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Second wave of COVID-19: more hype than reality

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ABSTRACT

Background: The second wave of COVID-19 hit India with the nation reporting over 4 lakh cases daily since second week of April 2021. Keeping in view the lack of adequate data in this regard; and the public health importance of the second wave of the Covid-19 pandemic, the researchers proceeded to carry out the study. The aim of the study was to study the clinicopathological profile of hospitalised COVID19 cases in an urban area.

Methods: The workers carried out a cross sectional descriptive study. Period of the study was April 2021 to September 2021. Detailed epidemiological, clinical, laboratory and radiological data was obtained in respect of 149 cases of Covid-19.

Results: Mean age of the cases was 39.79 years. One hundred and twelve (75.17%) cases were males, while thirty-seven (24.83%) were females. One hundred and twenty-nine (86.57%) gave history of fever. Eight (6.04%) cases were totally asymptomatic. Clinical condition of six (4.02%) cases necessitated them to be placed on ventilator for various periods of time. Eight (5.36%) cases were administered oxygen for various periods of time. All the cases recovered after varying periods of time; and there were no fatalities. Diabetes mellitus was the commonest comorbidity; and it was seen in twenty (13.42%) of cases.

Conclusions: Our study has indicated that symptomatology of the disease may vary over time. The researchers believe that the most important conclusion of our work is that the world must remain alert to the characteristics of the virus and the disease.

Keywords: Clinico epidemiological, COVID-19, SARS-CoV- 2, Second wave

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV- 2), was identified to be the causative organism of COVID-19, a newly emerging zoonotic disease, in the city of Wuhan, China in 2019.¹⁻⁷

The outbreak was declared as a global public health emergency by World Health Organization (WHO) on January 30, 2020. Since the outbreak of COVID-19, the

disease has spread worldwide with the number of cases growing exponentially.^{8,9}

The notion that epidemics usually have two peaks of new cases over a period of time is widely accepted.¹⁰

Different countries across the globe experienced the second wave of the COVID19 pandemic at different times. Spain, France, Italy, Germany and UK experienced the second wave from mid July 2020 onwards.¹¹ Russia

experienced an increase in new cases from Nov 2020 onwards.¹²

The second wave of COVID-19 hit India with the nation reporting over 4 lakh cases daily since second week of April 2021.¹³

Adequate literature was available on clinicoepidemiological profile of COVID-19 cases in the second wave in various countries across the globe. However, despite carrying out an extensive medline search, the researchers observed that similar data for India was conspicuous by its paucity. Keeping in view the lack of adequate data in this regard; and the public health importance of the second wave of the COVID-19 pandemic, the researchers proceeded to carry out the study.

Aim

To study the clinicoepidemiological profile of COVID-19 cases during the second wave in an urban area.

Objectives

To study the differences in clinicoepidemiological profile of COVID-19 cases in the first wave based on available literature and second wave based on data collected by the researchers. To determine whether there exists an association between administration of first dose of Covid-19 vaccine and risk of developing moderate or severe COVID-19 infection. To determine whether the difference between the mean age of Covid-19 cases in the first wave, based on data pertaining to first wave of Covid-19, which was available with the researchers, was significantly different from the mean age of Covid-19 cases in the second wave. To determine whether the difference between the mean of various laboratory parameters of Covid-19 cases in the first wave, based on data pertaining to first wave of Covid-19, which was available with the researchers, was significantly different from the mean of various laboratory parameters of Covid-19 cases in the second wave. To determine whether the difference between the mean duration of hospitalisation of COVID-19 cases, based on data pertaining to first wave of COVID-19, which was available with the researchers, was significantly different from the mean duration of hospitalization of COVID-19 cases in the second wave.

