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Clinicodemographic profile and treatment outcomes of COVID-19 patients admitted in a designated tertiary care hospital, Chennai: A comparative analysis of first and second wave of the pandemic

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ABSTRACT

Background: COVID-19 caused by severe acute respiratory syndrome (SARS)-COV 2 virus was declared a pandemic by the WHO in March 2020. India has reported 44,689,512 cases and 530,779 deaths as of March 9, 2023. Different variants may lead to varying clinical presentations and outcomes, emphasizing the need for ongoing analysis of local COVID-19 patients. **Aims and Objectives:** To describe the clinic-demographic profile and treatment outcomes of COVID-19 patients in a tertiary care hospital in Chennai and to compare the patient characteristics during the first two waves of the pandemic in India. **Materials and Methods:** A retrospective record-based study analyzed patients with SARS-CoV-2 between May 2020 and July 2021, collecting data on demographics, travel history, symptoms, hospital stay, and outcome. Data were analyzed using SPSS Version 20.0. Chi-square test and Fisher exact tests were used to ascertain significant association between variables. **Results:** Out of 944 cases of COVID-19, 70% were aged 20–60 years with a male predominance in both waves. The mean age during the first wave was 45.04 ± 17.32 and during the second wave was 45.86 ± 15.49. Intensive care and ventilatory support needs increased in the second wave. Hospital stay was longer during the first wave. Death rates were 3% and 14% in the first and second waves, respectively. **Conclusion:** In our study, community transmission was observed as most COVID patients did not have travel history. Males, elderly and those with comorbidities were heavily impacted. The second wave had higher ICU and mortality rates.

Key words: Severe acute respiratory syndrome -CoV 2; COVID-19; Intensive care units; Hospitalization

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INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by the severe acute respiratory syndrome (SARS)-CoV-2 virus, a newly emergent coronavirus, that was first recognized in Wuhan, China in December 2019.[1] This SARS-CoV-2 virus being distinct from both SARS and middle east respiratory syndrome (MERS) is also more contagious than its predecessors (SARS and MERS) as confirmed by early epidemiological findings. Hence, the COVID-19 disease has spread rapidly across the globe in a short span of time with WHO declaring the disease a Pandemic by March 11th, 2020[2] As of March 9th, 2023, a total of 759,408,703 confirmed cases of COVID-19 including 6,866,434 deaths had been reported globally with the Europe, Western Pacific, and Americas being the worst hit regions.[3] The United States

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of America (USA), China, India, France, and Germany are the countries which bore the maximum brunt of the disease load of the ongoing pandemic so far.[3]

India, currently has the largest number of confirmed COVID-19 cases in South East Asia region and stands next only to USA and China in the world. A total of 446, 89, 512 confirmed cases with 5, 30, 779 deaths had been reported in India as of March 9th, 2023.[4] Maharashtra, Kerala, Karnataka, Tamil Nadu, and Andhra Pradesh are the worst-hit states in our country.[4]

SARS CoV-2 being a virus evolves over time leading to the formation of variants of the virus. The WHO has classified the variants as variants of concern (VOC) and variants of interests. Out of the five globally identified VOCs (Alpha, Beta, Gamma, Delta, Omicron), the Omicron (B.1.1.529) is the currently circulating dominant variant globally.[5] These variants may have characteristics different from the original virus such as altered transmission (it may spread more or less easily) or altered severity (for example, it may cause more or less severe disease).

The clinical presentation and outcomes of patients with COVID-19 have been variable in different countries.[6-8] The emergence of the different variants of SARS-CoV-2 can have implications such as regional variability in the clinical presentations and hospital outcomes among the COVID-19 patients within country and between countries of the world. With the pandemic still going on, it is therefore important to document and analyze the clinical profile of the COVID-19 patients in the local population from time to time till the disease situation comes under complete control. Hence, the present study was done with the objective to describe the demographic profile, clinical characteristics, and treatment outcomes of COVID-19 patients admitted in a tertiary care hospital in Chennai with a comparative analysis of the patient characteristics during the first and second wave of the pandemic in India.

