

Comparison Of Demographic And Clinical Characteristics Between First And Second Covid19 Waves: A Retrospective Study From A Tertiary Care Center In India.

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INTRODUCTION:

In the beginning, the COVID-19 pandemic overburdened public health systems throughout the world, mostly due to a lack of knowledge about the virus's behavior and methods of treatment. [1-3] SARS-CoV-2, a new coronavirus in the Coronaviridae family, is the virus that is causative agent of this infection. [3] Wuhan's seafood markets were originally thought to be the source of the outbreak's zoonotic propagation in China. But the discovery of human-to-human transmission later on encouraged a widespread community spread, which quickly turned into a worldwide pandemic. [4-8]

To date, the global community has encountered several waves of the COVID-19 pandemic. The previous pandemic observations reveal that, the characteristics of this infection vary across geographical regions and countries, influencing the affected age range, sex distribution, symptoms, and disease severity. [6,7] This variability is supported by numerous studies conducted over time. For example, during the second wave in Spain, a higher proportion of younger individuals were affected, and there was an increased case fatality rate compared to the first wave. [8] Similarly, Seong et al. noted a higher case fatality rate during the third wave in South Korea compared to the second wave.[9]

The first wave of COVID-19 hit most countries and continents before August 2020; the second and third waves appeared in August and September 2020 and March 2021, respectively. [9,10] However India was slower to catch up with the pandemic, missing a wave and only seeing two waves of COVID-19 infection. Beginning in March 2020, the first wave peaked in September 2020, with approximately 90,000 confirmed infections daily. After that, the severity progressively decreased, reaching 10,000 confirmed cases daily by February 2021. The period from March 2021 to June 2021 witnessed a second wave.

In the present study, we conducted a comparative analysis of patients diagnosed with SARS-CoV-2 infection, focusing on age, symptoms, duration, and severity, during the first and second waves of the pandemic. Also, we intend to assess the effect of vaccination in outcome of 2nd wave compared to the first Covid-19 wave.

Aim Of The Study:

To investigate variances in demographic and clinical characteristics between the first and second waves of Covid-19.

OBJECTIVES:

- 1) To assess and compare the affected population, age group and gender among both Covid-19 waves.
- 2) To assess the differences in severity of symptoms, morbidity and mortality in first wave and second wave of pandemic.
- 3) To compare the outcome of Covid-19 vaccination in vaccinated and unvaccinated Covid-19 patient in second wave.

MATERIAL AND METHODS

Study Design: Retrospective study.

STUDY SUBJECTS:

Covid-19 infected patients admitted in general medicine isolation ward / isolation ICU of Saraswathi Institute of Medical Sciences, Hapur who fulfill the inclusion and exclusion criteria.

The sample size: Total number of admitted Covid-19 positive patients during March 2020 to June 2021

INCLUSION CRITERIA:

Data of admitted patients (both male and female) with RT PCR or Rapid antigen Test SARS-CoV-2 positive.

EXCLUSION CRITERIA:

Data of admitted patients who absconded.

Data of admitted patients who were sent for home isolation.

METHODOLOGY:

The study was started after receiving approval from the Institute's Ethics Committee and reference file SIMS/FMT/ETHI/29/2023. Database of Saraswathi Institute of Medical Sciences, Hapur patients who meet the requirements for inclusion was collected and analysed. The evaluation of the data was based on admission symptoms, demographics, comorbidities, duration of stay, and immunization history.

STATISTICAL METHOD:

The data was entered into a Microsoft Excel sheet and analyzed using SPSS Software 25.0. Continuous data was expressed in terms of mean and standard deviation. Categorical data was expressed in the form of proportions and percentages. Appropriate statistical analyses, such as the Chi-Square test and t-test, were performed, and a p-value <0.05 was considered statistically significant.