METHODS

We conducted a cross sectional descriptive study from April 2021 to September 2021. Data for conducting the study was obtained from several urban areas in India. Detailed epidemiological, clinical, laboratory and radiological data pertaining to date of onset of symptoms, date of admission, movement history during the known incubation period, history of having had contact with a known COVID-19 positive case, history of COVID-19

vaccination, whether individual was under quarantine or not when tested for COVID-19, details of various investigations carried out during the course of hospitalisation and other relevant data was obtained from each case. Above data in respect of 149 cases of COVID-19 was obtained. The cases were classified as mild, moderate, and severe COVID-19 based on the SpO2 and oxygen requirement.¹⁴

The data was collected during routine surveillance of the second wave of the COVID-19 pandemic. All cases which occurred during the study period were reviewed. A detailed clinical and epidemiological history was elicited. In consonance with the local policy, only moderate and severe cases were admitted to the hospital. The data set pertaining to all the cases was unlinked and anonymous. Prior to the conduct of the study, ethical clearance from the institutional ethical committee was obtained. We also utilised data of three hundred and thirty-two cases of Covid19 of the first wave which was available to us as part of routine surveillance, for comparison of various parameters between the first wave and the second wave.

The data was entered into an MS Excel file. Data was subject to appropriate statistical tests. Quantitative variables were described using mean, median, minimum, maximum, and standard deviation and SD and qualitative variables were described using proportion.

For comparing difference between two means of first and second wave in respect of age of cases, Hb%, TLC, Platelet count and duration of hospitalisation, independent T-test was applied. The null hypothesis was that mean age, Hb%, TLC, Platelet count and duration of hospitalisation, were equal in both the groups and alternate hypotheses were that they were not equal.

On bivariate analysis association between the variables were assessed using chi square test and the adjusted and unadjusted OR were assessed along with 95% confidence interval. All variables which were significant were included in the multivariate logistic regression to predict the association of the factors with severity of COVID-19. All the tests were two tailed; and the significance was set at 5% p value less than 0.05 was considered statistically significant. Statistical package used was Statistical package for social sciences (SPSS) 23.0.

RESULTS

Clinical profile

Mean age of the cases was 39.79 years (Median 37 years, Standard deviation 15.23 years, minimum 8 and maximum 79 years). One hundred and twelve (75.17%) cases were males, while thirty-seven (24.83%) were females. One hundred and twenty-nine (86.57%) gave history of fever. Cough, headache and bodyache were reported by one hundred and five (70.46%), seventy-six (51.00%) and sixty five (43.62%) cases respectively.

Eighteen (6.71%) cases reported some amount of breathing difficulty. Uncommon symptoms reported were myalgia, anosmia, chest pain and vomiting, and pain

abdomen, which were observed in thirteen (8.72%), nine (6.04%), six (4.02%) and four (2.68%) respectively. Eight (6.04%) cases were totally asymptomatic.

Table 1: Sex and age wise distribution of cases.

Age (years)	Sex		Total (%)
	Male (%)	Female (%)	
<20	10 (6.71)	2 (1.34)	12 (4.81)
20-29	24 (16.10)	5 (3.35)	29 (19.46)
30-39	34 (22.81)	11 (7.38)	45 (30.20)
40-49	19 (12.75)	3 (2.01)	22 (14.76)
50-59	11 (7.38)	8 (5.36)	19 (12.75)
60-69	9 (6.04)	7 (4.69)	16 (10.73)
>70	5 (3.35)	1 (0.67)	6 (4.02)
Total	112 (75.17)	37 (24.83)	149 (100)

Table 2: Results of haemoglobin, total leucocyte count, platelet count, and inflammatory markers like serum ferritin and D Dimer.

Test	Mean, Median (Min, Max, Std deviation)			Number of cases in whom test carried out (%)			Number of cases in whom result was deranged (%) (Out of those in whom test was carried out)		
	Mild	Moderate	Severe	Mild	Moderate	Severe	Mild	Moderate	Severe
Hb (gm%)	13.85, 13 (13.16., 0.69)	13.81, 14, (13.14.6, 0.54)	13.73, 14.05 (13, 14.2, 0.57)	135 (100%)	8 (100%)	6 (100%)	0 (0)	0 (0)	0 (0)
TLC	7212.59, 7600 (4500, 8400, 925.54)	6912.5, 7600 (4700, 8000, 1238.01)	6951, 7150 (5200, 8000, 1123.83)	135 (100%)	8 (100%)	6 (100%)	0 (0)	0 (0)	0 (0)
Platelet count (/mm3)	293600, 289000 (87000, 365000, 27775.53)	262500, 289000 (165000, 310000, 56218.95)	246166.66, 288500 (120000, 324000, 89441.41)	135 (100%)	8 (100%)	6 (100%)	0 (0)	0 (0)	0 (0)
Serum ferritin (ng/ml)	-	-	663.1, 530.65 (234.8, 1297.8, 420.56)	0 (0)	0 (0)	6 (100%)	-	-	5 (83.33)
D Dimer (mcg/ml)	-	-	12.14, 0.9 (0.03, 5.63, 2.45)	0 (0)	0 (0)	6 (100%)	-	-	4 (66.66)

