Original Article

Access this article online
Quick Response Code:

Website: www.jehp.net
DOI: 10.4103/jehp.jehp_563_20

Clinical correlation of severe acute respiratory syndrome-coronavirus-2 cases in selected districts of Uttar Pradesh: A cross-sectional hospital-based study

Rajesh Kumar Verma[1], Sanjay Kannaujia[2], Neha Khurana[1], Amit Singh[1], Dharmendra P Singh[1], Alok Kumar[3]

[1]Department of Microbiology, Uttar Pradesh University of Medical Sciences, Etawah, Uttar Pradesh, India, [2]Department of Pathology, Uttar Pradesh University of Medical Sciences, Etawah, Uttar Pradesh, India, [3]Department of Forensic Medicine, Uttar Pradesh University of Medical Sciences, Etawah, Uttar Pradesh, India

Address for correspondence:
Dr. Rajesh Kumar Verma, Department of Microbiology, Academic Block, Uttar Pradesh University of Medical Sciences, Saifai, Etawah - 206 130, Uttar Pradesh, India.
E-mail: rshverma@gmail.com

Received: 25-05-2020
Accepted: 01-10-2020
Published: 29-12-2020

Abstract:

BACKGROUND: The novel coronavirus (CoV) has resulted in a global pandemic despite drastic measures to avoid contagious spread. On April 3, 2020, there were around 1 million reported cases and 51,515 deaths due to CoV disease 2019. The disease presents with flu-like symptoms such as fever, dry cough, and fatigue. India being a resource-limited country, it is very important to differentiate the suspected cases clinically.

AIM: The aim was to know the correlation of various clinical features of severe acute respiratory syndrome CoV 2 (SARS-CoV-2)-infected cases in selected districts of UP.

SETTING AND DESIGN: This was a retrospective cross-sectional hospital-based study.

MATERIALS AND METHODS: This was a retrospective cross-sectional study performed on 1243 suspected cases of SARS-CoV-2 infection from March 25, 2020 to April 17, 2020 in the department of microbiology of our institute to know the incidence of SARS-CoV-2 infection in selected districts of Uttar Pradesh. These cases were analyzed to see the association of various clinical symptoms with SARS-CoV-2 infection. For statistical analysis, Pearson's Chi-square test was performed using SPSS version 23.

RESULTS: Out of total suspected cases, 4.5% were positive. Travel history was present in 80.4% of positive cases. About 83.9% had fever, 28.6% had shortness of breath, 35.7% had dry cough, 17.9% had either Type I or II diabetes mellitus, 12.5% had chronic kidney disease, and 7.1% had obstructive pulmonary diseases.

CONCLUSION: Negative clinical history is very important in ruling out the suspected cases who came out to be free from the infection.

Keywords:

Coronavirus disease 2019, real-time polymerase chain reaction, severe acute respiratory syndrome coronavirus 2

Introduction

The new Coronavirus Disease-2019 (COVID-19) is spreading rapidly in the world since December 2019 and has resulted in a pandemic despite drastic measures to avoid its contagious spread. Rapid and accurate identification of the cases infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become very important to control the source of infection and limit its spread. Many researchers have been involved in probing a way that will help to diagnose

How to cite this article: Verma RK, Kannaujia S, Khurana N, Singh A, Singh DP, Kumar A. Clinical correlation of severe acute respiratory syndrome-coronavirus-2 cases in selected districts of Uttar Pradesh: A cross-sectional hospital-based study. J Edu Health Promot 2020;9:357.

the disease in the early phase and with limited resources.

In diagnosing viral infections, nucleic acid-based diagnostic tests have become a rapid and reliable method for detection. Among nucleic acid tests, the polymerase chain reaction (PCR) method is considered as the "gold standard" as it is highly sensitive and specific. Today, real-time reverse transcriptase-PCR (rRT-PCR) is of great importance for the detection of SARS-CoV-2. As the early diagnosis of COVID-19 is critical for the prevention and control of this pandemic, clinical characteristics alone cannot be used to label a case as COVID-19, especially for patients presenting in the early phase of the disease.[1-3]

COVID-19 presents with flu-like symptoms as reported by Huang *et al*., who concluded that the patients suffered from fever, malaise, dry cough, and dyspnea.[4] The aim of this study was to correlate the various clinical features associated with SARS-CoV-2 infection with the outcome of the rRT-PCR.