Aims and objectives

To describe the clinic-demographic profile and treatment outcomes of COVID-19 patients in a tertiary care hospital in Chennai and to compare the patient characteristics during first two waves of the pandemic in India.

MATERIALS AND METHODS

The present study was done for a period of 3 months from October to December 2022 as a retrospective study of all cases admitted in the COVID-19 ward of a Private Medical College and Hospital in Chennai between May 2020 and July 2021. Only the laboratory-confirmed (RT-PCR positive for SARS Cov-2) COVID-19 patients admitted in COVID ward were included in the study. All other patients with only symptoms suggestive of COVID-19 with RT-PCR negative results were excluded. Sample size calculation was not done as all the admitted patients were included in the study.

After obtaining approval from the Institutional Ethics Committee along with informed consent waiver, the scanned copies of the case sheets of the entire COVID-19 patients admitted between May 2020 and July 2021 were collected from Medical Records Section of the hospital. Once the case sheets were checked for laboratory confirmation of COVID-19, the data pertaining to the sociodemographic details, history of travel to high transmission regions, exposure to COVID-19-positive cases, clinical symptoms during admission, and duration of hospital stay were collected.

The collected data were entered in MS Excel spreadsheet. The entered data were analyzed using SPSS version 20.0. All the categorical variables were described as frequency and proportions. Quantitative variables were described as mean (standard deviation) or median (IQR) depending on parametric distribution. Chi-square test and Fisher exact tests were performed to find the association of the independent variables with the outcome variable. Statistical significance was set at $P<0.05$.

Inclusion criteria

Patients with laboratory-confirmed (RT-PCR positive for SARS Cov-2) COVID-19 admitted in COVID ward were included in the study.

Exclusion criteria

Patients with severe preexisting lung diseases, i.e., COPD and interstitial lung diseases were excluded from the study.

RESULTS

The present study was done among patients admitted to COVID-19 ward included 944 cases during the first and second wave of the pandemic. In both COVID-19 first and second waves, majority (70%) of the COVID-19 cases belonged to 20–60-year age group and majority were males. The Mean age during the first wave was 45.04±17.32 and during the second wave was 45.86±15.49. Majority of the cases admitted belonged to Chengalpet district in both first wave (70.6%) and second wave (58%). Fever and cough were the most common symptoms of all COVID-19 cases during both waves. Only 30.2% of cases and 22.6% of cases had history of contact in the first and second wave, respectively. About 37.9% of cases in the first wave and 48.3% of cases in the second wave had history of comorbidities (Table 1).

Table 1: Clinicodemographic profile and treatment outcome of the study participants