RESULTS:

The research comprised 1596 individuals who tested positive for COVID-19; of these, 845 were diagnosed in COVID 19 first wave and rest of the 751 patients diagnosed in second wave of COVID-19. The first wave of COVID-19 occurred from March to September 2020, and the second wave observed from March to June 2021. The percentage of patients in each gender category in both waves' deviates from the 50% predicted percentage, suggesting that men made up a substantially larger proportion than women (67.45% & 61.7% in the first and second waves, respectively). The average patient age during both waves was (45.805+₋ 18) in the second wave, compared to (46.01+₋ 18.5) in the first. There is a shift in the proportion of infected patients among older patients in the second wave, with the majority of patients in the first wave being between the ages of 18 and 65, and in the second wave being between the ages of 36 and 65. As represented in Table-1,2 and 3.

Furthermore, the study found that, 38% of patients in the first wave compared to only 5% in the second wave were asymptomatic. There was a significant increase in the second wave with regards to fever (26% vs 68%), cough (21% vs 52%), and shortness of breath (53% in 1st vs 84% in 2nd). [Graph 4 and 5] There was no discernible difference in cardiovascular symptoms between the two waves. Additionally, the first wave's duration of symptoms lasted longer than the second wave's i.e. during first wave mostly patients remained symptomatic for 1 to 2 weeks (72%) whereas most of the second wave patients had symptoms lasting upto 7 days (48%). Moreover, we were concerned about an increase in the number of symptoms per patient during the second wave, in contrast to the first wave. The present study findings, reported that, during first wave mortality rate was around 2.84%, whereas in second wave it was 23.03%. [Graph 1,2,3] This difference appears to be due to the emergence of new, more contagious strain of virus, which increased mortality, particularly in the elderly population, with a greater degree of severity (need for NIV assistance) in the second wave than the first. The data leads us to conclude that with second wave the age of infected patients increased, and although the patients had symptoms for less duration but the severity increased considerably.

Following the launch of the COVID-19 vaccine in January 2021, an intensive programme of vaccination was started by the government, which lead to 59.9% of the population in our sample of second Covid-19 wave being vaccinated. Also, during this wave, we detected 173 deaths out of our sample of 751 admitted patients. Of the total deaths, only 66 received vaccinations and 107 did not, demonstrating the evident improvement in case fatality, post COVID-19 vaccine in western Uttar Pradesh. [Table-2]

