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A comparative study on clinico-demographic profile of covid-19 patients hospitalized during first and second wave in a tertiary care hospital of north India

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ABSTRACT

Background

In India first wave of COVID-19 pandemic was followed by a massive surge of COVID-19 cases. Present study was conducted to compare demographic characteristics, clinical and mortality profile of admitted patients during first and second waves of coronavirus outbreak. Methods: This was a cross-sectional analytical study of medical records of admitted patients in a tertiary care centre. Medical records of 500 patients in each of the two waves were chosen randomly for study. Each record included demographic details and clinical records of patients. Statistical analysis: Data was entered on Microsoft Excel 2013, and analysed using STATA version 17. 0. Chi-square test was used for comparison of qualitative data and for quantitative data unpaired t-test was used.

Result

Mean age (years) of the patients in both wave was 38.34±16.94 and 48.83±16.83 respectively, and it differed significantly. There was significant difference in clinical presentations and co-morbidities of patients. Hypertension (13% vs. 22.6%) and Diabetes (15% vs. 20%) were commonest co-morbidities in patients admitted in both waves. Severity of disease was also significantly different, moderate and severe disease was present in 15.6% of admitted in first wave and 46% in second wave (*P* 0.001). Mortality was significantly more in second wave (*P* 0.016).

Conclusion

Marked difference observed in clinico-demographic profile included higher mean age of admitted patients, more patients from urban area and more patients with comorbid conditions such as diabetes and hypertension in second wave. Severity of disease and mortality was higher in second wave.

Key-words: COVID-19; pandemic; mortality; co-morbidity; severity.

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INTRODUCTION:

The coronavirus infectious disease (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), undoubtedly, posed a public health challenge to almost all the countries of the world. [1] In India, the first wave that started with a reported case of COVID-19 on January 30, 2020 and peaked in September 2020, showed a declining trend by February 2021.[2]With the subsequent easing in isolation measures, spread of the virus increased markedly and heralded the onset of second wave of COVID-19 pandemic since March 2021. [3] It disseminated like a 'tsunami' in India.

As of date, more than a year later since the onset of second wave, COVID-19 cases are still occurring sporadically but regularly. A stage has come where the experts have started considering the endemic nature of COVID-19 outbreak. [4] The pandemic waves are, by and large, over and it is time to look back at what we all went through and if there is a lesson to learn from it.

In view of this, we undertook the present study and planned to compare the demographic characteristics, clinical and mortality profile of the patients admitted during first and second waves of coronavirus outbreak in a tertiary care hospital.

MATERIAL AND METHODS:

Study setting: The present study of medical record was conducted in tertiary care hospital, Government Institute of Medical Sciences, Greater Noida which was designated COVID centre. A total of 350 beds were earmarked for COVID care.

Study design: This was an analytical cross-sectional study.

Study Period: Study was conducted during June 2021 to December 2021.

Study population: Study of medical records was conducted in a tertiary care hospital, after the approval from Institutional Ethics Committee. This study analysed data of patients admitted during the two waves of COVID-19 pandemic. 2761 patients were admitted during the first wave and 1350 during second wave of coronavirus pandemic. A confirmed case was defined as a person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms. [5] Following admission, the cases were managed in COVID 19 wards by a team of doctors. After completing the treatment discharge after recovery or death – the clinical record of the patient was deposited with the Medical Record Division (MRD). For the purpose of the study the records of demographic characteristics, clinical and mortality profile of COVID-19 positive patients were retrieved from the MRD.

Inclusion criteria:

1 All randomly selected cases were included in the study.

Exclusion criteria:

1. All employees of the hospital who were admitted even with mild illness as a precautionary measure.
2. All those cases whose record was incomplete were excluded from the study.

Data considered for study included-

1. Demographic data- age, sex, religion, place of residence

2.Morbidity profile/ past history- hypertension, diabetes, gastrointestinal disorder, chronic obstructive pulmonary disease (COPD), coronary artery disease (CAD), chronic kidney disease and any type of cancer,

3. Chief complains-such as fever, cough, shortness or difficulties in breathing, weakness, anorexia, sputum production, dyspnoea, myalgia, nausea, vomiting, diarrhoea, headache, abdominal pain, dizziness, etc.

