

## CLINICOEPIDEMIOLOGICAL FEATURES OF COVID-19 PATIENTS OF SECOND WAVE AT A TERTIARY CARE TEACHING HOSPITAL IN GUJARAT, INDIA

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### ABSTRACT

**Objective:** The studies describing the clinicoepidemiological features of coronavirus disease-2019 (COVID-19) patients of first wave are available but about second wave, very few studies have documented. This study was aimed to describe the clinicoepidemiological features and the causes of mortality of COVID-19 patients of second wave admitted in our center.

**Methods:** This retrospective, observational, and cross-sectional study was carried out among 200 randomly selected and confirmed COVID-19 indoor patients admitted between April 7, 2021 and July 3, 2021 in Dr. N. D. Desai Hospital, Nadiad. The demographic profile, clinical features, comorbidities, inflammatory markers, and causes of mortality in these patients were analyzed.

**Results:** A total 200 patients of COVID-19 of second wave were analyzed. Majority of them were males (64.5%) and the patients between 18 and 60 years of age constituted 60%. Hypertension (70.93%) and diabetes mellitus (46.51%) were common comorbidities followed by ischemic heart diseases and chronic kidney disease. The most common presenting features were fever (75.7%), cough (68.8%), and shortness of breath (60%). The median duration of hospital stay was 7 days [interquartile range, 4–12]. The patients needed any kind of mode of oxygen therapy were 82.5%. The most common cause of death was cardiac arrest (70.58%) followed by severe acute respiratory distress syndrome (ARDS) (35.29%).

**Conclusions:** In this retrospective study, most patients were young males with the age <60 years. The patients had one or more comorbidities, hypertension being the most common. Inflammatory markers were significantly higher in patients who died in our hospital.

**Keywords:** Coronavirus disease-2019, Clinicoepidemiological features, Comorbidities, Intensive care unit, Second wave, Wave-2, COVID-19 deceased, Mortality.

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### INTRODUCTION

Coronavirus disease-2019 (COVID-19) caused by the novel severe acute respiratory syndrome coronavirus 2 emerged in China in December 2019. It is still circulating and responsible for higher numbers of COVID-19-related infected cases and deaths globally, even in 2021 [1]. The world has recorded 111,102,016 confirmed cases and 2,462,911 deaths due to COVID-19 till February 22, 2021. In India, confirmed cases and deaths due to COVID-19 were 11,005,850 and 156,385 till February 22, 2021 [2,3].

COVID-19 shows variety of clinical features of asymptomatic carriers to severe pneumonia, acute respiratory distress syndrome (ARDS), multi-organ involvement, and death [4]. Earlier retrospective observational case series from India during the first wave of COVID-19 has been reported that almost half (42.9%) of the patients were asymptomatic [5]. Fever and dry cough were the most common symptoms [5,6]. Fewer patients have been required invasive mechanical ventilation support [5].

In India, during the second wave of COVID-19, gastrointestinal symptoms are adding in earlier clinical spectrum of COVID-19 [7]. Gastrointestinal manifestations are also more common in other countries [8]. Due to the high number of infections, the total death numbers are significantly higher, but no significant increase in percentage of the death rate in the second wave of COVID-19 as compared to first wave [8].

Research studies concerning the clinicoepidemiological features of COVID-19 during first wave are available in India [4,5]. However, studies regarding the clinicoepidemiological features, mortality rate, and cause of death of COVID-19 during second wave are sparse. Hence,

the present study was aimed to describe clinical and epidemiologic profile of the COVID-19 patients admitted in our tertiary care teaching hospital between April 7, 2021 and July 3, 2021.

### METHODS

This retrospective, observational, and cross-sectional study was carried out in Dr. N. D. Desai Hospital, a tertiary care teaching hospital of Nadiad, Gujarat, India. The study was started after prior permission from the Human Ethics Committee (Dr. NDDFMSR/IEC/06/2021).