Table 1: Shows demographic profile of study participants

FIRST WAVE	TOTAL	REFER	DEATH	DISCHARGE
Mean age	46.017	49.4	66	44.66

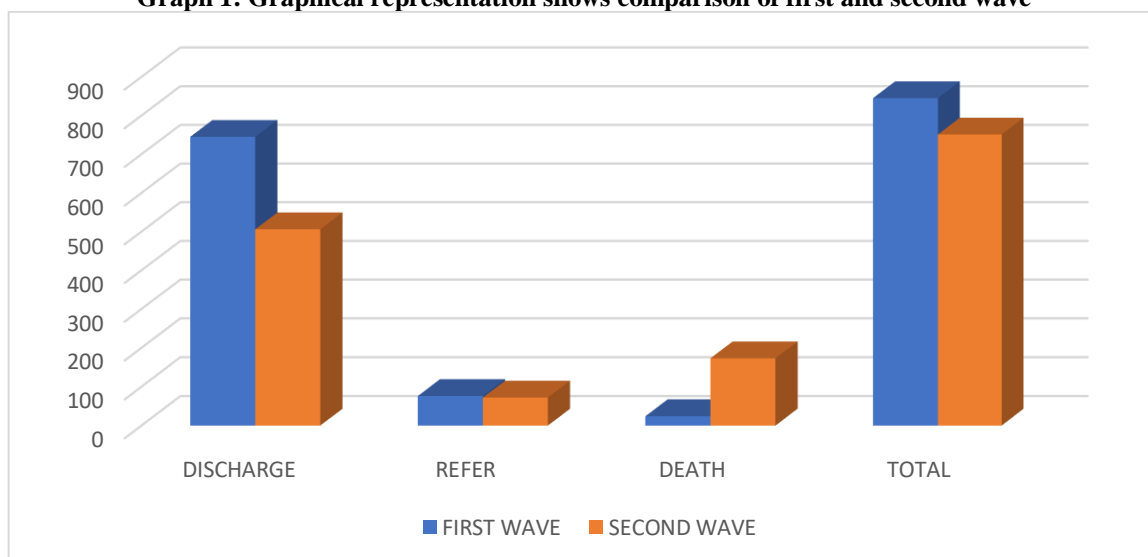
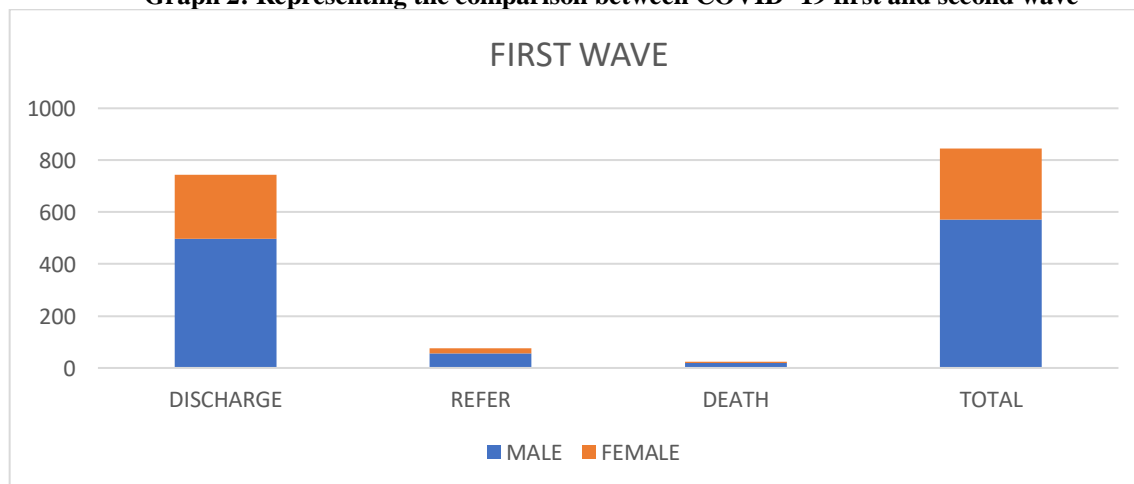
male	572	57	18	497
female	273	19	6	248
total	845	76	24	745

Table 2: Representing percentage of vaccinated and unvaccinated

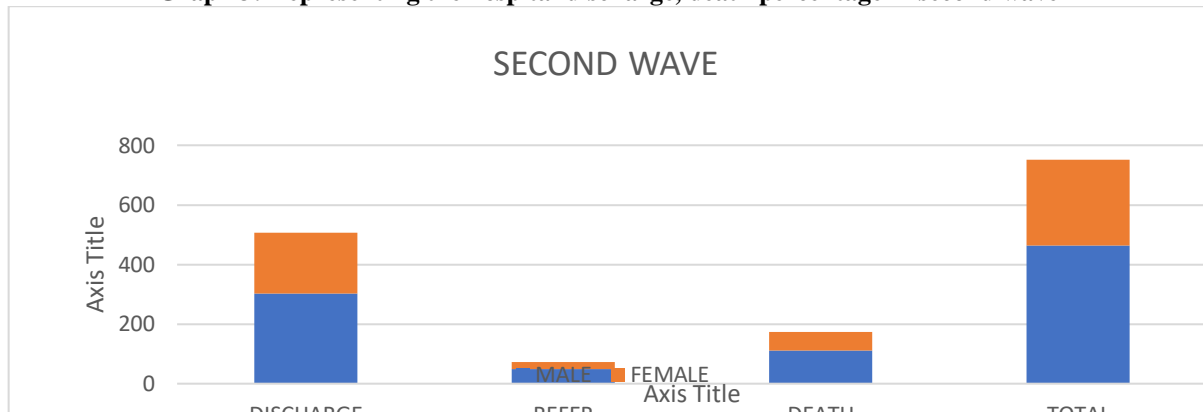
SECOND WAVE	PATIENTS	DEATH
VACCINATED	450 (60%)	66 (38%)
UNVACCINATED	301 (40%)	107 (62%)
TOTAL	751	173

Table 3: Shows mean age, death and discharge of study population.

