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Original Research Article

Epidemiological Characteristics of COVID-19 Patients in India- an Observational Study

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Conflict of interest: Nil

Abstract:

Background: Disease transmission of COVID-19, isolation and hospitalization of the patient can be reduced by early detection and diagnosis. Any delay in isolation and hospitalization can increase the difficulty in disease control and can lead to longer periods of infectiousness. In the present study, we have tried to understand the spread, common symptoms involved, recovery and death rates of the initial cases admitted in Chhindwara Institute of Medical Sciences (CIMS) hospital which would further help in framing better infection control practices for limiting the spread of the infection.

Methods: This was an observational study carried out during October 2020 to December 2020 at CIMS Chhindwara to analyse epidemiological characteristics such as age and gender, admitted facility, district hospital or home isolation. Throat and nasal swabs were collected for diagnosis by Real-time reverse-transcriptase PCR.

Results: Out of 850 patients, 538 were males and 312 were females with average age of 51.9 years. 586 patients were home isolated and 264 patients were admitted in hospital. 598 patients were asymptomatic, only 252 patients presented with COVID symptoms. Throat swab was the most common specimen collected. Significant association was seen between gender and cycle quartile with p value is less than 0.05.

Conclusions: After review of all the epidemiological characteristics it was concluded that significant association was seen between gender and cycle quartile.

Keywords: Epidemiological characteristics, COVID-19, cycle threshold.

Introduction

In December 2019, pneumonia cases of unknown etiology were reported. The new organism identified was named as SARS-CoV2 virus belonging to Coronaviridae family. The Emergencies Committee of the International Health Regulations on January 30 declared this outbreak as a Public Health Emergency of International Importance. On March 2020, the WHO had declared this as a global pandemic [1]. Potential risk factor in spreading of this infection is the International flights. Initial cases reported across the country had a travel history from Wuhan, China. First laboratory confirmed case from Kerala, India was reported on January 30th 2020 also had a travel history from Wuhan, China and subsequently from first week of March, across India COVID-19 cases began to increase [2]. Disease transmission of SARS-CoV 2 is mainly by the close contact with the person carrying the virus via droplet [3]. Risk factors associated with severe adverse outcomes include old age, underlying respiratory, cardiovascular and metabolic disease, elderly population and people with underlying suppressed immune system [4].

Few studies have reported severe outcomes in adult population less than 65 years old [5]. Disease transmission can be reduced by early detection and diagnosis of COVID-19 disease, isolation and hospitalization of the patient. Any delay in isolation and hospitalization can increase the difficulty in disease control and can lead to longer periods of infectiousness.

In this study we have tried to understand the spread, common symptoms involved, recovery and death rates of the initial cases admitted in our hospital which would further help in framing better

infection control practices for limiting the spread of the infection.

Materials and Methods

Study design and participants

This was an observational study carried out during October 2020 to December 2020 at Chhindwara. A total of 850 hospitalized patients with RT-PCR confirmed SARS CoV-2 infection admitted in CIMS Hospital, Chhindwara during the earlier described period were included in this study. All the RTPCR negative cases of COVID-19 and confirmed positive cases admitted other than CIMS hospital, Chhindwara was excluded from this study. All the consecutive, non-duplicate samples were included in the study. This study was reviewed and approved by the Institutional Ethical Committee, Chhindwara Institute of Medical Sciences (CIMS), Chhindwara, Madhya Pradesh (IEC no. CIMS/Ethics Committee/2022/623).

Data collection

ICMR Specimen Referral Form for COVID-19 (SARS-CoV2) and patient's medical record were used for data collection. The medical records of all RT-PCR confirmed COVID-19 patients admitted in CIMS hospital, Chhindwara and records from Virology laboratory, CIMS, Chhindwara, Madhya Pradesh between October 2020 to December 2020 were analyzed. Information of various variables collected for analysis was: demographic characteristics such as age and gender, admitted facility, district hospital or home isolation. Diagnostic parameters such as specimen type, cycle quartile and kit used for diagnosis and clinical characteristics such as symptomatic requiring admission or home isolation were recorded. Throat and nasal swabs were collected from suspected patients of SARS-CoV2 for qualitative detection of nucleic acids from these specimens and sent to Virology laboratory, CIMS, Chhindwara according to ICMR guidelines [6].

RTPCR assay for SARS-CoV-2

Throat swabs and Nasal swabs from the suspected SARS-CoV-2 patients were collected in viral transport medium (VTM) according to the ICMR guidelines [6]. All the samples were packed in triple layer packing and transported to the Virology laboratory with cold chain. All the specimens were tested as soon as possible on reaching the Virology laboratory. Quant Studio™ 5 Real-Time PCR System (Applied Biosystems, USA), was used for performing viral testing of the SARS-CoV-2 suspected specimens. Mag MAX Viral RNA isolation Kit (Thermo-fisher, USA) was used for Viral RNA extraction. Detection of SARS-CoV-2 by RT-PCR assay using SARS-CoV-2 RT-PCR kit was used as protocol provided by the manufacturer. Depending on the amplification of the targeted genes such as E gene, N gene, ORF1ab gene, RdRp gene, S gene genes results were reported as positive and negative.

