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Original Research Article

Comparison of COVID-19 second wave with the first wave of a tertiary care center in Western Uttar Pradesh, India

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ABSTRACT

Background: During this COVID-19 pandemic, there were two distinct waves observed in almost every country. A second wave beginning in March 2021 was much more devastating than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medical supplies in parts of the country.
Methods: This retrospective observational study was conducted at Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India from March 2020 to May 2021. All COVID positive patients were included from the hospital records. The data was analysed by appropriate statistical techniques and tests.
Results: There were two distinct waves of COVID-19: wave 1 from 01 March 2020 to 31 December 2020 and wave 2 from 01 January 2021 to 31 May 2021. On admission, the mean (±SD) age of patients in the pandemic period was 45.97 years (±18.41). Males acquired COVID-19 infection in higher number in all age group compared to females in both waves. There was a higher male to female patient percentage who died in hospital from COVID-19 in wave 1 and wave 2 (χ^2=0.027, p=0.869).
Conclusions: A comparative analysis of the first wave with that of the second wave can suggest a better way for the policymakers and stakeholders in the management of COVID-19 recurrence or its severity in India and other countries.

Keywords: COVID-19, First wave, SARS-CoV-2, Second wave

INTRODUCTION

The first cases of COVID-19 in India were reported on 30 January 2020 in three towns of Kerala, among three Indian medical students who had returned from Wuhan, the epicenter of the pandemic.[1-3] During this COVID-19 pandemic, there were two distinct waves observed in almost every country.[4] A second wave beginning in March 2021 was much more devastating than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medical supplies in parts of the country.[5]

During the prolonged first wave, India registered a low number of daily confirmed cases/million inhabitants in comparison to many other countries; however, the scenario started changing from March 2021, with the rapid rise of COVID-19-positive cases throughout the country. A comparison of COVID-19 positive cases/day between India and the rest of the world, as represented in the repository 'ourworldindata', showed that the first wave in India started in March 2020, achieved a peak in September 2020 with more than 90,000 confirmed cases/day, and gradually decreased in intensity with 10,000 confirmed cases/day in February 2021.[6] Except for few countries including India, most of the other countries/continents witnessed the first wave of COVID-19 before August 2020 while the second wave started appearing in August–September 2020 followed by the third wave in March 2021.[7,8]

There could be several factors responsible for the increased number of cases in the second wave. It is observed that the mutant virus has more effective transmission capability and its incubation period is also lesser. There has been a

widespread disregard to the 'COVID appropriate behaviours or CAB' by the public and the quality of masks used are highly variable. N-95 masks are not much favored masks in India, due to their higher costs and the majority public are using either the indigenous masks made of clothes or are repeatedly using the same and worn out masks. Especially in Summer weather it is very difficult to wear masks for long hours. The sharp rise can also be attributed to the higher testing; but doubts have been raised about the quality of testing as several cases of positive COVID-19 symptoms are reported as negative on the RT-PCR test.

This study aims to compare the clinical profile of the first wave (April-June 2020) and the second wave (March-May 2021) of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in a tertiary care center of Western Uttar Pradesh.

The present study was undertaken to assess differentials in the cases admitted in the second wave compared to the first wave.

Aim

The aim of the study was to assess differentials in the cases admitted in the 2nd wave compared to the 1st wave.

Objectives

The objectives were to study the demographic profile (age, sex) of COVID positive patients of both waves-I and II; to study the ICU/HDU admissions on the basis of RT-PCR to find severity of illness in both waves- I and II; and also to study mortality rate in COVID positive patients of both wave-I and II.

METHODS

This retrospective observational study was conducted at Saraswathi Institute of Medical Sciences (SIMS), Hapur, Uttar Pradesh, India from March 2020 to May 2021. All COVID positive patients were included from the hospital records. We examined the demographic profile (age and sex), outcomes of the COVID-19 patients belonging to the first (W1) and the second wave (W2) of the pandemic in India. Wave-1 was defined as period from March to December 2020 and wave-2 from January to May 2021 for the purpose of this study.

Inclusion criteria

All COVID positive patients admitted in hospital from March 2020 to May 2021 were included.

Exclusion criteria

All COVID negative patients were excluded.

The data collected was entered in Microsoft excel and imported in IBM statistical package for the social sciences (SPSS) version 25.0. The data was analysed by appropriate statistical techniques and tests such as correlation, Chi-square test, graphical representation of data, and frequency distribution.