#### Study population

The study was conducted among 200 randomly selected and confirmed COVID-19 indoor patients admitted between April 7, 2021 and July 3, 2021 at our hospital.

#### Data collection method

Case record forms were filled with help of indoor case papers obtained from medical record section of our hospital.

#### Inclusion criteria

We included confirmed COVID-19 patients admitted during second wave between April 7, 2021 and July 3, 2021.

#### Exclusion criteria

Improperly maintained indoor case papers were excluded from the study.

#### Study procedures

Total 200 indoor case papers of the COVID-19 patients of second wave were scrutinized. Case record forms were filled with help of indoor case

papers. Data were collected and analyzed for demographic information, complaints, pre-morbid conditions, initial SpO<sub>2</sub>, type of admission, modes of oxygen therapy, and duration of the hospital stay. The highest value of C-reactive protein (CRP), D-dimer, and neutrophil/lymphocyte ratio (NLR) during hospital stay was collected. Outcome of patients and cause of death were also noted. Adult patients were divided into age-groups of 18–60 and more than 60 years and their clinical characteristics and outcomes were compared. We also stratified patients into deceased and non-deceased group to find out any significant differences.

### Statistical analysis

Data were expressed as proportions and median (interquartile range). Subgroup analysis was done for patients with different complaints, need of intensive care unit (ICU) admission, modes of oxygen therapy, comorbid conditions, outcomes, and cause of death. Quantitative data for the two groups were compared with Mann-Whitney test. Qualitative data were compared by Fisher's exact test. GraphPad Prism 9.3.1 was used for statistical analysis.  $P < 0.05$  was considered as statistically significant.

### RESULTS

In our retrospective study, a total of 200 cases of the COVID-19 patients of the second wave was analyzed. Out of them, 129 (64.5%) were male patients and 71 (35.5%) patients were female. The majority of the patients were in the age group of 18–60 years 120 (60%) while >60 years age group contributed 80 (40%) patients. Total 86 (43%) patients have comorbid condition. Hypertension 61 (70.93%) and diabetes mellitus 40 (46.51%) were common comorbidities. Other comorbid conditions include ischemic heart diseases and chronic kidney disease. Out of 86 patients, 23 patients had more than one comorbid conditions (Table 1).

Common clinical complaints among of the COVID-19 patients of the second wave are summarized in Table 2. This table shows that patients had been reported with fever 146 (73%), cough 141 (70.5%), shortness of breath 120 (60%), sore throat 62 (31%), weakness 23 (11.5%), chest pain 12 (6%), and nausea and vomiting 9 (4.5%). Other clinical manifestations were headache, diarrhea, abdominal pain, vertigo, body ache, anorexia, and loss of taste sensation.

Out of 200 cases, 10 patients were intubated in our hospital. Patients were given treatment according to the institutional practice. The patients were managed on oxygen by nasal cannula and facemask initially and if the oxygen requirement increased, they were managed on non-invasive ventilation before intubation. Out of 200 cases, 35 (17.5%) cases were managed without any mode oxygen therapy (Table 3).

Patients were stratified into two age-groups (18–59 and >60 years) in our study to find out age-related differences in the number of gender, comorbidities, presenting symptoms, duration of hospital stay, SpO<sub>2</sub> on admission, number of ICU admission, median value of CRP, NLR, and D-dimer (Table 4).

In the study, 60% of the patients were in age-group between 18 years and 59 years and 40% in the group above the age of 60 years. There was no significant difference in the male-to-female ratio between the two groups. The patients having comorbidities (two or more) were higher in the age-group above 60 years as compared to younger age-groups but it was not statistically significant. Multiple comorbidities were seen in 16.25% of patients above the age of 60 years, as compared to 10.83% in age-group 18–59 years of age. The patients having hypertension were higher 43.75% in the age group above 60 years as compared to 21.67% in age-group 18–59 years of age which was statistically significant. Initial SpO<sub>2</sub> on admission, ICU admission, duration of hospital stay, median value of CRP, NLR, and D-dimer were not showing significant difference between both groups. The percentage mortality 26.25% was significantly higher in the age-group of more than 60 years as compared to 10.83% in younger age-group (Table 4).