Positive and negative controls were included in each RT-PCR experiment. Ct values for targeted genes were recorded in case of all the positive results. For analysis purpose, Ct values were divided into different quartiles (Q1, Q2, Q3 and Q4), where Q1 quartile consisted of Ct value < 22.9, Q2 quartile with Ct value between 23.0 and 27.9, Q3 quartile with Ct value between 28.0 and 32.9 and Q4 quartile with Ct value > 33.0 [7]. All the experiments done in triplicates and values represented as ± standard deviations.

Kits and reagents

For viral RNA extraction, MagMAX Viral/Pathogen Nucleic Acid Isolation Kit (MVP I) (Thermo-fisher, USA) was used. RTPCR kits such as Covidsure (India), Meril (India), Q-line (India) and Taqpath (USA) were used for COVID-19 detection. All the other reagents were molecular grade and purchased from Hi-media, India.

Statistical Analysis

Individual study parameters were recorded in the Microsoft Office Excel sheet. Data presented as percentages, mean, standard deviations and chi square test. P-values with a significance level of <0.05 were recorded as statistically significant. Descriptive statistics were analyzed by Sigma plots (10.0 versions) and Origin 7.0 software.

Result

In this observational study, a total of 850 Covid 19 patients were included. These participants were attended at District Hospital for Covid treatment. Participant's data were collected from October 2020 to December 2020.

Table 1: Demographic characteristics

Characteristics	Variables	N (%)	*P* Value
Age (in years)	below 15	42 (4.9)	X^2=93.33
	15-30	194 (22.8)	P=0.001
	31-45	244 (28.7)	
	46-60	232 (27.3)	
	61-75	117 (13.8)	
	75 above	21 (2.5)	

Mean age	51.9±15.9		
Gender	Male	538 (63.3)	X^2=74.25
	Female	312 (36.7)	P=0.001
Admitted facility	District hospital	264 (31.1)	X^2=77.29
	Home isolation	586 (68.9)	P=0.001

During the reporting period, 850 patients with SARS-CoV-2 infection were admitted and treated. There were 312 (36.7%) females and 538 (63.3%) males in the group. Table 1 showed the demographic features of the patients. The youngest patient was four years old, while the oldest was eighty-three years old.

The average age of the participants was 51.9 years, with a standard deviation of 15.9 years. During the period majority of the participants were under home isolation and around 264 (31.1%) patients were admitted to the district hospital. Majority of the infected patients, 244 patients (28.7 %) were from 31-45 years age group followed by 232 patients (27.3%) of age 46-60 years. 194 patients (22.8) were reported in the age group of 15-30 years and 117 patients (13.8) were from the age group of 61-75 years.

Minority of the infected Patients were from below 15 years age group and from above 75 years age group i. e, 42 patients (4.9%) and 21 patients (2.5%), respectively.

Table 2: Diagnostic parameters:

Characteristics	**Variables**	**N (%)**	***P* Value**
Specimen Type	TS	783 (92.1)	0.0007
	TS/NS	67 (7.9)	
Kit used for COVID Test	Genes2Me	468 (55.1)	0.0015
	Q Line	232 (27.3)	
	Taqpath	88 (10.4)	
	Meril	33 (3.9)	
	Covid Sure	29 (3.4)	
Cycle quartile	Q1	190 (22.4)	0.0015
	Q2	300 (35.3)	
	Q3	274 (32.2)	
	Q4	86 (10.1)	
Total		850	

Throat swabs (TS) were the most commonly used specimen for RT-PCR test. It was collected from 783 (92.1%) patients. However, only 67 patients (7.9) nasal swabs were (NS) specimen obtained. For target genes such as the E gene, N gene, ORF 1 ab, RdRp gene, and S gene, a cycle threshold (Ct value) was recorded. Ct was divided into quartiles (Q1, Q2, Q3, and Q4) to better highlight the size of the effect, as proposed by other researchers. The Q1 quartile had a cycle threshold of 22.9, the Q2 quartile had a cycle threshold of 23.00 to 27.9, the Q3 quartile had a cycle barrier of 28.0 to 32.9, and the Q4 quartile had a cycle threshold of 33.0.Quartiles of the cycle: 300 (35.3%) patients were in Q2, 274 (32.2) patients were in Q3, 190 (22.4) patients were in Q1, and 86 (10.1) patients were in Q4. Mean cycle threshold were 26.7 SD 4.9.