Characteristics	n (%)	COVID-19 (1)	COVID-19 (2)
Age			
0–19	26 (2.8)	15 (3.2)	11 (2.3)
20–39	335 (35.5)	174 (37.0)	161 (34.0)
40–59	380 (40.2)	176 (37. 5)	204 (43.1)
60–79	190 (20.1)	96 (20.4)	94 (19.8)
80–99	13 (1.4)	9 (1.9)	4 (0.8)
Gender			
Male	650 (68.9)	340 (72.3)	310 (65.4)
Female	294 (31.1)	130 (27.7)	164 (34.6)
District			
Chengalpet	607 (64.3)	332 (70.7)	275 (58.1)
Thiruvannamalai	10 (1.1)	7 (1.5)	3 (0.6)
Kanchipuram	104 (11.0)	49 (10.4)	55 (11.6)
Thiruvallur	44 (4.7)	33 (7.0)	11 (2.3)
Chennai	144 (15.3)	27 (5.7)	117 (24.7)
Andhra pradesh	7 (0.7)	5 (1.1)	2 (0.4)
Puducherry	4 (0.4)	3 (0.6)	1 (0.2)
Others	24 (2.5)	14 (3.0)	10 (2.1)
Fever			
Yes	753 (79.8)	373 (79.4)	380 (80.2)
No	191 (20.2)	97 (20.6)	94 (19.8)
Cough			
Yes	676 (71.6)	676 (71.6)	676 (71.6)
No	268 (28.4)	268 (28.4)	268 (28.4)
Sore throat			
Yes	274 (29.0)	138 (29.4)	136 (28.7)
No	670 (71.0)	332 (70.6)	338 (71.3)
Respiratory distress			
Yes	380 (40.3)	167 (35.5)	213 (44.9)
No	564 (59.7)	303 (64.5)	261 (55.1)
Diarrhea			
Yes	112 (11.9)	38 (8.1)	74 (15.6)
No	832 (88.1)	432 (91.9)	400 (84.4)
H/o of travel to other state/country			
Yes	8 (0.8)	4 (0.9)	4 (0.8)
No	936 (99.2)	466 (99.1)	470 (99.2)
H/o of contact with COVID-19 case			
Yes	249 (27.7)	142 (30.2)	107 (22.6)
No	695 (72.3)	328 (69.8)	367 (77.4)
Comorbidity			
Yes	407 (43.1)	178 (37.9)	229 (48.3)
No	537 (56.9)	292 (62.1)	245 (51.7)
Under intensive care			
Yes	67 (7.1)	18 (3.8)	
No	877 (92.9)	452 (96.2)	
Requiring ventilator support			
Yes	28 (3.0)	2 (0.4)	49 (10.3)
No	916 (97.0)	468 (99.6)	425 (89.7)
Duration of hospital stay			
1–7 days	374 (39.6)	138 (29.4)	236 (49.7)
8–14 days	465 (49.2)	287 (60.9)	178 (37.6)
15–21 days	78 (8.3)	36 (7.7)	42 (8.9)
22–28 days	15 (1.6)	5 (1.1)	10 (2.1)
29 days and above	12 (1.3)	4 (0.9)	8 (1.7)
Treatment outcome			
Discharge	787 (82.8)	405 (86.2)	382 (80.7)
Referred	19 (2.0)	16 (3.4)	3 (0.6)
AMA discharge	53 (6.2)	32 (6.8)	21 (4.4)
Death	85 (9.0)	17 (3.6)	68 (14.3)

The present study reported that only 3.8% of COVID-19 cases required intensive care during the first COVID wave which surged to 10.3% during second COVID wave. Similarly, COVID-19 cases requiring ventilator support increased from 0.4% to 5.5%. The mean duration of hospital stay for COVID-19 cases was longer (9.26 days) during the first

wave compared to second wave (8.82 days). Though the duration of hospital stay was lesser in COVID second wave, about 86% of cases admitted were cured during the first wave and about 80% were cured during the second wave.

Table 2: Association between clinicodemographic variables with the requirement of intensive care

Variables	Requiring intensive care		Fisher exact P-value
	Yes	No	
Age group (1st wave)			
0–19	0 (0.0)	15 (100.0)	0.001
20–39	2 (1.1)	172 (98.9)	
40–59	4 (2.3)	172 (97.7)	
60–79	11 (11.5)	85 (88.5)	
80–99	1 (11.1)	8 (88.9)	
Age group (2nd wave)			
0–19	0 (0.0)	11 (100.0)	0.001
20–39	3 (1.9)	158 (98.1)	
40–59	31 (15.2)	173 (84.8)	
60–79	12 (12.8)	82 (87.2)	
80–99	3 (75.0)	1 (25.0)	
Gender (1st wave)			
Male	12 (3.5)	328 (96.5)	0.595
Female	6 (4.6)	124 (95.4)	
Gender (2nd wave)			
Male	36 (11.6)	274 (88.4)	0.267
Female	13 (7.9)	151 (92.1)	
Comorbidity (1st wave)			
Yes	13 (7.3)	165 (92.7)	0.005
No	5 (1.7)	287 (98.3)	
Comorbidity (2nd wave)			
Yes	34 (14.8)	195 (85.2)	0.001
No	15 (6.1)	230 (93.9)	

About 3% deaths were reported during first wave and about 14% deaths were reported during second wave (Table 1).