Materials and Methods

Clinical specimen and data collection

This was a retrospective study; information was gathered, including clinical data, demographic characteristics, underlying medical conditions, clinical symptoms, clinical laboratory testing results, and traveling history of 1243 suspected patients with the duration of March 25, 2020–April 17, 2020 from the record files present in the Department of Microbiology of our institution.

Inclusion criteria

1. Cases of all age groups with suspected SARS-CoV-2 infection
2. All contacts of confirmed cases of SARS-CoV-2 infection.

Exclusion criteria

1. Patients who did not fulfill the criteria given by the Indian Council of Medical Research for testing
2. The sample in which quantity was insufficient.

Study design

This was a retrospective cross-sectional study.

Methodology

Two samples (nasopharyngeal and oropharyngeal swab) were collected from the patients suspected of SARS-CoV-2 infection wearing personal protective equipment (PPE), and both the swabs were put into the same viral transport medium (VTM). This VTM was transported in a triple layer packing to the COVID-19 testing laboratory of our institution under cold chain.

After receiving the samples in the laboratory, they were kept at −20°C until processed.

RNA extraction

It was done under full PPE in Biosafety Level-2 facility using QIAamp™ Viral RNA extraction kit (Qiagen, Germany) as per the manufacturer's protocol.

Real-time reverse transcription polymerase chain reaction

The extracted RNA was tested for the presence of "E gene and RNPase" in the screening test using Ag Path ABI™ provided by ICMR-NIV, Pune, as per the manufacturer's protocol.

If the sample came to be positive, confirmatory PCR was done to detect the presence of "ORF 1b gene and RdRp gene" using Ag Path ABI™ provided by ICMR-NIV, Pune, as per the manufacturer's protocol.

Statistical analysis

For the association of results with clinical symptoms and demographic profiles, Pearson's Chi-square test was performed using Statistical Package for the Social Sciences (SPSS) version 23 by International Business Machines Corporation, Armonk, New York, United States.

Results

A total of 1243 samples of suspected cases of novel CoV (2019-nCoV) were received during our study duration from various adjoining districts such as Etawah, Kannauj, Mainpuri, Farrukhabad, Firozabad, Jalaun, Jhansi, Mahoba, and Lalitpur, including our own institution in the COVID-19 testing laboratory. Out of the total suspected cases, 56 (4.5%) came out to be positive for the infection. Among all the positive cases (56), maximum were males accounting for 78.6% of cases, whereas in females it was 21.4% [Figure 1].

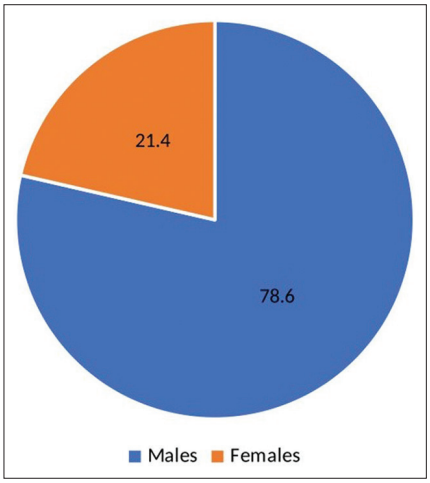

Figure 1: Gender distribution of positive SARS-CoV-2 cases

The maximum number of positive cases (38, 67.9%) were from Firozabad, followed by Mainpuri (14.3%), Kannauj (12.5%), and Etawah (5.4%). During our study duration, no positive case was found from the rest of the districts.

Out of the total positive cases, the highest number (35.7%) of cases was between the age group of 21 and 30 years [Figure 2].