Table 3: Clinical characteristics

Symptomatic			
Characteristics	**Frequency**	**Percent**	***P* Value**
No	598	70.4	0.01
Yes	252	29.6	0.025
Total	850	100.0	

Of the total patients, majority 598 (70.4%) of the patients were asymptomatic, only 29.6% of the patients presented with COVID symptoms.

Table 4: Age and CT statistical parameters

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	***P* Value**
Age	850	2	99	42.6	17.2	0.0001
Mean CT	850	13.1	36.6	26.7	4.9	0.0001

Mean age of the patients were (Mean ± SD, 42.6±17.2) and mean CT was (Mean ± SD, 26.7 ± 4.9).

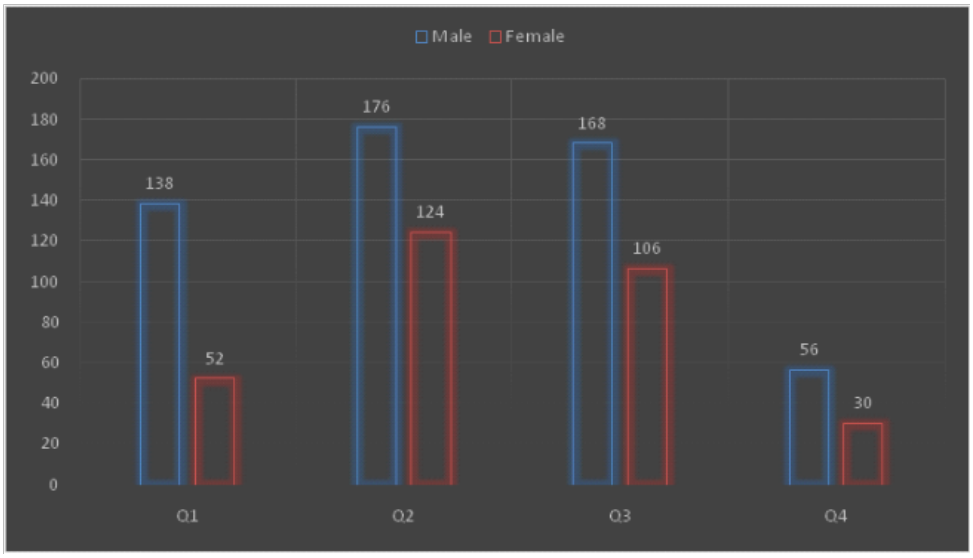

Figure 1

Figure 1 showed the association between gender and cycle quartile. Majority of the COVID positive patients were male (63.3%) and majority of them were Q2 cycle quartile followed by Q3, Q1, and Q4. There is a significant association showing between gender and cycle quartile as p value is less than 0.05 (p= 0.013, $x^{2=}$10.481).

Discussion

In this study, all the 850 participants who attended District Hospital for Covid treatment we included in the study. Out of these 850 patients 538 (63.3%) were males and 312 (36.7%) were females with average age of 51.9 years with standard deviation of 15.9 years. Out of 850 participants, 264 (31.1%) patients were admitted to district hospital (Table 1). In a study from India, 73.6 % males were reported [8]. In a study reported by Giesen et al from Spain, 51.6 % confirmed cases were in male population [9].

Majority of the infected patients, 244 patients (28.7%) were from 31-45 years age group followed by 232 patients (27.3%) of age 46-60 years. 194 patients (22.8) were reported in the age group of 15-30 years and 117 patients (13.8) were from the age group of 61-75 years. Minority of the infected Patients were from below 15 years age group and from above 75 years age group i.e. 42 patients (4.9%) and 21 patients (2.5%), respectively (Table 1). Mazumder et al has reported 42.3% patients in the age group of 20 – 39 years and median age of 40 years in women and 38 years in men [8].

Throat swabs (TS) were the most commonly used specimen for RT-PCR test. It was collected from 783 (92.1%) patients. However, only 67 patients (7.9) nasal swabs were (NS) specimen obtained (Table 2). For the standard covid-19 diagnosis, nasopharyngeal swabs are the gold standard followed by oropharygeal swabs and nasal swabs [10].

For target genes such as the E gene, N gene, ORF 1 ab, RdRp gene, and S gene, a cycle threshold (Ct value) was recorded. Ct was divided into quartiles (Q1, Q2, Q3, and Q4) to better highlight the size of the effect, as proposed by other researchers. The Q1 quartile had a cycle threshold of 22.9, the Q2 quartile had a cycle threshold of 23.00 to 27.9, the Q3 quartile had a cycle barrier of 28.0 to 32.9, and the Q4 quartile had a cycle threshold of 33.0. Quartiles of the cycle: 300 (35.3%) patients were in Q2, 274 (32.2) patients were in Q3, 190 (22.4) patients were in Q1, and 86 (10.1) patients were in Q4. Mean cycle threshold were 26.7 SD 4.9 (Table 2). For Ct value study, Choudhari et al [11] has used cycle quartiles representing the Ct threshold grouped into various Ct ranges.

