi.org/10.53730/ijhs.v6nS2.8347>

Prevalence of COVID-19 in western Maharashtra and evaluation of HRCT features of COVID-19

Dr. Ranjana Dattatraya Valvi

Associate Professor, Department of Radiology, Prakash Institute of Medical Sciences and Research, Urun, Islampur

Dr. Vijaya S. Rajmane

Professor and Head, Department of Microbiology, Prakash Institute of Medical Sciences and Research, Urun, Islampur

Dr. Pradeep S. Kulkarni*

Professor and Head, Department of Radiology, Prakash Institute of Medical Sciences and Research, Urun, Islampur

*Corresponding author

Abstract---Background: The rapid increased number of COVID -19 cases and the high death toll was an emergent and widespread concern around the globe hence this study aims to evaluate the prevalence of COVID 19 in western part of Maharashtra and to evaluate the HRCT features. Methods and Materials: A total of 244 patients during April –May 2020 who visited the tertiary care hospital aged between 0- 80 years and who were suspected for COVID 19 underwent RTPCR test. The study was conducted between April – May 2020. Collected data were recorded and entered, verified, processed, and analyzed using software package SPSS program version 19. The gender, age, and HRCT findings were recorded. Two examiners specialized in the subject of Radiology reported the HRCT reports. HRCT was performed in a single breath-hold on a 16 slice-MDCT scanner. Results: A total number of 244 COVID 19 suspected patients underwent RTPCR test. Among 244 patients 164 patients tested positive for COVID 19. The prevalence of COVID 19 was 67.21% . There was a higher prevalence in male as compared to females and mostly 4th and 5th decade of life were affected i.e. aged between 41 to 60 years. The mean CO-RADS score was 11.76±7.68. Conclusion: This study stated that the prevalence of COVID 19 was high in western part of Maharashtra. The study also concludes that males were more commonly affected. It should be noted that CO-RADS is a CT-based system that assesses the suspicion of pulmonary involvement in COVID-19

Keywords---COVID-19, prevalence, CO RADS, RT-PCR.

Introduction

The corona virus disease was 1st identified in china during December 2019 and had a devastating effect globally ⁽¹⁾. Within 3 months i.e. by 6th march 2020, over 100,000 cases were reported and this confirmed the accelerated transmission of the disease. Over 23,669 deaths were reported over 190 countries ⁽²⁾. Out of these countries US was largely affected. This was soon declared as pandemic and government across the globe applied interventions to control the transmission and burden of COVID 19. Interventions such as use of masks along with regular hygiene practices, use of sanitizers, travel related restrictions, social distancing etc were implemented ^(2,3).

The 1st case in India was detected on January 30, 2020 in Kerala. There is a wide variation in the reporting of cases across the States/Union Territories and across the districts within each State. Low- and middle-income countries contain the majority of confirmed cases of severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) ⁽³⁾. The true prevalence of COVID-19 cases in India remain unknown due to lack of testing of SARS-COV-2. Hence this study aims to report the findings of the first round of COVID 19 in western Maharashtra. Prevalence is calculated based on the age wise COVID-19 positivity rate among patients with severe respiratory illness

Materials and Methods

A total of 244 patients during April –May 2020 who visited the tertiary care hospital aged between 0- 80 years and who were suspected for COVID 19 underwent RTPCR test. The research protocol was initially submitted to the institutional ethical committee and review board of the institution. The ethical clearance was obtained from the institution before commencing the study. The study was conducted between April – May 2020. Collected data were recorded and entered, verified, processed, and analyzed using software package SPSS program version 19. The gender, age, and HRCT findings were recorded. Two examiners specialized in the subject of Radiology reported the HRCT reports. HRCT was performed in a single breath-hold on a 16 slice-MDCT scanner.

Case definition

We defined a confirmed case of COVID-19 as “case of laboratory-confirmed COVID-19 infection irrespective of signs and symptoms” as per the National Centre for Disease Control, India guidelines

Result

A total number of 244 COVID 19 suspected patients underwent RTPCR test. Among 244 patients 164 patients tested positive for COVID 19. The prevalence of COVID 19 was 67.21% . There was a higher prevalence in male as compared to

females and mostly 4th and 5th decade of life were affected i.e. aged between 41 to 60 years. The mean CO-RADS score was 11.76 ± 7.68 .