**Table 1: Clinical characteristics of study patients**

Characteristics	Patients, n (%)
Gender distribution	
Male	129 (64.5)
Female	71 (35.5)
Age distribution (years)	
18–60	120 (60)
>60	80 (40)
Duration of hospital stay (days), median (IQR)	7 (4–12)
Comorbidities	
Hypertension	61 (70.93)
Diabetes mellitus	40 (46.51)
Patients with two pre-morbid conditions	23 (26.74)

IQR: Interquartile range

**Table 2: Distribution of presenting complaints**

Presenting complaints	Number of patients (%)
Fever	146 (73)
Cough	141 (70.5)
Shortness of breath	120 (60)
Sore throat	62 (31)
Weakness	23 (11.5)
Chest pain	12 (6)
Nausea and vomiting	9 (4.5)
Others	22 (11)

**Table 3: Modes of oxygen therapy given**

Modes of oxygen therapy received	Number of patients (%)
Patients received nasal cannula	71 (35.5)
Patients received face mask	80 (40)
Patients received NRBM	99 (49.5)
Patients received BiPAP	16 (8)
Patients received intubated	10 (5)

NRBM: Non-rebreathing mask, BiPAP: Bilevel positive airway pressure

In our study, we also stratified patients into deceased and non-deceased group to find out significant differences in the number of gender, comorbidities, presenting symptoms, duration of hospital stay, SpO<sub>2</sub> on admission, number of ICU admission, median value of CRP, NLR, and D-dimer in between two groups (Table 5).

In the study, 17% of the patients were in deceased and 83% in the non-deceased group. There was no significant difference in the male to female ratio between the deceased and non-deceased groups. The patients having comorbidities (two or more) were higher in the deceased patients as compared to the non-deceased patients but it was not statistically significant. Multiple comorbidities were seen in 23.53% of deceased patients as compared to 10.84% in non-deceased patients. The patients having hypertension were higher 41.18% deceased as compared to 28.31% in non-deceased which was not significant. Diabetes mellitus was statistically significant comorbidity seen 35.29% deceased patients as compared to 16.87% in non-deceased patients. The patients with shortness of breath as chief complaint were 79.41% in deceased as compared to 56.02% in non-deceased group and it was statistically significant. Median value of initial SpO<sub>2</sub> on admission in deceased patients as compared to non-deceased patients was significant low. Numbers of ICU admission were significant higher 50% in deceased patients as compared to 4.22% non-deceased patients. Duration of hospital stay of deceased patients and non-deceased patients was not showing statistically significant difference. High CRP, high NLR, and high D-dimer were significantly more present in patients who died of COVID-19 in our hospital (Table 5).

Out of 200 patients, 56.5% patients were discharged followed by discharge against medical advice (18%) and refer to higher center transfers of patients were 8.5%. Total 34 (17%) patients were died

Table 4: Characteristics of the patients according to the different age-groups

Characteristics	Age-group (years)		p
	18-59 (n=120)	>60 (n=80)	
Gender			
Male	73	56	0.23
Female	47	24	0.23
Number of comorbidities (% of patients)			
0	82 (68.33)	32 (40)	
1	25 (20.83)	35 (43.75)	
2	12 (10)	11 (13.75)	0.29
>2	1 (0.83)	2 (2.5)	
Comorbid condition, n (%)			
Hypertension	26 (21.67)	35 (43.75)**	0.0016
Diabetes mellitus	19 (15.83)	21 (26.25)	0.10
Presenting complaints, n (%)			
Fever	90 (75)	56 (70)	0.52
Cough	83 (69.17)	58 (72.5)	0.64
Shortness of breath	67 (55.83)	53 (66.25)	0.18
Sore throat	37 (30.83)	25 (31.25)	>0.9
SpO <sub>2</sub> on admission	93 (88-97)	92 (86-95)	0.067
ICU admission, n (%)	14 (11.67)	10 (12.5)	>0.9
Duration of hospital stay	7 (4-12)	7 (5-12)	0.39
Median value CRP	65.69 (25.34-99.40)	78.43 (33.95-131.8)	0.12
Median value NLR	4.33 (2.62-8.50)	5.33 (3.42-10.40)	0.10
Median value of D-dimer	686.5 (583.3-995.3)	674.5 (599.3-888)	0.74
Number of mortality, n (%)	13 (10.83)	21 (26.25)**	0.0066