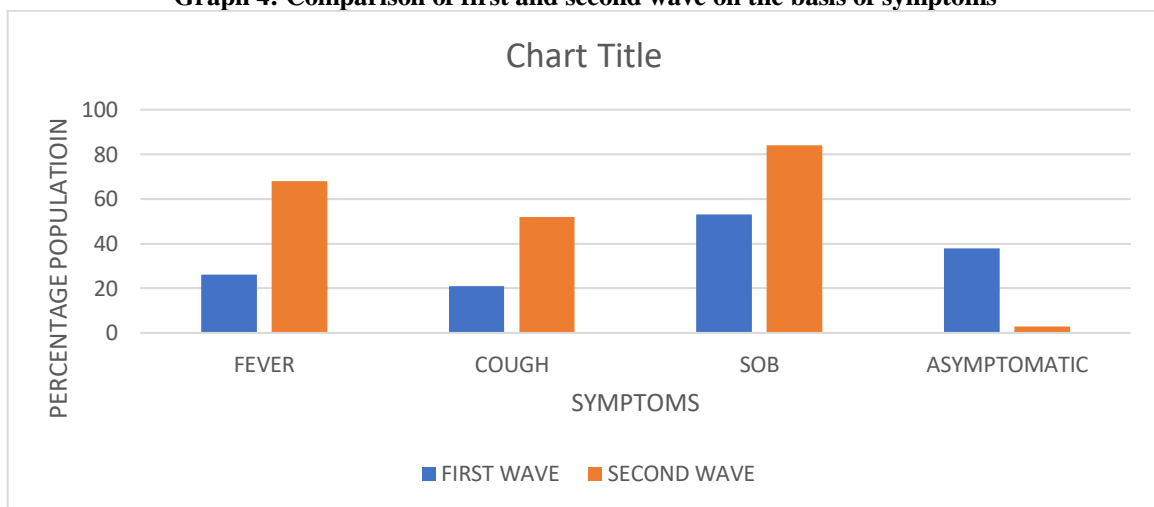
SECOND WAVE	TOTAL	REFER	DEATH	DISCHARGE
MEAN AGE	45.805	47.33	54.16	43.5
MALE	464	49	112	303
FEMALE	287	23	61	203
TOTAL	751	72	173	506

Graph 1: Graphical representation shows comparison of first and second wave**Graph 2: Representing the comparison between COVID -19 first and second wave**

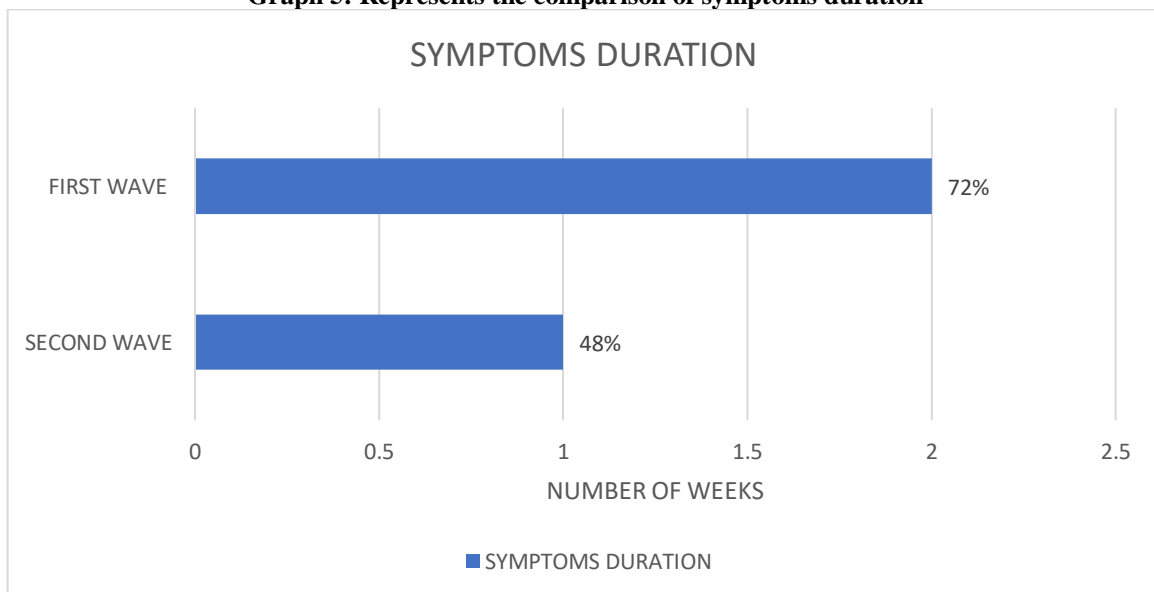
Graph 3: Representing the hospital discharge, death percentage in second wave



