2
DOI: 10.5281/zenodo.8215740
Original research article

Comparing the Demographic Characteristics and Severity of Hospitalized Patients between 2 Peaks of Covid Waves in 2020 And 2021 in Civil Hospital Ahmedabad, India

Authors:

1. **Dr Revant Agarwal**
   Designation: Second year resident doctor of emergency medicine department
   Institution: B. J. Medical College, Civil Hospital Ahmedabad.
   Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
   E-mail address: agarwalrevi@gmail.com
   Mobile number: 8511277047

2. **Dr. Parth Raval**
   Designation: First year resident doctor of emergency medicine department
   Institution: B. J. Medical College, Civil Hospital Ahmedabad.
   Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
   E-mail address: parthraval42@yahoo.com
   Mobile no: 9687637900

3. **Dr. Shraddha Kalsariya**
   Designation: First year resident doctor of emergency medicine department
   Institution: B. J. Medical College, Civil Hospital Ahmedabad.
   Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
   E-mail address: shraddhakalsariya@gmail.com
   Mobile no: 7046360342

4. **Dr. Arunjith G**
   Designation: First year resident doctor of emergency medicine department
   Institution: B. J. Medical College, Civil Hospital Ahmedabad.
   Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
   E-mail address: arunjithgk@gmail.com
   Mobile no: 9497350633

5. **Dr. Vishakha Patel**
   Designation: First year resident doctor of emergency medicine department
   Institution: B. J. Medical College, Civil Hospital Ahmedabad.
   Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
   E-mail address: vishakhapatel1997@gmail.com
   Mobile no: 6353306920

6. **Dr. Chirag Patel**
   Designation: Associate Professor and Head of Department of Emergency Medicine
   Institution: B. J. Medical College, Civil Hospital Ahmedabad.
   Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
   E-mail address: drcjpatel@yahoo.co.in

Mobile no: 9428801755

Corresponding Author:
Dr Revant Agarwal
Designation: Second year resident doctor of emergency medicine department
Institution: B. J. Medical College, Civil Hospital Ahmedabad.
Postal address: Emergency Medicine Department, Civil Hospital Ahmedabad.
E-mail address: agarwalrevi@gmail.com
Mobile number: 8511277047

Abstract

Background and aim: To understand and compare the outcome of hospitalised patients during the 2 peaks of COVID 19 from Ahmedabad city, in terms of age and sex distribution, comorbidities, Severity of symptoms, subsequent oxygen, ICU requirement and positivity rate

Material and Method: Retrospective, observational study was done on total 10283 COVID-19 suspected patients in Emergency Medicine Department Ahmedabad in between 18th April 2020 to June 2021. Continuous variables were tested by an independent sample T test.

Result: There was significant rise of 46.66% in covid cases in 2021 as compared to 2020. In 2020 majority of cases (47.30%) were of 60-80 years while in 2021 two age groups 40-60 years and 60-80 years were affected equally. In both years' males were affected more than females. Hypertension was the most common comorbidity from the second wave were treated with non-invasive mechanical ventilation (16.26%) and less with invasive mechanical ventilation (5.38%). Conventional oxygen therapy was given to majority of patients in 2020 peak (67.51%) and 2021 peak (76.14%).

Conclusions: ICU beds requirement increased due to increase in number of patients between 2 covid peaks. There was significant increase in COVID-19 patients showing that strain of COVID-19 during 2nd peak was more infectious.

Keywords: - covid-19, demographic data, covid peak

Introduction

Coronavirus disease 2019 (COVID-19) which is caused by SARS-CoV-2 was first identified in Wuhan, China, over two years ago and remains a major health problem worldwide. According to the data provided by WHO, over 5, 411, 7591 people have died due to COVID-19 (as of 31st dec 2021).

A total of 34,808,886[1] cases of RT-PCR-confirmed COVID-19 have been reported in India as of 31st December 2021, of which 480,592[1] died due to the disease. With over 2, 38,022 cases and 3421 deaths[3], Ahmedabad City has the highest COVID-19 burden in the state of Gujarat.