RESULTS

In this study of patients admitted with COVID-19 during the 15 months of the pandemic, we examined differences between wave 1 and wave 2 in patient characteristics, including: age, sex, outcomes in hospital including length of stay (LOS), ICU/HDU admissions and in-patient mortality; and referral to higher centers.

Characteristics of COVID 19 wave 1 and wave 2

There were two distinct waves of COVID-19: wave 1 from 01 March 2020 to 31 March 2021 and wave 2 from 01 April 2021 to 31 May 2021. Total 2529 RT-PCR confirmed COVID-19 patients were included in the present study. Out of total 1795 (71%) patients in wave 1 and 734 (29%) patients in wave 2 were admitted. There was peak in all admissions during wave 1 and wave 2 in September 2020 and in April 2021, respectively.

On admission, the mean (±SD) age of patients in the pandemic period was 45.97 years (±18.41); those with COVID-19 in wave 1 this was 45.09 years (±19.18) and with COVID-19 in wave 2 was 48.08 years (±16.15). The highest proportion of total admissions was seen among the oldest group (60-70 years) in wave 1 (17.39%). The analysis showed that in wave 1, three age groups, *viz.*, 60-70 years, 50-60 years and 40-50 years were the most affected followed by the 30-40 years, 20-30 years and more than 70 years age groups.

The study showed that both male and female patients peaked during September 2020 (185: 106) in wave 1 and April 2021 (329: 149) in wave 2 (Figure 1).

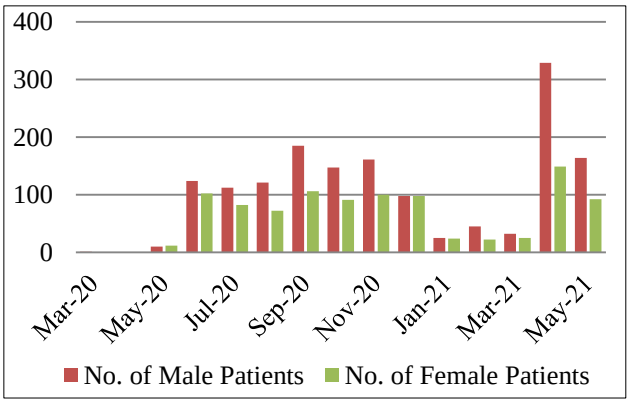

Figure 1: Monthly patient sex wise analysis of COVID-19 wave 1 and wave 2 (March 2020 – May 2021).

Out of 2529 patients, 392 needed ICU/HDU admission, and this proportion was not similar in both the waves (8% in wave-1 versus 92% in wave-2).

The major observations were: length of stay (LOS) prior to discharge (longer in wave; length of stay prior to death (shorter in wave 1); and in hospital mortality (higher in wave 1) (Figure 2).

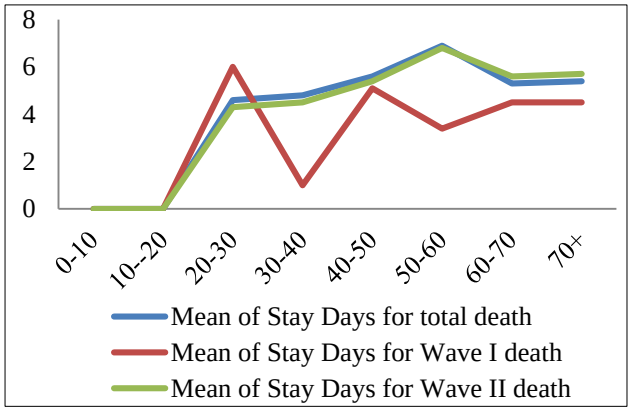

Figure 2: Mean of stay days of death patients.

Males acquired COVID-19 infection in higher number in all age group compared to females (38.6%) in both waves.

Proportionately infection in the younger age-group 0-20 was higher in first wave vis-à-vis second wave. Beyond the age of 30, the proportionate number was higher in wave II for all age-groups between 30-70 (Table 1).

Table 1: Proportion wise age-group analysis of COVID-19 patients in wave I and II.