Mean duration from onset of symptoms to diagnosis was 1.25 days (median 1 day, standard deviation 0.88 days, minimum 0 days and maximum 4 days). Mean duration from diagnosis to admission in hospital was 0.8 days (median 1, standard deviation 0.7 days, minimum 0 day and maximum 2 days). Mean duration of hospitalisation was 8.18 days (median 7 days, standard deviation 1.92 days, minimum 5 day and maximum 17 days).

Clinical condition of six (4.02%) cases necessitated them to be placed on ventilator for various periods of time.

Eight (5.36%) cases were administered oxygen for various periods of time. All the cases recovered after varying periods of time; and there were no fatalities. Based on previous data pertaining to first wave of COVID-19, available with the researchers, 10.84% cases required ventilatory support; and 25.30% required oxygen for varying periods of time. Based on data collected during the present study; and extant guidelines, approximately ninety one percent cases were categorised as mild, five percent moderate and four percent severe.

Table 3: Duration between administration of vaccine and onset of symptoms.

No. of cases who received first dose of Covishield vaccine	Mean, Median (Min, Max, Std deviation)*	No. of cases who received second dose of Covishield vaccine	Mean, Median (Min, Max, Std deviation)@
139	68.63, 74 (8, 97, 14.35)	134	41.84, 46.5 (2, 69, 12.55)

*One case had developed Covid19 before administration of Covishield vaccine. Hence data of one hundred and thirty eight cases has been included for this analysis. @Eight cases had developed Covid19 after administration of first dose of Covishield vaccine but before administration of second dose of Covishield vaccine. Hence data of one hundred and twenty six cases has been included for this analysis.

Laboratory and other investigations profile

All the cases except three (2.01%) had a normal chest X-Ray. CT Scan in these three cases revealed pneumonia, which resolved prior to discharge of the cases from the hospital. The pneumonia in all the cases resolved after five to seven days.

Table 4: First dose of vaccine versus severity of disease.

First dose of vaccine administered	Developed moderate or severe COVID-19	Did not develop moderate or severe COVID-19	Total
Yes	9	130	139
No	4	6	10
Total	13	136	149

Repeat RT PCR was not carried out for any case prior to discharge from the hospital, in consonance with the local policy.

Results of haemoglobin, total leucocyte count, platelet count, and inflammatory markers like serum ferritin and D Dimer are tabulated in Table 2. Liver function tests, renal function tests, serum electrolytes; and inflammatory markers like CRP, LDH, procalcitonin and Interleukin 6 were not carried out for any of the one hundred and forty-nine cases, as they were not indicated and due to resource constraints.

All the one hundred and forty-nine cases displayed a normal differential leucocyte count.

COVID-19 and other comorbidities

Diabetes mellitus was the commonest comorbidity; and it was seen in twenty (13.42%) of cases. Ischaemic heart disease was observed in four (2.68%) cases.

Further univariate or bivariate analysis of these comorbidities as a risk factor for severe Covid-19 was not carried out because of small sample size in most of the cells of the 2x2 table.

Epidemiological profile

None (0%) of the cases gave history of travel abroad, while eleven (7.38%) gave history of travel within India. One hundred and thirteen (75.83%) gave history of contact with a positive case of COVID-19; out of which one hundred and nine (96.46%) were under quarantine when they underwent RT-PCR test for SARS-CoV-2. The RT-PCR was carried out in consonance with the local policy. Out of one hundred and forty-nine, one hundred and thirty nine (93.28%) had received one dose of Covishield vaccine, out of which one hundred and thirty four (96.40%) had received both doses of the Covishield vaccine.

Duration between administration of first dose of Covishield vaccine and onset of symptoms; and administration of second dose of Covishield vaccine and onset of symptoms is tabulated in Table 3.