Ahmedabad is the most populated city in Gujarat with a population of nearly 5, 633, 9272 and is also one of the top cities of Gujarat, with the highest number of COVID-19 cases. Our hospital has been caring for COVID-19 patients since the beginning of the pandemic and is one of the best tertiary education and research hospitals on the state. We have served 20,644 (till 31st December 2021) hospitalized COVID-19 patients during the pandemic. In our study we aimed of comparing the demographic characteristics and severity of hospitalized patients between two peaks of covid waves in 2020 and 2021 in civil hospital Ahmedabad, India in terms of Age and Sex distribution, co-morbidities, severity of symptoms and subsequent oxygen and ICU requirement and Positivity rate.

It is imperative to understand how this pandemic is growing along with the characteristics of this spread so that we can better prepare ourselves for any upcoming events.

Material and Methods

Retrospective, observational study was done with records collected from patients who came into emergency department of Medicity Campus, of which initially 1200 bed hospital was used and later according to demands other hospital's some portions were converted to covid facility totalling to about 2219 beds including 437 intensive care unit(ICU) beds and 1331 oxygen beds.

Total 20272 COVID-19 suspected patients were attended in triage of Emergency Medicine Department 1200 bed covid hospital in between 18th April 2020 to June 2021 and these patients were admitted to 1200 bed Civil Hospital Ahmedabad, and other sister hospitals.

The study included data of 10283 COVID-19 suspected or confirmed positive patients who came to 1200 bed hospital triage with COVID-19 like symptoms during the period between 01/05/2020 to 30/06/20 and 01/04/21 to 30/5/2021 .Only patients who needed oxygen support were included in this study.

Any patients who is stable on room air was excluded from study.

In this study demographical details (age, gender), comorbidities, requirement for oxygen according to severity (intubation, bipap or oxygen support), outside confirmed positive cases(including both RTPCR and Rapid antigen test Positive) were obtained from Emergency medicine department's electronic health records were included. No sample size calculations were performed. The sample size was determined by the time window of the study.

These details were put onto an excel spreadsheet and analysed. Continuous variables were tested by an independent sample T test, $P < 0.05$ was considered statistically significant.

Result

During the study period, 10283 patients with SARS-Co-V2 infection, confirmed by RT-PCR and Rapid antigen test, were admitted to the hospital. Table 1 summaries the demographic characteristics of patients admitted to the hospital and enrolled in the study. Out of 10283 patients, 3577 patients and 6706 patients were taken for the comparison in peak of 2020 and 2021 respectively in two months duration of month May 2020 to June 2020 and May 2021 to June 2021. In 2021 peak there was significant rise of 46.66% in covid cases as compared to 2020. In 2020 peak majority of cases (47.30%) were from 60-80 yrs. of age group. In 2021 peak two age groups 40-60 yrs. (42.63%) and 60-80 yrs. (41.29%) were affected almost equally. In 2020 and 2021 peak male population were affected more as compared to female population. In 2020 peak 58.88% and 41.12%, male and female patients affected respectively. In 2021 peak 41.12 % and 40.58 %, male and female patients affected respectively. Table 2 shows the comorbidities among admitted covid 19 patients. There were differences noted in terms of having any comorbidity between the waves [first wave vs. second wave: 2223 patients (62.14%) vs. 3012 patients (44.91%)]. The most common comorbidity of the covid patients in both waves was hypertension (29.97 % in the first wave vs. 24.50 % in the second wave), followed by diabetes mellitus (22.45 % in the first wave vs. 17.06 % in the second wave), and CVS disorders (3.94 % in the first wave vs. 1.66 % in the second wave). As per Table 3 there was 44.66% rise in covid 19 positive cases by RTPCR and Rapid antigen test. Subjects from the second wave were treated more often with non-invasive mechanical ventilation (16.26%) and less often with invasive mechanical ventilation (5.38%). Conventional oxygen therapy was given to majority of patients in 2020 peak (67.51%) and 2021 peak (76.14%).