In this study, out of the total patients, majority 598 (70.4%) of the patients were asymptomatic, only 29.6% of the patients presented with COVID symptoms (Table 3). Asymptomatic patients had no symptoms of COVID-19 infection but had a history of exposure to the COVID-19 patient. All the asymptomatic patients were isolated in their homes. 29.6% patients with COVID-19 symptoms and some of them with severe infection required hospitalization.

In this study, the mean age of the patients were (Mean ± SD, 42.6±17.2) and mean CT was (Mean ± SD, 26.7 ± 4.9) (Table 4). In a study reported by Vargese et al, the mean age was 36.5 (± 13.9) years and majority were males (80.2 %) [12].

In this study, significant association was seen between gender and cycle quartile as p value is less than 0.05 (p= 0.013, $x^{2=}$10.481) with majority of the COVID positive patients as male (63.3%) and

majority of them were Q2 cycle quartile followed by Q3, Q1, and Q4 (Figure 1).

Conclusion

Our results showed that 63.3% were males and 36.7% were females with average age of 51.9 years with 31.1% patients who required admission in hospital. Majority of the patients (28.7%) were from the age group of 31 – 45 years.

Throat swab was the most common specimen collected from 92.1% patients. Target genes used were E gene, N gene, ORF 1 ab, RdRp gene, and S gene. Cycle threshold (Ct value) was recorded and was divided into quartiles (Q1, Q2, Q3, and Q4). Significant association was seen between gender and cycle quartile with p value is less than 0.05. 70.4% of the patients were asymptomatic, only 29.6% of the patients presented with COVID symptoms. Limitation of the study was that we could not assess the risk factors and co-morbidities of the patient admitted in the hospital.

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References

1. World Health Organization (WHO). WHO Director-General's opening remarks at the media briefing on COVID-19. https:// www.who.int/dg/speeches/detail/ whodirector-general-s-opening-remarks-at-the-media briefing-on-covid-19-11-march-2020. Accessed April 26, 2020.
2. Ministry of health and family welfare | GOI RSS. https://www.mohfw.gov.in/.
3. World Health Organization (2020) Coronavirus Disease (COVID-19) Pandemic. Geneva: World Health Organization.
4. CDC COVID-19 Response Team (2020) Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020. US: Centers for Disease Control and Prevention.
5. Picard A. Young people don't get a pass with COVID-19. Canada: The globe and mail.
6. Specimen Collection, Packaging and Transport Guidelines for 2019 novel Coronavirus (2019-nCoV). SOP number: ICMR-NIV/2019-nCoV/Specimens_01, 2020;pages 1-2.
7. Choudhuri J, Carter J, Nelson R, et al. SARS-CoV-2 PCR cycle threshold at hospital admission associated with patient mortality. PLoS ONE. 2020, 15(12): e0244777.
8. Mazumder A, Arora M, Bharadiya V et al. SARS-CoV-2 epidemic in India: epidemiological features and insilico analysis of the effect of interventions [version 2; peer review: 2 approved] F1000Research 2020, 9:315.https://doi.org/10.12688/f1000research.23496.2
9. Christine Giesen, Laura Diez-Izquierdo, Carmen María Saa-Requejo, Inmaculada Lopez-Carrillo, Carmen Alejandra Lopez-Vilela, Alicia Seco-Martinez, María Teresa Ramirez Prieto, Eduardo Malmierca, Cristina Garcia-Fernandez, on behalf of COVID Epidemiological Surveillance and Control Study Group. Epidemiological characteristics of the COVID-19 outbreak in a secondary hospital in Spain. American Journal of Infection Control 2021; 49: 143−150.
10. Lippi G, Simundic AM, Plebani M. Potential preanalytical and analytical vulnerabilities in the laboratory diagnosis of coronavirus disease 2019 (COVID-19). Clin ChemLabMed. 2020; 58:1070–6.
11. Choudhuri J, Carter J, Nelson R, et al. SARS-CoV-2 PCR cycle threshold at hospital admission associated with patient mortality. PLoS ONE. 2020; 15(12): e0244777.
12. Varghese B, Shajahan S, Anilkumar H, Haridasan RK, Arya R, Thazhathedath H, Surendran Nair AT. Symptomatology and Epidemiologic Characteristics of COVID 19 Patients in Kerala, India. J Evolution Med Dent Sci 2020; 9 (46): 3411 – 3417.