4. Severity of disease and case fatality ratio Severity of cases was defined as per Government of India guidelines. Coronaviruses confirmed patients were divided into three groups of mild disease as Upper respiratory tract symptoms (&/or fever) without shortness of breath or hypoxia, moderate disease as any one of the following: respiratory rate > 24/min or breathlessness or SpO2: 90% to < 93% on room air and severe disease as any one of the following respiratory rate>30/min or breathlessness or SpO2 < 90% on room air. [6]

Sampling procedure: Medical records of the admitted patients were chosen using systematic random sampling technique. Since the admitted patients were 2761 in first wave and 1350 in second wave, the sampling interval 'k' was calculated as 5 (2761/500=5.5) for first wave and 2 (1350/500=2.7) for second wave. Accordingly, for the first wave, the first case was randomly chosen from first five records and subsequent records were chosen with

an interval of 5 each till the desired sample size was reached. Similarly, in the second wave the first record was randomly chosen from first 3 and the subsequent records were chosen at an interval of 2, till the desired sample size was reached.

Sample size: In the present study sample size was estimated on the basis of case fatality ratio (CFR) of 19.2% during the first wave and a CFR of 24.18% during second wave. [7]

The sample size was calculated using the formula:

$n = 4pq/L^2$, [8] where

n= sample size,

p= proportion in the population possessing the characteristic of interest.

L=absolute error

q = (1-p)

Considering 95% confidence interval, prevalence 24.18% and taking "L", absolute error in the estimate of "p" as 4%, the sample size was calculated to be 442 for each wave. Hence total of 500 COVID-19 patients in each of respective waves were included in the study.

Statistical analysis: Data was entered in Microsoft Excel 2013 and analysed using STATA version 17.0. Categorical variables were described as frequency and percentage. Chi-square test was used for comparison. Quantitative data was described as mean and standard deviation and unpaired t-test was used for comparison of mean. P-value less than 0.05 were taken as statistically significant.

Ethics: The study was approved by the institute ethical committee (Letter no. GIMS/IEC/HR/2021/45, dated- 31.12.2021).

Results:

In the present study demographic characteristics and clinical profile of 1000 COVID-19 patients – 500 cases in first wave and 500 cases in second wave – admitted to a tertiary care hospital of north India was compared. Comparative profile of Demographics characteristics of the admitted patients during the two waves is summarized in Table1.

Table 1 Comparison of demographic characteristic of patients in both the waves

Demographic factor	First wave n=500	Second wave n=500	Total n=1000	Chi-square	P-value	df
Age categories (year)						
0-19	52(10.4)	5(1.0)	57(5.7)	75.957	0.000	3
20-39	231(46.2)	176(35.2)	407(40.7)			
40-59	149(29.8)	174(34.8)	323(32.3)			
≥60	68(13.6)	145(29.0)	213(21.3)			
Sex						
Male	325(65.0)	336(67.2)	661(66.1)	0.540	0.462	1
Female	175(35.0)	164(32.8)	339(33.9)			
Address						
Rural	125(25.0)	87(17.4)	212(21.2)	8.644	0.003	1
Urban	375(75.0)	413(82.6)	788(78.8)			

Religion						
Hindu	476(95.2)	470(94.0)	946(94.6)	0.705	0.401	1
Muslim & others	24(4.8)	30(6.0)	54(5.4)			

The mean age of the patients admitted in the first wave and second wave was 38.34±16.94 years and 48.83±16.83 years respectively, difference was found statistically significant (t= 9.829, *P* <0.001). In age group i.e. 0-19 and 20-39 years a higher proportion of patients were admitted during first wave. Patients 40-59 years and over 60 years of age were found admitted in higher proportion in the second wave compared to the first (*P* 0.000). Higher proportion of male patients was admitted in both the waves (325/500, 65.0%) vs. 336/500, 67.2%). Most of admitted patient were Hindu 476(95.2%) in first wave and 470(94.0%) in second wave. Admitted patients mostly came from urban areas – a higher proportion in second wave. The difference in admission of rural 125 (25%) in first wave vs. 87 (17.4%) in second wave and urban patients 375 (75.0%) in first wave vs. 413 (82.6%) in second wave, the difference was significantly higher in second wave (*P*< 0.001).