Table 1- Demographic data:

	Year 2020	**Year 2021**	**Percentage rise**	**Z test**	**p value**
	n = 3577	n = 6706	46.66 %		
AGE:					
0-20	34(0.95%)	14(0.21%)	↓142.86 %	5.25	<0.01

20-40	353(9.87%)	777(11.59%)	54.57%	-2.65	<0.01
40-60	1299(36.32%)	2859(42.63%)	54.56%	-6.21	<0.01
60-80	1692(47.30%)	2769(41.29%)	38.89%	5.85	<0.01
80-100	199(5.56%)	287(4.28%)	30.66%	2.92	<0.01
SEX:					
MALE	2106(58.88%)	3985(59.42%)	47.15%	-0.53	0.29
FEMALE	1471(41.12%)	2721(40.58%)	45.94%	0.53	0.29

Table 2: Comorbidities among admitted covid 19 patients:

	Year 2020	**Year 2021**	**Percentage rise**	**Z test**	**p value**
	n =2223(62.14%)	n = 3012(44.91%)	26.19 %		
DM	803(22.45%)	1144(17.06%)	29.81	6.64	6.64
HTN	1072(29.97%)	1643(24.50%)	34.75	5.99	5.99
RS	65(1.82%)	38(0.57%)	-71.05	6.06	6.06
CVS	141(3.94%)	111(1.66%)	-27.03	7.14	7.14
RENAL	86(2.40%)	46(0.69%)	-86.96	7.37	7.37
CNS	56(1.57%)	30(0.45%)	-86.67	5.93	5.93

Table 3: Positivity rate by RTPCR and Rapid antigen test among admitted covid 19 patients:

	Year 2020	**Year 2021**	**Percentage rise**	**Z test**	**p value**
	n = 3577	n = 6706	46.66 %		
MALE	314(8.78%)	1082(16.13%)	70.98	-10.37	<0.01
FEMALE	203(5.68%)	744(11.09%)	72.72	-9.052	<0.01

Table 4: Distribution of Covid 19 patients according to Oxygen therapy:

	Year 2020	**Year 2021**	**Percentage rise**	**Z test**	**p value**
	n = 3577	n = 6706	46.66 %		
Oxygen Support	2415(67.51%)	5071(76.14%)	8.63		
MALE	1417(39.61%)	3015(44.96%)	53.00	-5.21	<0.01
FEMALE	998(27.90%)	2056(30.66%)	51.46	-2.91	<0.01
BIPAP	582(16.27%)	1091(16.26%)	-0.01		
MALE	342(9.56%)	622(9.28%)	45.02	0.47	0.31
FEMALE	240(6.71%)	469(6.99%)	48.83	-0.54	0.29
INTUBATION	448(12.52%)	361(5.38%)	-7.14%		
MALE	271(7.58%)	221(3.30%)	-22.62	9.68	<0.01
FEMALE	177(4.95%)	140(2.09%)	-26.43	7.99	<0.01

Figure 1: Age wise bifurcation of covid 19 patients in both waves:

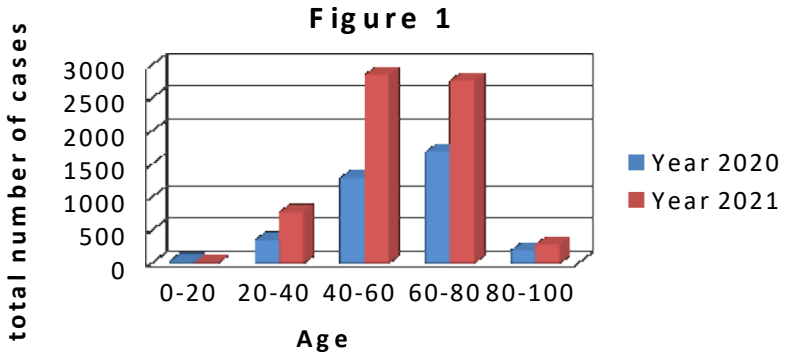


Figure 2: Covid 19 cases distribution in both peaks as per sex:

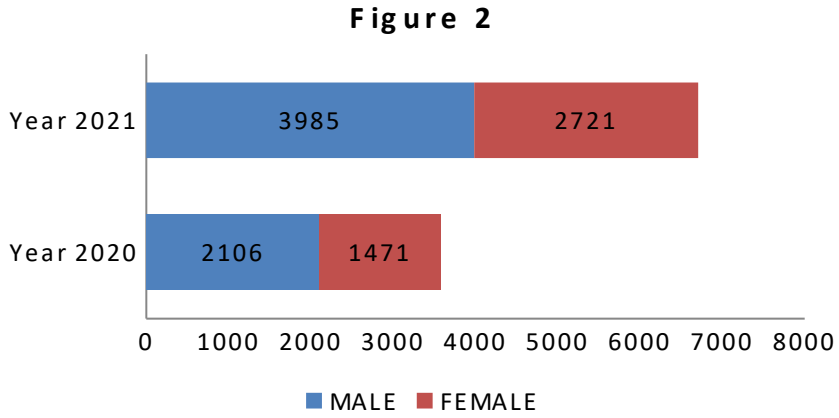


Figure 3: Covid 19 cases as per comorbidity in both peaks:

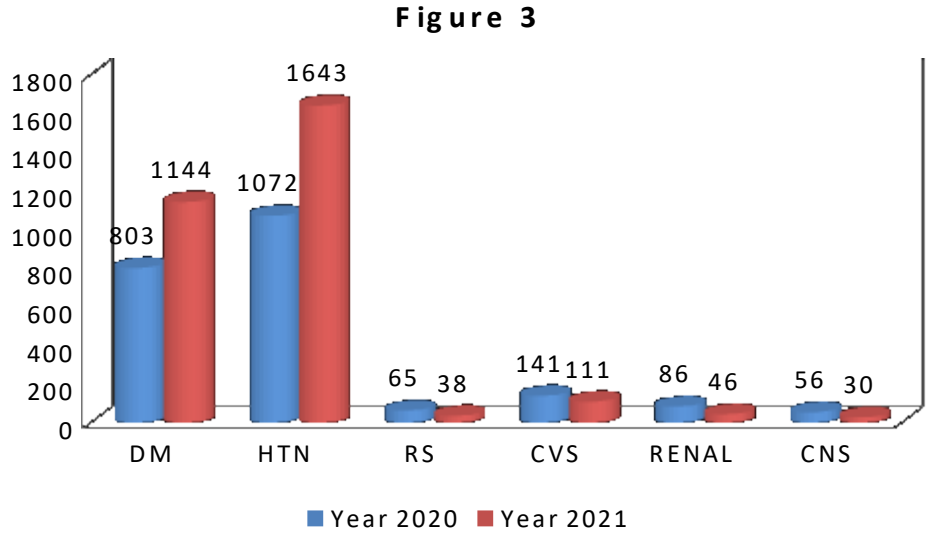


Figure 4: Covid 19 cases as per Oxygen therapy in both peaks:

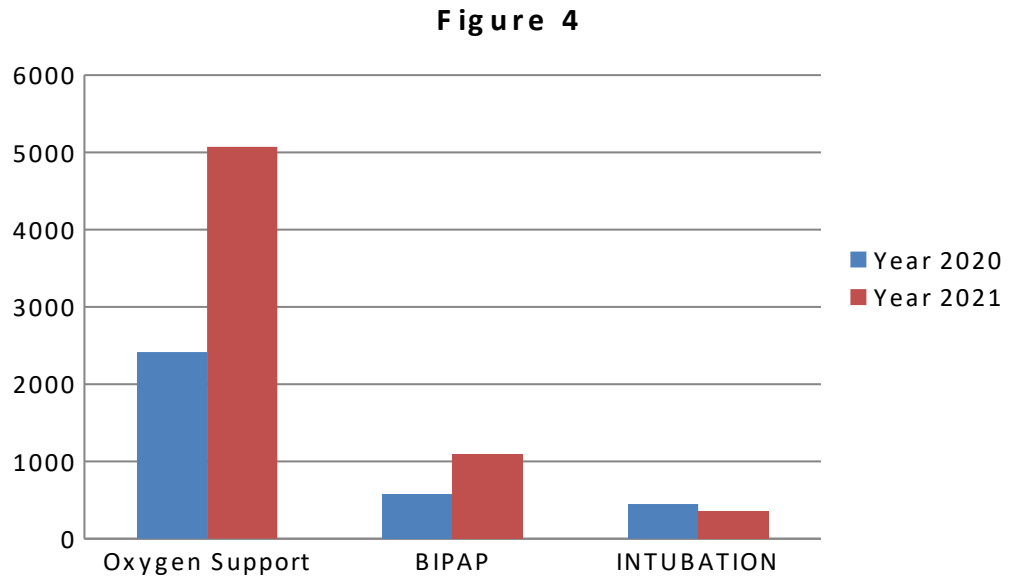
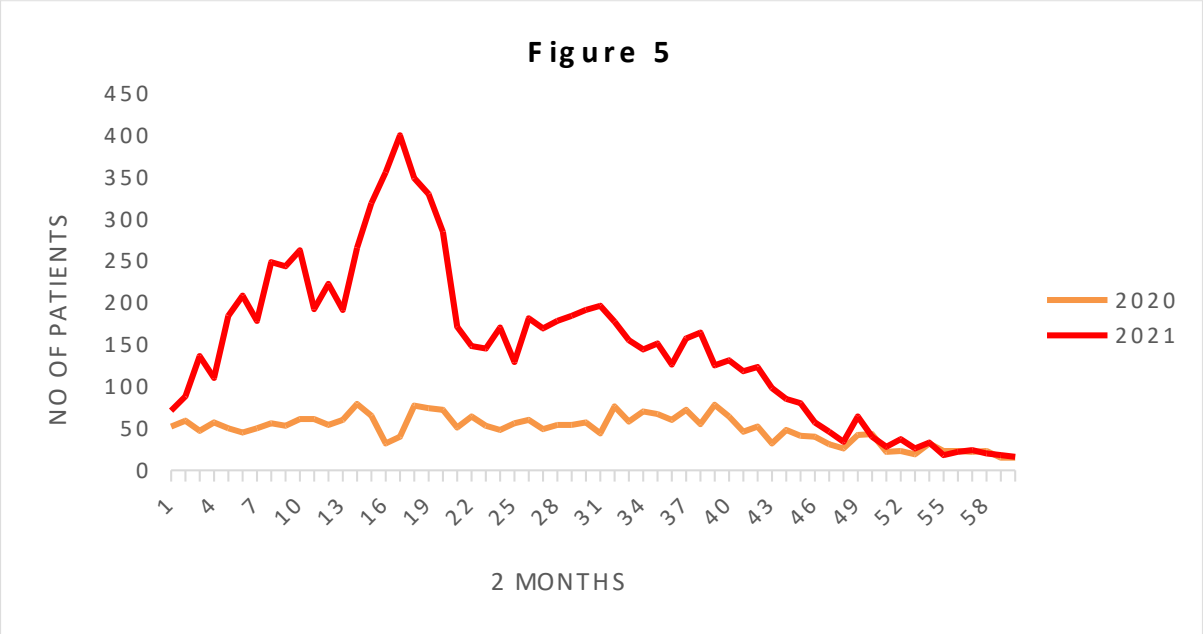


Figure 5: Covid 19 cases in both peaks:



Discussion

In this study, we included only hospitalized COVID-19 patients from emergency department with severe/critical illness, and we compared their demographic characteristics, comorbidities, positivity rate for covid 19 and oxygen therapy given to patients during the first and second wave. Several studies have been reported that male patients experience higher disease severity.[4, 5, 6] The data suggest that admitted patients with COVID-19 are younger (median age 58 years) compared with that reported by the US and European population (median age 62 years).[7] Almost same proportion of comorbidities (first wave -62.14%, second wave- 44.91%) as compared to western countries (14.40%–60.10%) [8].