Age group	% I wave	% II wave
0-10	3.80	0.50
10-20	5.20	0.80
20-30	15.10	11.40
30-40	15.40	19.20
40-50	14.90	21.20
50-60	16.20	18.50
60-70	17.40	17.10
70+	11.40	11.03

Trend analysis shows the COVID-19 infection started decreasing from the month of November 2020 reaching the plateau of 50-60 per month from January 2021 to March 2021 before climbing back again to a level of 478 in the month of April 2021. The number then declined by 222 to 256 in the month of May 2021, by the end of the observation period (Figure 3).

The ages of death in hospital from COVID-19 in wave 1 was 60.65±14.97 years and in COVID-19 wave 2 was 53.7785±15.37 years. In aggregate, death analysis of COVID-19 wave I and II shows that in comparison to wave I the mortality is higher in all age-group above 0-20. The observation with respect to mortality in various age-groups showed that 0-20 did not have any mortality and as the age advanced the mortality continued to rise till the age of 70 (Figure 4).

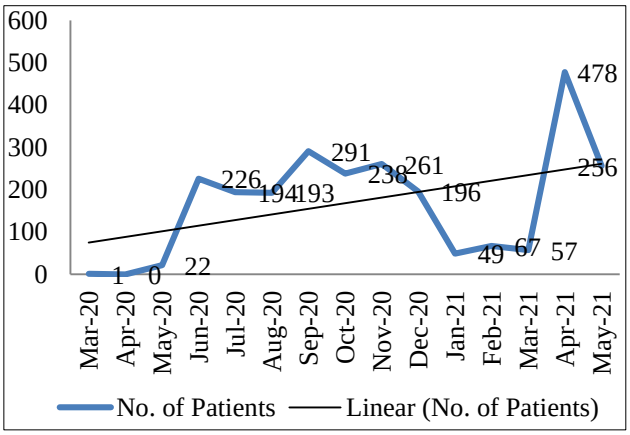

Figure 3: COVID-19 patient month-wise analysis.

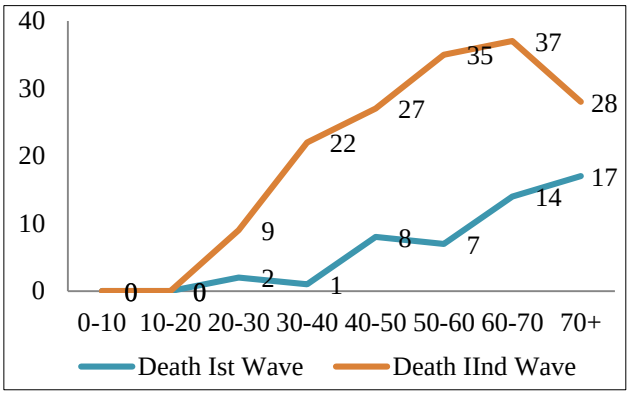

Figure 4: Death analysis of COVID-19 wave I and II patients.

Mortality rates in hospital were consistently highest among patients admitted with COVID-19 in wave 1: the respective mortality rates in hospital within groups of patients in the pandemic with COVID-19 in wave 1 and with COVID-19 in wave 2 were 27 (n=49) and 215 (n=158) respectively.

This percentage for COVID-19 patients in wave 1 was 71% and in wave 2 was 29%, i.e. proportionally more patients died in wave 1 than in wave 2.

There was a higher male to female patient percentage who died in hospital from COVID-19 in wave 1 (31:18) and wave 2 (102:56) (χ^2=0.027, p=0.869).

The measured case fatality rate varies from 21.5% for W2 to 2.7% for W1.

There was higher proportion of men (61.4%) than women (38.6%) admitted in wave 1 as compared to wave 2, but there were relatively higher rates of mortality among men

in both waves of COVID-19. The reasons for this male preponderance of mortality remain unclear.

84% patients were discharged to home out of the total 2529 patients. 7% were referred to other hospitals for the reason of requirement of higher level of care and on the request of patient's relative. 8% patients died due to complications of COVID-19 (Figure 4).

The differences seen in both waves are very significant and it is most likely that clinical intervention improvements and experience gained in wave 1 contributed to better outcomes in wave 2. The longer duration of in-patient stay until death seen in wave 2 may reflect intervention strategies that will have improved overall survival, but also delayed time to death.