Comparative profile of Clinical characteristics of the admitted patients: Hypertension and Diabetes were the common co-morbidity in patients admitted in both the waves, but the proportion was higher in patients admitted during second wave. Hypertension was present in 13% patients in first wave and 22.6% patients in second wave and this difference was statistically significant (P 0.000). Diabetes was present in 15% of patients admitted in first wave and 20% of patients admitted in second wave and it was found to be statistically significant (P 0.037). [Table2].

Table 2: Comparison of clinical profile of patients in both the waves

Characteristics	First wave	Second wave	Total	Chi-square	P-value	df
Co-morbidities						
Hypertension	65(13.0)	113(22.6)	178(17.8)	15.747	**0.000**	1
Diabetes	75(15.0)	100(20.0)	175(17.5)	4.329	**0.037**	1
COPD	9(1.8)	6(1.2)	15(1.5)	0.609	0.435	1
CAD	10(2.0)	12(2.4)	22(2.2)	0.186	0.666	1
No co-morbidities	363(72.6)	359(71.8)	722(72.2)	0.080	0.778	1
Presenting Complains						
Fever	249(49.8)	321(64.2)	570(57.0)	21.151	**0.000**	1
Cough	200(40.0)	253(50.6)	453(45.3)	11.336	**0.001**	1
Shortness of breath	103(20.6)	323(64.6)	426(42.6)	197.936	**0.000**	1
Sore throat	64(12.8)	20(4.0)	84(8.4)	25.161	**0.000**	1
Asymptomatic	164(32.8)	26(5.2)	190(19.0)	123.743	**0.000**	1

Severity						
Mild	422(84.4)	270(54.0)	692(69.2)	108.400	**0.000**	1
Moderate and Severe	78(15.6)	230(46.0)	308(30.8)			
Mortality	27(5.4)	47(9.4)	74(7.4)	5.837	**0.016**	1

Fever was the most common presenting complaint in patients admitted in first the waves (49.8%) and shortness of breath in patients admitted in second wave (64.6%). There was significant difference in symptomatology of the patients in both the waves. Fever, cough and shortness of breath were more common in patients admitted in second wave and the difference was statistically significantly associated. Sore throat and asymptomatic patients were admitted in higher proportion in patients during first wave compared to second, this difference was found to be statistically significant (p<0.001). [Table2].

Severity of disease was also significantly different in patients admitted in both the wave. In, first wave more patients with mild disease (84.4%) were admitted whereas in second wave mild disease was present in (54%) patients, moderate and severe disease was present in 78(15.6%) in patients admitted in first wave and 230 (46.0%) admitted in second wave (*P*<0.001). Mortality was higher in patients admitted in second wave, 5.4% of admitted patients died in first wave as compared to 9.4% in second wave, with statistically significant difference (p 0.016) [Table 2].

DISCUSSION

The present study was a comparative analysis of the COVID-19 admitted patients during the two waves of SARS-CoV-2 pandemic. The admission to the hospital was governed by the policies issued and modified by the government in these waves. The two waves of COVID-19 differed in demography and clinical presentation. In the present study mean age (38.34 years) of the admitted patients was lower in first wave as compared to the second wave (48.83 years).