Association

In both waves, age group and comorbidity were found to have statistically significant (P>0.05) association with requirement of intensive care (Table 2). Likewise, age group and comorbidity were found to have statistically significant (P>0.05) association with treatment outcome (P=0.001) (Table 3). The age of the cases admitted during first wave was found to have statistically significant (P>0.05) association with the duration of hospital stay (Table 4).

DISCUSSION

The present study is done among cases admitted during the first wave and second wave of COVID-19 pandemic in a designated COVID-19 hospital in Chennai. The purpose of the study is to list out the demographic and clinical features of the cases admitted during both waves and to bring out the differences in the observed characteristics. In both first and second wave, more than 70% of the COVID-19 cases belonged to 20–59-year age group. This is similar to studies done in India during first and second waves of COVID-19 pandemic which showed that in both waves majority of cases belonged to 11–60-yeas age group.[9,10]

In COVID first wave, the highly affected patients belonged to 20–39 years and 40–49 years age group, whereas, in

Table 3: Association between clinicodemographic variables with treatment outcomes

Variables	n (%)	Treatment outcomes				Fisher exact P-value
		Discharged	Referred	AMA Discharge	Death	
Age group (1st wave)						
0–19	15 (100)	15 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.001
20–39	174 (100)	162 (93.1)	4 (2.3)	7 (4.0)	1 (0.6)	
40–59	176 (100)	154 (87.5)	4 (2.3)	16 (9.1)	2 (1.1)	
60–79	96 (100)	68 (70.8)	8 (8.3)	9 (9.4)	11 (11.5)	
80–99	9 (1.9)	6 (66.7)	0 (0.0)	0 (0.0)	3 (33.3)	
Age group (2nd wave)						
0–19	11 (100)	11 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.001
20–39	161 (100)	149 (92.6)	0 (0.0)	5 (3.1)	7 (4.3)	
40–59	204 (100)	154 (75.5)	2 (1.0)	12 (5.9)	36 (17.6)	
60–79	94 (100)	68 (72.3)	0 (0.0)	4 (4.3)	22 (23.4)	
80–99	4 (100)	0 (0.0)	1 (25.0)	0 (0.0)	3 (75.0)	
Gender (1st wave)						
Male	340 (100)	296 (87.1)	11 (3.2)	22 (6.5)	11 (3.2)	0.748
Female	130 (100)	109 (83.9)	5 (3.8)	10 (7.7)	6 (4.6)	
Gender (2nd wave)						
Male	310 (100)	249 (80.4)	1 (0.3)	10 (3.2)	50 (16.1)	0.080
Female	164 (100)	133 (81.1)	2 (1.2)	11 (6.7)	18 (11.0)	
Comorbidity (1st wave)						
Yes	178 (100)	140 (78.7)	10 (5.6)	15 (8.4)	13 (7.3)	0.001
No	292 (100)	265 (90.7)	6 (2.1)	17 (5.8)	4 (1.4)	
Comorbidity (2nd wave)						
Yes	229 (100)	165 (72.1)	3 (1.3)	9 (3.9)	52 (22.7)	0.001
No	245 (100)	217 (88.6)	0 (0.0)	12 (4.9)	16 (6.5)	

Table 4: Association between clinicodemographic variables with duration of hospital stay

Variables	Duration of hospital stay					Fisher exact P-value
	1–7 days	8–14 days	15–21 days	22–28 days	29 days and above	
Age group (1st wave)						
0–19	9	6	0	0	0	0.0001
20–39	59	107	7	0	1	
40–59	42	119	14	1	0	
60–79	23	52	14	4	3	
80–99	5	3	1	0	0	
Age group (2nd wave)						
0–19	10	0	1	0	0	0.17
20–39	96	52	8	2	3	
40–59	92	80	23	6	3	
60–79	34	46	10	2	2	
80–99	4	0	0	0	0	
Gender (1st wave)						
Male	102	202	31	2	3	0.149
Female	36	85	5	3	1	
Gender (2nd wave)						
Male	106	91	26	2	4	0.092
Female	130	87	16	8	4	
Comorbidity (1st wave)						
Yes	45	112	16	4	1	0.165
No	93	175	20	1	3	
Comorbidity (2nd wave)						
Yes	152	117	28	8	5	0.892
No	84	61	14	2	3	