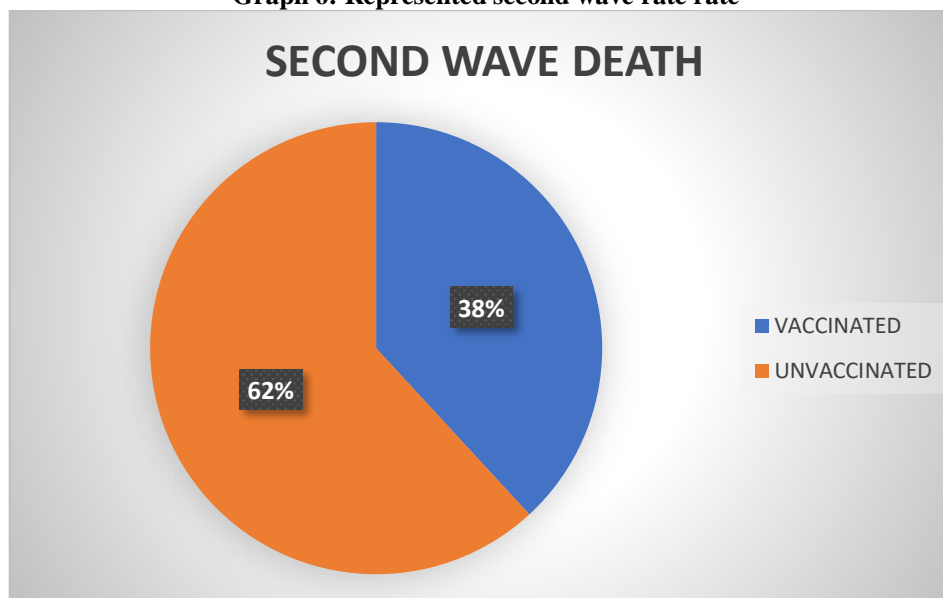
Graph 4: Comparison of first and second wave on the basis of symptoms



Graph 5: Represents the comparison of symptoms duration



Graph 6: Represented second wave rate rate



DISCUSSION:

In the current investigation, we demonstrated the ferocity of both waves of the COVID-19 pandemic, i.e., waves first and second at a tertiary health centre in the state of Uttar Pradesh (UP). This research describes the two waves of the COVID-19 pandemic, with RT PCR, or rapid antigen test, SARS-CoV-2 positive. In this study, we conducted a comparative analysis of demographic characteristics, clinical findings, vaccination status, and mortality rates among COVID-19 patients admitted to our centre during the first and second waves of the pandemic. We observed a notable difference in admission rates between the two waves, with a significant increase during the second wave. This increase can largely be attributed to the higher transmissibility of the Delta variant (B.1.617.2), which became the dominant strain in our region from mid-April 2021, after first being identified in India in December 2020. [11]

In this study, the prevalence of male and female patients in both wave's deviations from the expected 50%. There were approximately 67.45% men in the first wave and around 61.7% men in the second. It appears that in both waves, there was a higher prevalence of men as compared to women. These findings were comparable with the study performed by **Tendulkar P, et al.** [12] on the Indian population. According to them, the percentage of the male population was high in both waves as compared to the female population, i.e., 70.3% vs. 61.3% among males and 29.7% and 38.7% among females in the first and second waves, respectively.