Table 5 summarises comorbidity data amongst covid 19 patients in first and second waves in different studies of different countries and comparison of that data with present study. Different countries experienced first and second waves in different months and years. Sargin Altunok et al study[9] was conducted in Istanbul and A total of 1649 adult patients were hospitalized in the first wave (between April 1 and May 31), and a total of 1790 adult patients were hospitalized in the second wave (between October 1 and November 30). Iftimie S et al study[10] was conducted in Spain, in patients admitted between 15th March and 15th October 2020 in which all patients admitted up to 30th June were in the first wave and all those admitted from 1st July in the second wave, which divided the study period into two equal parts of three and a half months. Sho Saito et al study[11] was conducted in Japan in which patients admitted between 26th January and 31st May 2020 were included in the first wave and those admitted between 1st June and 31st July 2020 were included in the second wave. In all studies involvement of male population was more than female population. In Sargin Altunok et al study[9] 68% and 71.4% patients, while in present study 62.14% and 44.91% patients with comorbidities were affected in first and second wave respectively. Table 6 summarises type of oxygen therapy given to patients in Iftimie S et al study[10], Sho Saito et al study[11] and our study. Conventional oxygen therapy was given in majority of patients in our study in first (67.51%) and second (76.14%) waves, in Iftimie S et al study[10] in first wave more patients were treated with conventional oxygen therapy (76%) and in second wave with non-invasive mechanical ventilation (59.1%) while in Sho Saito et al study[11] conventional oxygen therapy was predominant treatment given in first (32.1%) and Second wave (13%). The increased testing capacities and awareness especially in villages and small towns of India over time were allowing physicians to diagnose less severe patients, and this seems to be one of the leading reasons for the higher positivity rate and a smaller number of patients needed invasive
Mechanical ventilation in the second wave.

Table 5: - Comparison of data with Sargin Altunok et al study 6, Iftimie S et al study7 and Sho Saito et al stud

	Sargin Altunok et al study[6]		**Iftimie S et al study[7]**		**Sho Saito et al study[8]**		**Our Study**	
Variable	**First wave (n= 228)**	**Second wave (n=681)**	**First wave (n= 204)**	**Second wave (n=264)**	**First wave (n = 5194)**	**Second wave (n = 1361)**	**First wave (n = 3577)**	**Second wave (n = 6706)**
Age (years)	64.5 (54–74.7) (Median)	65(54–73) (Median)	67 ± 18 (Mean)	58 ± 26 (Mean)	52(34, 68) (Median)	37(25, 53) (Median)	58 ±14	56 ±14
Male, n (%)	129 (56.6)	391 (57.4)	114 (55.9)	144 (54.5)	3068 (59.2)	796 (58.6)	2106(58.88)	3985(59.42)
Comorbidities, n (%)	155 (68)	486 (71.4)	-	-	-	-	2223(62.14)	3012(44.91)
DM, n (%)	71 (31.1)	233 (34.2)	56 (27.4)	64 (24.2)	738 (14.2)	108 (7.9)	803(22.45)	1144(17.06)

HTN, n (%)	99 (43.4)	317 (46.5)	Included in CVS	Included in CVS	-	-	1072(29.97)	1643(24.50)
RS, n (%)	35 (15.4)	104 (15.3)	31 (15.2)	47 (17.8)	184 (3.5)	29 (2.1)	65(1.82)	38(0.57)
CVS, n (%)	27 (11.9)	96 (14.1)	108 (52.9)	144 (54.5)	251 (4.8)	26 (1.9)	141(3.94)	111(1.66)
RENAL, n(%)	12 (5.3)	48 (7)	32 (15.6)	34 (12.9)	65 (1.3)	9 (0.7)	86(2.40)	46(0.69)
CNS, n (%)	15 (6.6)	42 (6.2)	45 (22.0)	52 (19.7)	257 (4.9)	25 (1.8)	56(1.57)	30(0.45)

Table 6: - Comparison of type of Oxygen therapy given to covid 19 patients with other stu

	Iftimie S et al study[10]		**Sho Saito et al study[11]**		**Our Study**	
Variable	**First wave (n=204)**	**Second wave (n=264)**	**First wave (n = 5194)**	**Second wave (n = 1361)**	**First wave (n = 3577)**	**Second wave (n = 6706)**
Conventional oxygen therapy	155 (76 %)	25 (9.5%)	1664 (32.1%)	177 (13%)	2415 (67.51%)	5071 (76.14%)
Noninvasive mechanical ventilation	7 (3.4%)	156 (59.1%)	-	-	582 (16.27%)	1091 (16.26%)
Invasive mechanical ventilation	27 (13.2%)	11 (4.2%)	389 (7.5%)	18 (1.3%)	448 (12.52%)	361 (5.38%)

Conclusion

There was significant increase in number of patients between 2 covid peaks. It was seen that number of patients far exceeded the estimates leading to shortage of hospital beds as well as medical personnel. Number of patients requiring ICU beds increased while the ICU facilities were limited. Other hospitals in Medicity campus had to be converted to covid care centres including ICU to treat increased number of patients. There was significant increase in confirmed COVID-19 patients showed that strain of COVID-19 during 2nd peak was more infectious despite appropriate safety measures.