About 80.4% of positive cases had a history of either interstate or intrastate travel. Around 83.9% of cases had a history of fever, 28.6% had shortness of breath, 35.7% had dry cough, 17.9% either had Type I or II diabetes mellitus, 12.5% had chronic kidney diseases, and 7.1% had obstructive pulmonary disease [Table 1].

Table 2 shows the significant correlation between the positive cases and the various clinical features which are used to define the suspected cases of SARS-CoV-2 infection. About 99.1% of suspected cases with a negative travel history were also negative for the COVID-19 infection, whereas 93.8% of positive cases had a history of travel.

Ethical clearance

This study was approved by the institutional ethical committee with the ethical clearance number 23/2020-21.

Discussion

SARS-CoV-2 is a novel virus that caused the first major pandemic of the new millennium.[5-7] The world has

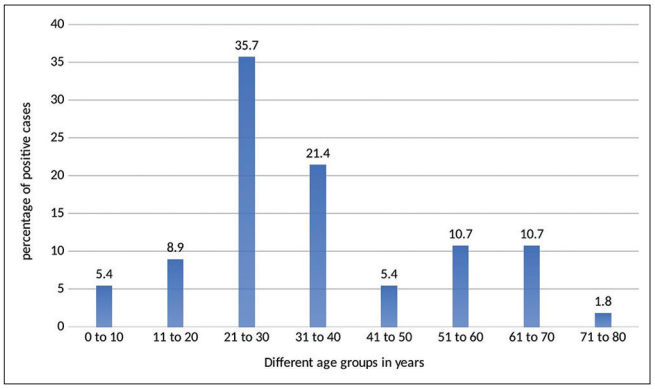

Figure 2: Percentage of positive cases in different age groups represented by the bar diagram

Table 1: Incidence of SARS-CoV-2 infection according to their demographic profile and clinical symptoms and underlying medical condition

Demographic Profile and Symptoms	Total number of cases, *n* (%)
Gender	
Male	44 (78.6)
Female	12 (21.4)
Morbidity status	
Home quarantine	13 (23.2)
Institution quarantine	43 (76.8)
Travel history	
Present	45 (80.4)
Absent	11 (19.6)
History of fever	
Present	47 (83.9)
Absent	9 (16.1)
History of shortness of breath	
Present	16 (28.6)
Absent	40 (71.4)
History of dry cough	
Present	20 (35.7)
Absent	36 (64.3)
History of DM	
Present	10 (17.9)
Absent	46 (82.1)
History of CKD	
Present	7 (12.5)
Absent	49 (87.5)
History of COPD	
Present	4 (7.1)
Absent	52 (92.9)

DM=Diabetes mellitus, CKD=Chronic kidney disease, COPD=Chronic obstructive pulmonary disease

Table 2: Association of test positivity with various factors and its interpretation

Various factors	Test results (%)		*P* interpretation
	Positive	Negative	
Gender			
Male	44 (4.6)	923 (95.4)	0.89
Female	12 (4.3)	264 (95.7)	
Travel history			
Yes	45 (93.8)	3 (6.2)	<0.01*
No	11 (0.9)	1184 (99.1)	
Morbidity status			
Home quarantine	13 (5.9)	208 (94.1)	0.18
Institution quarantine	43 (4.2)	979 (95.8)	
History of fever			
Yes	47 (54.7)	39 (45.3)	<0.01*
No	9 (0.8)	1148 (99.2)	
Shortness of breath			
Yes	16 (66.7)	8 (33.3)	<0.01*
No	40 (3.3)	1179 (96.7)	
History of dry cough			
Yes	20 (52.6)	18 (47.4)	<0.01*
No	36 (3.0)	1169 (97.0)	
History of DM			
Yes	10 (66.7)	5 (33.3)	<0.01*
No	46 (3.7)	1182 (96.3)	
History of CKD			
Yes	7 (63.6)	4 (36.4)	<0.01*
No	49 (4.0)	1183 (96.0)	
History of COPD			
Yes	4 (33.3)	8 (66.7)	<0.01*
No	52 (4.2)	1179 (95.8)	