second wave, the highly affected patients belonged to 40–59 years age group. This is comparable with a study done by Sarkar et al., this study reports that the highly infected patient age group was 11–30 years and 31–45 years during first wave, and during second wave, the highly infected patients were in 31–45 years age group.[9]

In both COVID-19 first (72.3%) and second (65.4%) wave, males were mostly affected compared to females. This is in line with many hospital-based studies where higher rates of male admissions were reported.[11-13] This could be due to the fact that males are mostly involved in outdoor activities leading to increased exposure when compared to females who are mostly involved in indoor activities.

Studies done elsewhere has pointed out several possible factors such as higher expression of angiotensin-converting enzyme-2 in male than female,[14,15] sex-based immunological differences driven by X chromosome and sex hormone,[16] behavior like higher levels of smoking and drinking among males compared to females and careless attitude toward preventive measures such as frequent handwashing, wearing of face mask, and stay at home orders.[15]

In our study, fever was the most common presenting symptom (around 80%) in both COVID first and second wave. Cough (75.7%) and respiratory distress (44.9%) were more common in patients admitted in second wave than first wave. Similar findings were reported in a study done in Punjab[13] and in Reus, Spain.[17] Fever (73%) was the most common presenting complaint in patients admitted in both COVID first and second wave. Cough (73%) and shortness of breath (55%) in patients were more common in patients admitted in second wave. Fever, cough, and shortness of breath were more common in patients admitted in second wave.[13,17]

In our study population, we found that patients admitted during the second wave of the COVID-19 pandemic required more intensive care and ventilator support than during the first COVID wave. These findings are similar to a study done in Western Maharashtra that reported higher ICU admissions and increased ventilator support during the second wave of the COVID-19 pandemic.[18] In contrary to this, several studies have reported hospital admissions with mild or serious symptoms which were reported more in first wave than during the second wave.[17,19]

In our study in both COVID first and second waves, the association between increasing age, comorbid status, and those requiring COVID intensive care was found to be statistically significant (P>0.05).

In our study, more COVID-related hospital deaths were reported during COVID second wave when compared to first wave. Similar findings were reported in a study done in Western Maharashtra.[18]

In our study, it was reported that COVID hospital admissions were more associated with people with

comorbidities in COVID second wave (48.3%) than first wave (37.9%). This is similar to a study done in Western Maharashtra which reported more COVID hospital admissions with comorbidities during the second COVID wave.[18]

In our study, the median duration of stay at the hospital was 8 days during COVID first wave which is similar to a study done in Kazakhstan.[20]

In this comparative study, more number of deaths were reported in COVID second wave when compared to COVID first wave. Similar findings were reported in a study done in Western Maharashtra and another study done in North India.[18,21] Contrary to this more deaths were reported in first wave than second wave in a study done in Spain.[19]

Limitations of the study

Our study had certain limitations. As this was a single-center retrospective study, information was limited to those which were collected during hospital admissions during first and second wave of COVID. These findings cannot be generalized.

CONCLUSION

In our study population, almost all COVID admitted patients had no history of travel to any other country or state. indicating community transmission. In both wave male gender, elderly population and patients with comorbidities were most affected. Intensive care requirement and deaths were reported to be high during second wave compared to first wave.

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Authors' Contributions:
SC- Concept and design of the study, prepared first draft of manuscript; **RCK**- Interpreted the results; reviewed the literature and manuscript preparation; **EM**- statistical analysis; **VA**- Concept, coordination, and interpretation, preparation of manuscript and revision of the manuscript; **AS**- Statistical analysis and preparation of manuscript.

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