Data expressed as median (IQR) and percentage. \*\*p<0.05 as compared to age group 18-59; Fisher's exact test. IQR: Interquartile range, CRP: C-reactive protein, ICU: Intensive care unit, NLR: Neutrophil/lymphocyte ratio

Table 5: Characteristics of the patients according to the mortality and non-mortality

Characteristics	Non-deceased (n=166; 83%)	Deceased (n=34; 17%)	p
Gender, n (%)			
Male	107 (64.46)	22 (64.71)	>0.9
Female	59 (35.54)	12 (35.29)	>0.9
Number of comorbidities (% of patients)			
0	100 (60.24)	14 (41.18)	
1	48 (28.92)	12 (35.29)	
2	15 (9.03)	8 (23.53)	0.053
>2	3 (1.81)	0	
Premorbid condition, n (%)			
Hypertension	47 (28.31)	14 (41.18)	0.15
Diabetes mellitus	28 (16.87)	12 (35.29)*	0.012
Presenting complaints, n (%)			
Fever	118 (71.08)	28 (82.35)	0.20
Cough	116 (69.88)	25 (73.53)	0.83
Shortness of breath	93 (56.02)	27 (79.41)*	0.012
Sore throat	53 (31.93)	9 (26.47)	0.68
SpO <sub>2</sub> on admission	94 (90-97)	86 (75.5-92.7) <sup>ss</sup>	<0.0001
ICU admission, n (%)	7 (4.22)	17 (50) <sup>s</sup>	<0.0001
Duration of hospital stay (days)	7 (4-12)	6.5 (4-13)	0.9683
Median value CRP	65.50 (27.48-98.48)	96.61 (56.53-180.3) <sup>ss</sup>	0.0029
Median value NLR	4.059 (2.58-7.50)	9.556 (5.79-18.0) <sup>ss</sup>	<0.0001
Median value of D-dimer	662.5 (583.0-885.3)	814.5 (616.8-1533) <sup>@</sup>	0.0412

Data expressed as median (IQR) and percentage. \*p<0.05 as compared to non-deceased group (Fisher's exact test), <sup>s</sup>p<0.01 as compared to non-deceased group (Fisher's exact test), <sup>@</sup>p<0.05 as compared to non-deceased group (Mann-Whitney test), <sup>ss</sup>p<0.01 as compared to non-deceased group (Mann-whitney test). IQR: Interquartile range, CRP: C-reactive protein, ICU: Intensive care unit, NLR: Neutrophil/lymphocyte ratio

due to COVID-19 in our hospital. The cause of death was analyzed in all the deceased. Cardiac arrest remained the leading cause of death (70.58%) followed by severe ARDS (35.29%), sepsis with multi-organ dysfunction and pulmonary embolism.

## DISCUSSION

Our study, we describe the clinicoepidemiological characteristics, cause of mortality, and outcomes of the COVID-19 patients admitted in our tertiary care teaching hospital during second wave between April 7, 2021 and July 3, 2021. In this study, we analyzed and compare data between non-deceased to deceased patients and compared

patients according to the age groups. In our study, older age group (>60 years) comprised 40% of the admitted patients as compared to younger age group and it was almost similar in other study from India [9]. The hospitalized patients in the second wave the COVID-19 were significantly younger from age group <60 in a prospective study reported from Spain [10]. The second and subsequent waves in other countries have also reported that younger patients were more affected [7,10]. It might be due to younger age-groups in India remained largely unvaccinated till March 1, 2021 and restrictive measures were less stringent after September 2020 [11]. We did not find a single case from age group <18 year, it might be due to randomly selected patients,

and also children had milder disease [4]. Male patients comprised 64.5% cases in our study which was almost similar as other study reported from India [9].