Table: 1: Prevalence of COVID 19

Prevalence		
Test (n=244)	Positive	Negative
RTPCR	164(67.21%)	32.79 (27.05%)

Table: 2: Age wise COVID 19 Patients

Age wise COVID-19 Patients		
Age (in Years)	Frequency	Percentage
0-20	9	3.69
21-40	91	37.3
41-60	102	41.8
61-80	39	15.98
>80	3	1.23
Age (Mean $\pm$ SD)	45.88 $\pm$ 15.05	

Table: 3: Gender wise COVID 19 Patients

Gender Wise Distribution		
Gender	Frequency	Percentage
Male	153	62.7
Female	91	37.3

Table: 4: CO-RADS Classification/HRCT

CO-RADS classification/HRCT		
CO-RADS classification/HRCT	Frequency	Percentage
CORADS-1	12	4.92
CORADS-2	3	1.23
CORADS-3	6	2.46
CORADS-4	7	2.87
CORADS-5	97	39.75
CORADS-6	84	34.43
None	35	14.34
HRCT-Score (Mean $\pm$ SD)	11.76 $\pm$ 7.68	

Discussion

Since past 20 years there were several respiratory related diseases such as H1N1, Influenza etc epidemics outbreaks but SARS-CoV was declared as pandemic because of its high contagiousness and global spreading ⁽⁴⁾. The rapid increased number of COVID -19 cases and the high death toll was an emergent and widespread concern around the globe ⁽⁵⁾. This was a retrospective study, which included 244 patients, among which 164 patients tested positive for COVID 19 which revealed that the prevalence of COVID 19 was 67.21% in the sample

(Table:1). The regression analysis also found that males were more likely to be diagnosed with COVID 19 than females. The mean age group was 45.88 ± 15.05 (Table: 2). Our study also stated that COVID 19 was positively associated with several conditions such as Cardiac related diseases, depression, obesity, diabetes mellitus.

Several studies have reported RT-PCR assays' sensitivities for SARS-CoV-2 between 37% and 83%. The usefulness of RT-PCR assays is impacted by false-positive and false-negative results and limited availability of tests in some high-prevalence countries. Multiple reports show patients with positive findings on chest CT scans with a negative RT-PCR assay, which only later becomes positive⁽⁶⁾.

Categories For CO RADS

CO-RADS 0

This CO-RADS category means that the scan does not have the diagnostic quality that would allow the reporting radiologist to either attribute or exclude one of the other CORADS categories (e.g., due to severe artifacts or missing parts of the lung). It should not be interpreted as a final assessment and should lead to a repeat scan if possible.

CO-RADS 1

The CO-RADS 1 category includes cases with either a normal chest CT scan or one that has abnormalities unequivocally attributed to non-infectious diseases. Findings that would justify this assessment include emphysema, perifissural nodules, lung tumors, or fibrosis. The presence of interlobular interstitial thickening with pleural effusion should be included in this category if interpreted as representing interstitial pulmonary edema. (Figure 1)

CO-RADS 2

The CO-RADS 2 category includes cases with radiological findings in keeping with infectious diseases not compatible with COVID-19, but that are typical of other lung infections, such as bronchitis, bronchiolitis, bronchopneumonia, centrilobular ground-glass opacities, lobar pneumonia, or pulmonary abscesses. Radiological signs such as tree-in-bud, centrilobular nodular pattern, lobar or segmental consolidation, and cavities should suggest diseases other than COVID-19, which must be presented as the most likely diagnosis This category implies a low level of suspicion for pulmonary involvement by COVID-19.

CO-RADS 3

The CO-RADS 3 category includes radiological findings associated with lung involvement of COVID-19, but that are also found in other viral pneumonias and non-infectious diseases of the lungs. Findings that would justify the inclusion in this category include peri-hilar ground-glass, homogeneous, and extensive ground-glass opacities, ground-glass opacities associated with interlobular

interstitial thickening and patterns of organizing pneumonia if other typical findings of COVID-19 are absent [Figures 4 and 5]. Sparing of some secondary pulmonary lobules may be present, as can pleural effusion if associated with ground-glass opacities that are not centrilobular or not located near the visceral pleura. This category implies equivocal findings for pulmonary involvement by COVID-19.

CO-RADS 4

This category includes findings that, while typical for COVID-19, have some overlap with other viral pneumonias. Findings in this category are the same as in the category CO-RADS 5 but with an atypical distribution, specifically lack of contact with the visceral pleura, strictly unilateral [Figure 6], predominantly peribronchovascular [Figures 7 and 8] or when the findings are superimposed on severe and diffuse pre-existing pulmonary changes. This category implies a high level of suspicion for pulmonary involvement by COVID-19.