Data pertaining to administration of first dose of vaccine and developing moderate or severe Covid-19 is presented in Table 4. Odds ratio of developing moderate or severe Covid19 after administration of first dose of vaccine is 0.1038 (95% CI 0.025-0.436).

Comparison of first and second waves

The mean age of cases in the first wave, based on data which was available with the researchers is 45.78 years, as compared to 39.79 years of cases in the second wave. The mean Hb%, Total Leucocyte Count, platelets and hospital duration of cases in the first wave, based on data which was available with the researchers was 12.65 gm%, 8106.87/ cu mm, 1.67 lakh per mL and 9.41 days respectively. Mean of the above variables i.e., mean Hb%, TLC, platelet count and hospital duration of cases in the second wave were 13.94 gm%, 7183.22 cu mm, 2.89 lakh per mL and 8.18 days respectively.

After running the data on SPSS 20 version for comparing the difference between means using Independent sample t-test, the null hypothesis was rejected for Hb%, TLC, Platelet count and hospital duration, and alternate hypotheses in respect of all these parameters was accepted. The alternate hypothesis analysis for Hb% showed a t-statistic of -10.185 with 479 degrees of freedom with accompanying p-value of <0.001 and with a C.I of -1.53 to -1.03. For TLC, a t-statistic of 3.825 with 479 degrees of freedom with accompanying p<0.001 and with a C.I of 449 - 1398. For Platelet count, a t-statistic of -19.897 with 469 degrees of freedom with accompanying p<0.001 and with a C.I of -126074 to -103410. For Hospital duration, a t-statistic of -3.596 with 460 degrees of freedom with accompanying p<0.001 and with a C.I of

0.555 to 1.894. For age, null hypothesis was accepted as Levene's test showed significance of 0.1, a t-statistic of 3.68 with 479 degrees of freedom with accompanying p-value of 0.001 and with a C.I of 2.696 - 8.873.

DISCUSSION

Balacchi et al reported a mean age of 64.52 years \pm 15.14, during the first wave and a mean age of 68.26 years \pm 16.34 during the second wave. 15 Kumar et al reported a significantly lower mean age in the second wave [48.7 (18.1) year versus 50.7 (18.0) year, $p<0.001$] with higher proportion of patients in the younger age group intervals of <20, and 20-39 year.¹⁶ Nonaka et al also reported a statistically significant lower median age (58 years) of COVID19 patients admitted to the ICU in the second wave in February 2021, when compared to the median age (66 years) in the first wave in May and June 2020.¹⁷

Sen et al in their study on 2826 cases of COVID19 spanning across both the waves observed a mean age of 51.9 (range, 12-88) years with a male preponderance (1993, 71%).¹⁸

Vuong et al in their study on 551 cases of COVID19 observed a median age of 46 years with a female preponderance (58.8%).¹⁹ Contou et al observed a mean age of 62 (55-70) years and 65 (61-69) years with male preponderance of 81% and 76% in the first and second waves respectively.²⁰ The findings of our study differ from those of all the above researchers.

Krajcar et al reported 52.6% asymptomatic cases in the second wave, commonest symptoms reported were fever (47%), cough (16.5%) and coryza (11.3%).²¹ The findings of our study differ from those of the above researchers.

Symptomatology similar to our study was reported by Kumar et al as regards fever being the commonest symptom. However, their findings of a significantly higher proportion of people reporting difficulty in breathing, developing ARDS and requiring supplemental oxygen differ from our findings. Kumar et al also reported a considerable increase in the proportion of asymptomatic cases in the second wave. These findings are in consonance with the findings of our study, wherein based on data available to the researchers 0.6% of cases in the first wave were asymptomatic, while 6% cases were asymptomatic in the second wave.¹⁶

Kumar et al also reported lesser proportion of admitted patients with one or more comorbidities in the second wave, as compared to the first wave. These findings are also similar to our findings wherein based on data available to the researchers 20.18% and 3.61% cases in the first wave had diabetes mellitus and ischaemic heart disease respectively. The corresponding figures for the second wave 13.42% and 2.68% respectively.¹⁶ Nonaka et al reported an increased proportion of younger adults without comorbidities with severe disease during the

second COVID-19 wave. In their study, patients without comorbidities comprised 32.20% of patients admitted to the ICU due to COVID-19 in the second wave as compared to 15.32% in the first wave.¹⁷

Iftimie et al and Brehm et al reported a significantly shorter duration of hospitalization in the second wave.^{22, 23} These findings are in consonance with the findings of our study.