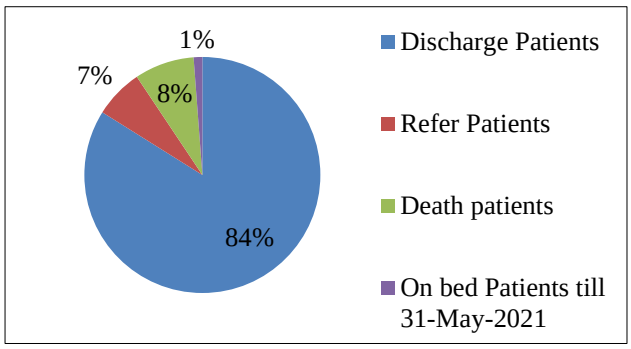

Figure 5: No. of deaths, discharges, referrals and on bed patients till 31 May 2021.

DISCUSSION

The incidence of COVID-19 cases, admissions and in-hospital deaths in the first wave exceeded the incidence in the second wave in this study.

The patient age is considered as one of the important factors for hospitalization and mortality.[9] Irrespective of gender and ethnicity, older patients appear to be at higher risk of mortality than younger patients. However, in terms of viral transmission, all age groups were equally susceptible to COVID-19 infection.[10] In our study in the most highly infected patient age groups were the 60-70 years (30.01%) and the 50–60 years (30.48%) in period I, which changed to the 40–50 years (32.03%) and the 30–40 years (30.47%) groups in period II of COVID-19. In a recent report, it was claimed that the population under 35 years of age has a high risk of SARS-CoV-2 infection.[11]

A literature survey revealed that male patients were more strongly affected than females in terms of mortality or disease severity.[12,13] However, with respect to COVID-19 incidence and patient gender, no significant relation has been reported so far.[14,15]

Our study showed that patients in the age groups of 11–30 years, 31–45 years and 61–80 years were at high risk of COVID-19 infection in wave 1 periods.

Our analysis revealed among the two genders, males were more infected than females in periods I and II of COVID-19. A metadata analysis by Hamid et al concluded that disease severity and mortality in male patients were higher than those in female patients of the same age.[16]

More patients were admitted during the second wave, they were younger and there were fewer deaths, in agreement with results reported by previous research in several countries. Furthermore, poor compliance with social distancing guidelines by young people might have facilitated contagion in young, healthy adults and children.[17,18]

Along with the emergence of highly transmissible variants in India, the 'implementation of lockdown' factor needs to be discussed. In India, the calculated Rt in the first week of March 2020 was 3.2 and further stabilized to 1.09 in the third week of April when India was under lockdown.[19] The Rt went below 1 from September 2020 to February 2021, when the Government of India relieved the lockdown in the country. In April 2021, the Rt in India reached 1.37, and this time, lockdown was necessary to arrest the virus diffusion. State wise lockdown proved effective in terms of managing daily COVID-19 cases, as imposing lockdown in April–May 2021 lowered the number of COVID-19 confirmed cases/day from 400,000 cases on 08 May 2021 to 127,000 cases on 31 May 2021.[20]

In this observational study 31 patients in W1 (March 20 – March 21) and 361 patients in W2 (April 21 – May 21), there were higher proportion of increased age, oxygen requirement, ventilator requirement, ICU admission, and organ impairment in the admitted COVID-19 cases during the second wave.

CONCLUSION

The results of the present study show that hospitalized patients in the second wave were younger, required fewer days of hospitalization, had lower mortality rates and treatments were more effective and less intensive.

As we analysed from our study that future outcomes are difficult to predict. COVID-19 will not disappear in the short or medium term. New variants of the virus may appear; the vaccination process can predictably last all the coming years. The maintenance of strict lockdowns for very long periods is difficult to bear from the economic, social and psychological points of view. Currently, the whole world has experienced the effects of COVID 19, and the results of our study indicate that the characteristics of the infection may vary over time.

It is obvious that the prevention is better than cure for this disease and all the possible measures such as engagement and participation of public in controlling the disease, strict implementation of COVID appropriate behaviors (i.e., social distancing, use of face masks, and hand sanitation), mini lockdowns, night curfews, and micro containments,

must be implemented and observed by the public to slowdown the implications of such diseases in near future.

A comparative analysis of the first wave with that of the second wave can suggest a better way for the policymakers and stakeholders in the management of COVID-19 recurrence or its severity in India and other countries.

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