Being a Government institute all the beds were occupied most of the times, so as to say bed occupancy was around 95-100%. This difference could be attributed to shortage in bed availability during second wave and changed Government policy for admission during second wave. During the first wave wave- Seek immediate medical attention if: Difficulty in breathing or High grade fever/severe cough, particularly if lasting for >5 days or A low threshold to be kept for those with any of the high-risk features. [6]During second wave- When to seek medical attention- Immediate medical attention must be sought if serious signs or symptoms develop. These could include- unresolved High-grade fever (more than 100° F for more than 3 days), Difficulty in breathing, Dip in oxygen saturation ($SpO_2 \leq 93\%$ on room air at least 3 readings within 1 hour) or respiratory rate >24/ min, Persistent pain/pressure in the chest, Mental confusion or inability to arouse, Severe fatigue and myalgia.[9]This finding was quite similar to the study done in Eastern Uttar Pradesh where the mean age of admitted patients was 35.1 ± 15.9 during first and 46.1 ± 16.8 in second wave. [10] Another study done in Pakistan had also shown similar finding, though the age difference was very small in that study. [11] There was also difference in gender of the admitted patients in both the waves, higher proportion of male patients were admitted in both the waves 65% in first wave and 67.2 % in second wave. This finding was similar to the study done by National Clinical Registry for COVID-19. [12] In our study there was an alteration in the clinical profile of admitted patients in the second wave with higher proportion having co-morbidities such as hypertension (P 0.000) and Diabetes (0.037). More symptomatic patients were admitted in second wave as compared to first wave (P<0.001). In a study conducted in Spain had also shown that the patients admitted in second wave had higher prevalence of co-morbidity as compared to patients admitted in first wave. [13] Patients admitted in second wave were usually symptomatic at the time of admission; fever and shortness of breath were the most common

presenting complains. The finding was similar to another study done in Eastern Uttar Pradesh where also more symptomatic patients were admitted in second wave. [10]

Higher proportion of patients with moderate and severe disease was admitted during second wave of COVID-19. This could be due to the explosive nature of the second wave which has put the health infrastructure under compulsion, making hospitalization possible for only more severe patients. This could also be explained by the phenomenon of 'silent hypoxemia' reported in COVID-19, where patients with hypoxia do not show corroborating signs of breathlessness, which could had led to patients reaching healthcare facilities with more severe disease. [14]

Mortality profile of admitted patients in second wave was different than patients admitted in first wave. There significant difference with higher proportion of patient's death in second wave compared to first. In a study conducted National Clinical Registry for COVID-19 showed the similar pattern of higher number of deaths in second wave (13.3%) and 10.2% in first wave. [12] Similarly, a study conducted in German tertiary centre showed higher mortality in second wave. [15] Discordant to our finding, Spain, Japan, Iran, and UK demonstrated lesser CFR during the second wave of pandemic. [16-21]The observatory finding can be accredited to continuation of COVID-19 appropriate behaviour and large scale vaccination preceding to the second peak.

The present study was conducted in a tertiary care hospital that is located in an urban area and has an easy reach by road. The patients admitted in both waves came from the same area and same population base. The differences observed were because of the differing policies for admission to hospital and a very different perception of the pandemic by the public. During the second wave, behaviour of the public was guided by the awareness and their own experience acquired during the first wave. As a result, hospitalization during second wave was more for those patients who suffered moderate to severe illness; had co-morbidities like diabetes/ hypertension; or were above 40 years of age. In other words, perception of the population about the pandemic played an important role in altering the profile of hospitalized patients in second wave. This also explains a higher mortality rate during the second wave. Overall deaths in India from 1 June 2020 to 1 July 2021 capitulated an estimate of 3.2 million (3.1 to 3.4) COVID deaths, or 29% (28 to 31%) of expected all-cause deaths during the 13-month period, including during the scattered weeks of assumed lower transmission. The majority of COVID deaths that India experienced throughout the pandemic occurred from 1 April to 1 July 2021 (2.7 million; 2.6 to 2.9).[22]

LIMITATIONS

Study was conducted at a single large health care centre; hence these findings are difficult to generalize at national or international level.

CONCLUSION

The present study compared the COVID-19 patients admitted from the same catchment area to the same tertiary care hospital during first and second wave of the pandemic. Significant differences were observed in clinico-demographic profile of the hospitalised patients during the two waves such as higher age of admitted patients, more patients were from urban area, and co-morbidities such as hypertension and diabetes were common in patients admitted in second wave. Severity of disease and mortality was higher in patients admitted in second wave. The observed differences could be attributed to the altered behaviour of the public who were armed with their experiences and awareness acquired during the first wave. A larger multi-centric study may be useful in confirming the findings of our study.

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