Nonaka et al reported invasive mechanical ventilation support in fifty percent of young individuals during the second wave.¹⁷ Vuong et al reported proportion of severe or critical cases as above 10%, which was significantly higher than during the first wave where only 1.2% required ventilation.¹⁹ These findings differ from those of our study wherein the proportion of moderate and severe cases was approximately five percent and four percent respectively.

Contou et al reported that patients admitted during the second wave were less likely to require invasive mechanical ventilation as compared to the first wave.²⁰ Brehm et al reported that the twenty two percent severe cases in the first wave, vis-à-vis sixteen percent in the second wave; and thirty nine percent critical cases in the first wave vis-à-vis thirty percent in the second wave. They also reported fewer patients necessitating ICU admission in the second wave (29%) as compared to the first wave (43%). They also reported fewer patients requiring mechanical ventilation in the second wave (20%) as against 32% in the first wave.²³ Mughal et al also reported a lesser likelihood of receiving invasive mechanical ventilation in the second wave as compared to the first wave.²⁴

These findings are similar to those of our study wherein the proportion of moderate and severe cases based on data which was available to us was approximately 25.30% and 10.84% respectively during the first wave; and five percent and four percent respectively during the second wave.

Kumar et al reported an increase in mortality from 10.19% in the first wave to 13.26% in the second wave.¹⁶ Contou et al reported a higher, though not statistically significant mortality among ICU patients in the second wave as compared to the first wave.²⁰ Brehm et al observed a case fatality rate of 16% for both phases of the pandemic.²³ These findings are in contrast to our study wherein, based on data of three hundred and thirty two cases of COVID-19 of the first wave, which was available to us, with seven (2.10%) deaths, we observed zero deaths in the second wave.

Mughal et al reported a lower in-hospital mortality of 5.9% during the second wave compared with 15.5% during the first wave.²⁴ Iftimie et al observed a reduction in case fatality rate from 24.0% in the first wave to 13.2%

in the second wave.²² These findings are similar to the findings of our study.

The lower mortality reported in our study could be attributed to one or more of the following factors. The mean age of COVID-19 cases in the second wave was significantly lesser than the mean age of cases during the first wave. The relatively younger population in general having a healthy immune system, resulted in lower mortality. Besides, the lesser proportion of cases with comorbidities, in the second wave, which by themselves pose an increased risk for severe COVID-19 and increased mortality as compared to the first wave could also have contributed to the reduced mortality. Besides, better general understanding and approach of the treating physicians about the disease having improved over time might also have contributed to the reduced mortality.

Another and probably the most important factor for the reduced mortality in the second wave, could be the various mutations which have occurred in the genome of SARS-CoV-2 since the onset of the pandemic, have rendered it more easily transmissible, but less virulent. This law of declining virulence has been postulated by several researchers including Natale et al, Goodman and Newey.²⁵⁻²⁷

Limitations

Being a cross sectional descriptive study is a major limitation of our study. Hence, we have been able to calculate the odds ratio for developing moderate or severe COVID-19 after administration of the first dose of the vaccine. Another limitation of this study is that Berkessonian bias (hospital bias) may have set in as only hospitalised cases of COVID-19 were included in the study. Our study is also at the limit of statistical significance for the calculation of mortality differences. Lack of genome sequencing to correlate viral mutations with various aspects of the disease, viz, the reduced duration of hospital stay, lesser proportion of moderate and severe cases, as compared to the first wave; and the reduced mortality is another limitation, due to inadequate resources.

CONCLUSION

The researchers feel that COVID-19 will not disappear in the near future. New variants of the virus may appear, though future prospects are difficult to predict. Vaccination of a substantial proportion of the world population, may last all throughout this year 2021 or even 2022. Our study has indicated that symptomatology of the disease may vary over time. The researchers believe that the most important conclusion of our work is that the world must remain alert to the characteristics of the virus and the disease. The medical fraternity must be able to modify scientific treatments quickly, if and when the need arises; lastly disseminate our results to the scientific community at the earliest for the betterment of mankind.

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