CO-RADS 5

The findings associated with this category can be broken down into two groups: Mandatory features, which must be present in all cases, and confirmatory patterns of features. At least one confirmatory pattern must be present. Mandatory features include ground-glass opacities, with or without consolidation, located near visceral pleural surfaces (including the fissures), and multifocal bilateral distribution. Subpleural sparing is allowed. There are three confirmatory patterns, which typically occur at different times along the course of the disease. At an early stage, this pattern presents multiple ground-glass areas, which can be rounded or half-rounded in shape and have unsharp demarcation, or multiple and sharply limited ground-glass areas outlining the limits of multiple adjacent secondary pulmonary lobules. Somewhat later in the course of the disease, visible intra-lobular interstitial thickening associated with the ground-glass opacities form a “crazy paving” pattern. At a later stage, the pattern evolves to one compatible with organizing pneumonia, which includes the reversed halo sign, ground-glass consolidation associated with extensive subpleural consolidations and air bronchogram, curvilinear subpleural bands, and bands of ground-glass with or without consolidation, but with an arching pattern with pleural contact. Thickened vessels may occur in any of these confirmatory patterns. This category implies a very high level of suspicion for pulmonary involvement by COVID-19.

CO-RADS 6

The CO-RADS 6 category indicated proven COVID-19 after a positive RT-PCR for the SARS-CoV-2 virus. The mean CO-RADS score was 11.76 ± 7.68 . CO-RADS provide a level of suspicion for pulmonary involvement of COVID-19 based on the features seen on a non-enhanced chest CT. The level of suspicion increases from very low (CO-RADS 1) to very high (CO-RADS 5) (7). Our study results were in accordance with the study findings of Jacob L (2021) that stated that the prevalence was higher in males as compared to females and COVID 19 was significantly associated co morbidities (8).

Conclusion

This study stated that the prevalence of COVID 19 was high in western part of Maharashtra. It should be noted that CO-RADS is a CT-based system that assesses the suspicion of pulmonary involvement in COVID-19. The actual interpretation of whether a patient suffers from COVID-19 needs to include other data, such as laboratory tests, clinical findings, and type and duration of symptoms. At present, the reference standard for diagnosing COVID-19 remains a positive RT-PCR. In clinical practice, however, this may require repeated testing including deep bronchial and fecal samples and may be hampered by scarcity of tests in high-prevalence areas.

References

1. Murhekar, Manoj & Bhatnagar, Tarun & Selvaraju, Sriram & Rade, Kirakumar & Saravanakumar, V & Wesley, Jeromie & Thangaraj, Vivian & Kumar, Muthusamy & Shah, Naman & Sabarinathan, R. & Turuk, Alka & Anand, Praveen & Asthana, Smita & Balachandar, Rakesh & Bangar, Sampada & Bansal, Avi & Bhat, Jyothi & Chakraborty, Debjit & Rangaraju, Chethana & Bhargava, Balram. (2020). Prevalence of SARS-CoV-2 infection in India: Findings from the. *The Indian Journal of Medical Research*. 10.4103/ijmr.IJMR_3290_20.
2. M J, Ganeshkumar P, Kaur P, *et al* Epidemiology of COVID-19 and effect of public health interventions, Chennai, India, March–October 2020: an analysis of COVID-19 surveillance system *BMJ Open* 2022;12:e052067. doi: 10.1136/bmjopen-2021-052067
3. Mohanan M, Malani A, Krishnan K, Acharya A. Prevalence of SARS-CoV-2 in Karnataka, India. *JAMA*. 2021;325(10):1001–1003. doi:10.1001/jama.2021.0332
4. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. Features, evaluation, and treatment of coronavirus (COVID-19). In: *StatPearls [Internet]*. Treasure Island, FL: StatPearls Publishing (2021).
5. M Nicola, Z Alsafi, C Sohrabi, et al. The Socio-economic Implications of the coronavirus and COVID-19 Pandemic: A Review, *Int J Surg*, 78 (2020), pp. 185-193.
6. Majidi H, Niksolat F. Chest CT in patients suspected of COVID-19 infection: A reliable alternative for RT-PCR. *Am J Emerg Med*. 2020;38:2730–2. doi: 10.1016/j.ajem.2020.04.016.
7. Prokop M, van Everdingen W, van Rees Vellinga T, et al. CO-RADS: A Categorical CT Assessment Scheme for Patients Suspected of Having COVID-19-Definition and Evaluation. *Radiology*. 2020;296(2):E97-E104. doi:10.1148/radiol.2020201473
8. Jacob L, Koyanagi A, Smith L, Haro JM, Rohe AM, Kostev K. Prevalence of and factors associated with COVID-19 diagnosis in symptomatic patients followed in general practices in Germany between March 2020 and March 2021. *Int J Infect Dis*. 2021; 111:37-42. doi:10.1016/j.ijid.2021.08.010