In the present study, we found that 43% patients with comorbidities were admitted in our hospital during the second wave of the COVID-19 as compared to 45% and 59.7% in other studies from India [9,11]. Hypertension 70.93% and diabetes mellitus 46.51% were the most common comorbid conditions in our study as same as others [4,9,11], but percentage of patients with hypertension were higher in our center.

The elderly patients (>60 years old) had more comorbidities particularly hypertension than younger patients. Diabetes mellitus was seen in 35.29% deceased patients. Hypertension was the most common comorbidity, but diabetes might be responsible for adverse outcomes following COVID-19 infection [12].

The most common presenting complaints in our study were fever, cough, shortness of breath, and sore throat similar to the findings of other studies [2,6,9,11]. In Iran, gastrointestinal manifestations were more common in the second wave [7]. We also found that some patients had non-respiratory symptoms such as vomiting and diarrhea. However, fever and respiratory symptoms remained the most common clinical manifestations in admitted patients. Shortness of breath was seen significantly higher in deceased group. It might be due to the circulating variants which were B.1.1.7 and B.1.617 and they had been debated to be more contagious as well as more virulent during the second wave of COVID-19 [11,13,14].

Initial SpO<sub>2</sub> on admission was almost similar in younger and the elderly patients (>60 years old) but it was significant lower in the deceased group. We observed that 82.5% patients required oxygen therapy as compared to 74.1% in other study [9]. In spite of that, invasive ventilation was done in 5% patients in our center due to less availability of ventilator bed. The silent hypoxemia in COVID-19 may responsible for more severe diseases and required supportive oxygen therapy [11,13,14]. Another reason was late arrival of patients in the hospital due to acute shortage of beds during the peak manifestation of COVID-19 [9].

ICU admission was almost similar in younger and the elderly patients (>60 years old). ICU admissions were higher in deceased group (50%) during the second wave of COVID-19 as compared to other [9,11]. It was due to scarcity of ICU beds during the peak of the second wave, several patients had to be managed in ward on oxygen support. Duration of hospital stays was similar in younger and the elderly patients as well as deceased and non-deceased. Duration of hospital stay was almost similar to other studies [9].

Median value of CRP, NLR, and D-dimer was higher in patients who died of COVID-19 during the second wave in our hospital. These higher value of inflammatory blood markers suggested that overall severity of COVID-19 cases was higher in the second wave [9]. It was supported by overall mortality that was 17% in our center as compared to others 10.5% and 13.3% [9,11].

#### Limitations

This study has some limitations. It is single-center and retrospective study with small sample size. We selected 200 confirmed COVID-19 cases randomly which were admitted between April 7, 2021 and July 3, 2021 at our hospital. Data related to patients refer to higher center transfer and discharged against medical advice were not studied, so they were not counted in deceased cases. Hence, our results data cannot be reflect overall scenario of India but they are helpful to compare data from other centers from India.

#### CONCLUSIONS

In our single-center and retrospective study of the second wave of the COVID-19, 64.5% of the patients were males. Most of them (60%) were of the age <60 years indicative of the majority of young population of India. Nearly, 43% patients had single or multiple comorbidities, most

common being hypertension followed by diabetes mellitus. The most common cause of death was cardiac arrest followed by severe ARDS. High CRP, NLR, and D-dimer were significantly more present in patients who died of the second wave COVID-19 in our hospital.

#### AUTHORS' CONTRIBUTIONS

All authors have contributed equally except data collection. Data were collected by Dr. Hiren Chawda, Dr. Kiran Panchal and Dr. Rutvij Hedamaba.

#### CONFLICT OF INTEREST

None of the authors have any conflict of interest.

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