References

1. World Health Organization. (n.d.). *WHO Coronavirus (COVID-19) Dashboard*. World Health Organization. Retrieved December 31, 2021, from https://covid19.who.int/table
2. *Ahmedabad City Population 2011 - 2022*. Ahmedabad City Population Census 2011-2022 | Gujarat. (n.d.). Retrieved December 31, 2021, from https://www.census2011.co.in/census/city/314-ahmedabad.html
3. *Covid-19 tracker | gujarat*. (n.d.). Retrieved December31, 2021 from https://gujcovid19.gujarat.gov.in/Home.aspx
4. Jin JM, Bai P, He W, et al. Gender differences in patients with COVID-19: focus on severity and mortality. Front Public Health.

2020; 29(8):152. https://doi.org/10.3389/fpubh.2020.00152. Accessed April 29, 2020.
5. Meng Y, Wu P, Lu W, et al. Sex-specific clinical characteristics and prognosis of coronavirus disease-19 infection in Wuhan, China: a retrospective study of 168 severe patients. PLoS Pathog. 2020; 16: e1008520. https://doi.org/10.1371/journal.ppat.1008520
6. Vahidy FS, Pan AP, Ahnstedt H, et al. Sex differences in susceptibility, severity, and outcomes of coronavirus disease 2019: crosssectional analysis from a diverse US metropolitan area. PLoS One. 2021;16(1): e0245556. https://doi.org/10.1371/journal.pone.0245556
7. Cummings MJ, Baldwin MR, Abrams D, et al. Epidemiology, clinical course, and outcomes of critically ill adults with COVID-19 in New York City: a prospective cohort study. The Lancet 2020; 395:1763–70.
8. Richardson S, Hirsch JS, Narasimhan M, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. JAMA 2020;323:2052–9
9. Sargin Altunok et al Comparison of demographic and clinical characteristics of hospitalized COVID-19 patients with severe/critical illness in the first wave versus the second wave.J Med Virol. 2021; 1–7. wileyonlinelibrary.com/journal/jmv. DOI: 10.1002/jmv.27319
10. Iftimie S, Lo´pez-Azcona AF, Vallverdu´ I, Herna´ndez-Flix S, de Febrer G, Parra S, et al.
(2021) First and second waves of coronavirus disease-19: A comparative study in hospitalized
patients in Reus, Spain. PLoS ONE 16(3): e0248029. https://doi.org/10.1371/journal.pone.0248029
11. First and second COVID-19 waves in Japan: A comparison of disease severity and characteristics Sho Saito, Yusuke Asai, Nobuaki Matsunaga, Kayoko Hayakawa, Mari Terada, Hiroshi Ohtsu, Shinya Tsuzuki, Norio Ohmagari J Infect. 2021 Apr; 82(4): 84–123. Published online 2020 Nov 2. doi: 10.1016/j.jinf.2020.10.033.
12. Descriptive Epidemiology of COVID-19 Deaths during the First Wave of Pandemic in India: A Single-center Experience Indian Journal of Critical Care Medicine, 26(1), 71-75 - January 2022 https://doi.org/10.5005/jp-journals-10071-24085
13. Siddiqui SS, Patnaik R, Kulkarni AP. General Severity of Illness Scoring Systems and COVID-19 Mortality Predictions: Is "Old Still Gold?". Indian J Crit Care Med. 2022 Summer;26(4):416-418. doi: 10.5005/jp-journals-10071-24197. PMID: 35656037; PMCID: PMC9067503
14. Clinical Characteristics and Treatment Outcomes of 293 COVID-19 Patients Admitted to the Intensive Care Unit of a Tertiary Care Hospital of Eastern India Indian Journal of Critical Care Medicine, 25(12), 1395-1401 - December 2021 https://doi.org/10.5005/jp-journals-10071-24048

Acknowledgements: none
Conflicts of interest: none
Funding: Nil