DM=Diabetes mellitus, CKD=Chronic kidney disease, COPD=Chronic obstructive pulmonary disease *represents significant values

experienced three outbreaks of highly pathogenic CoVs, including the emergence of SARS-CoV in 2002, middle east respiratory syndrome-CoV in 2012, and now, the outbreak of 2019-nCoV.[5,6] According to the WHO, common signs of COVID-19 infection include respiratory symptoms, fever and cough, shortness of breath, and breathing difficulties. Serious cases can lead to pneumonia, SARS, kidney failure, and death.[8]

As of now, the main route of transmission identified is direct contact with a patient and respiratory droplet. Due to its strong infectivity profile, early diagnosis and treatment are crucial to contain this infection; otherwise, community spread can seriously endanger public health. The final diagnosis of this disease relies on rRT-PCR positivity for the presence of CoV.[9]

In this study, we tried to establish a correlation between the clinical presentation in patients with COVID-19 and rRT-PCR test positivity. Our retrospective study showed that males (78.6%) are more commonly infected than females with the age group between 21 and 30 years. Our findings are in concordance to a study done by Chen *et al*.[10] in Wuhan, China, on 99 positive cases of SARS-CoV-2 infection which they concluded that 83% of cases had a history of fever, 82% had dry cough, and 31% had dyspnea, which in our study was 83.9% with fever, 35.7% with dry cough, and 28.6% with dyspnea. Another study done by Huang *et al*.[4] on 41 positive cases found that 98% of cases had a history of fever, 76% had dry cough, and 55% had dyspnea.

There is a significant correlation between the negative history of the suspected cases to the negative rRT-PCR result. Among the suspected cases in which the test result is negative, 99.2% of cases did not have fever, 96.7% did not have shortness of breath, and 97% did not have dry cough.

This study had some limitations. First, this study has a small sample size. At the time of data collection, nucleic acid tests for the diagnosis of COVID-19 had not yet been available for all the suspected patients.

Although we do not know much about this viral infection, from this study, we concluded that several factors including age, gender, history of travel, fever, shortness of breath, dry cough, diabetes mellitus, chronic kidney disease, chronic obstructive pulmonary disease, and demographic profiles are significant factors that play an important role in the screening and diagnosis of SARS-CoV-2 infection.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1. Shen M, Zhou Y, Ye J, AL-Maskri AA, Kang Y, Zeng S, *et al*. Recent advances and perspectives of nucleic acid detection for coronavirus. J Pharm Anal 2020;10(2):97-101.
2. Wan Z, Zhang Y, He Z, Liu J, Lan K, Hu Y, *et al*. A melting curve-based multiplex RT-qPCR assay for simultaneous detection of four human coronaviruses. Int J Mol Sci 2016;17(11):1880.
3. Noh JY, Yoon SW, Kim DJ, Lee MS, Kim JH, Na W, *et al*. Simultaneous detection of severe acute respiratory syndrome, Middle East respiratory syndrome, and related bat coronaviruses by real-time reverse transcription PCR. Arch Virol 2017;162:1617-23.
4. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.
5. Drosten C, Günther S, Preiser W, van der Werf S, Brodt HR, Becker S, *et al*. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. N Engl J Med. 2003;348:1967-76.
6. Ksiazek TG, Erdman D, Goldsmith CS, Zaki SR, Peret T, Emery S, *et al*. A novel coronavirus associated with severe acute respiratory syndrome. N Engl J Med. 2003;348:1953-66.
7. Peiris JS, Lai ST, Poon LL, Guan Y, Yam LY, Lim W, *et al*. Coronavirus as a possible cause of severe acute respiratory syndrome. Lancet 2003;361:1319-25.
8. World Health Organization (WHO). Corona Virus. World Health Organization; 2020. Available from: https://www.who.int/health-topics/coronavirus. Accessed on 10 May 2020.
9. Rubin EJ, Baden LR, Morrissey S, Campion EW. Medical journals and the 2019-nCoV outbreak. N Engl J Med 2020;382:866.
10. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al*. Epidemiological and clinical characteristics of 99 cases of 2019 novel corona virus pneumonia in Wuhan, China: A descriptive study. Lancet 2020;395:507-13.