The mean age of study participants was found to be very similar i.e., 46.01 ± 18.5 and 45.805 ± 18 in the first and second wave respectively. The mean age of patients in the first and second waves of the pandemic was approximately 64.5 years vs 65 years, according to **Sargin AE, et al.** (13) These findings were consistent with the present study findings. Similarly, **Tendulkar P, et al.** [12] reported that, the mean age of patients was very similar in the first and second waves of the COVID-19 pandemic which were approximately 55 and 56 respectively. A systematic review revealed the mean age of one of the 32 studies was 56 years old. [14]

The symptoms persisted longer during the first wave than they occurred during the second wave. In the present study, the duration of symptoms in the first wave prolonged that of the second wave. Specifically, during the first wave, a majority of patients experienced symptoms persisting for 1 to 2 weeks (72%), whereas in the second wave, the majority of patients had symptoms lasting up to 7 days (48%). Working with the first wave has provided a better understanding of COVID-19 epidemiology, explaining the potential for this variation. [15] This understanding or management of patients has proven to be a standard therapeutic approach for medical professionals or expertise to manage mild-to-moderate patients at home instead of admitting them to the hospital during the coming waves. To the best of our knowledge, we have asserted that, this type of management is beneficial in mitigating potential complications as the COVID-19 variant undergoes mutations and evolves into a more formidable threat.

Furthermore, our study reported that, the mortality rate was 23.03% in the second wave and 2.84% was reported in the first. This increased mortality rate is likely attributed to a new and more contagious virus strain. These findings concordance with a comparative study done by **Iftimie S, et al.** [16] according to them fatality rate among males was higher in the second wave as compared to the first wave. The second wave, especially impacts the elderly population, especially males, which represents a higher severity level, marked by a greater need for non-invasive ventilation (NIV)

assistance compared to the first wave. Our analysis indicates that, during the second wave, infected patients were generally in the elderly population, and experienced symptoms for a shorter duration, but faced a significant increase in severity.

Additionally, the mortality rates in a group of 173 patients, which included both vaccinated and unvaccinated individuals, were investigated in this study. 107 deaths (62%) were noted among unvaccinated individuals in this group, while 66 deaths (38%) occurred among vaccinated patients. [Graph 6] This emphasizes the relentless severity of the devastating second wave of the pandemic. These results were in contrast to the **Fan G et al. (2020)**, [17] who carried out an extensive examination of data collected from 53 different countries. Their analysis found that, there was a significant reduction in deaths that were reported during the COVID-19 second wave.

In this study, we were unable to investigate the occurrence of a third wave induced by the Omicron variant. This was due to the mild nature of infections and the remarkably low number of hospitalizations observed during this particular wave. Therefore, we stated that, the experiences from the first and second waves in diagnosis, prognosis, and treatment of COVID-19 will help us to increase our awareness for the forthcoming complications.

CONCLUSION:

On analysis, study indicate more elder population were infected in second wave than in 1st wave with more malepreponderence. Patients in second wave were more symptomatic with more no of symptoms per patient than those in 1st wave, but stayed for shorter duration of time. Most prevalent symptoms in both waves we shortness of breath, cough and fever. There is significant need of NIV support with higher mortality of patients in second wave than in 1st wave.

A second wave of immunizations was observed once the COVID-19 vaccine was introduced in January 2021, with 59.9% of the population in our sample having received the vaccination. In western Uttar Pradesh, we found 173 deaths in the second wave of COVID-19 out of 751 population; among them, only 66 had received vaccines and 107 had not, indicating the vaccine's positive effects.

LIMITATIONS

Our study had limitations. Firstly, data was from one health center in Uttar Pradesh, limiting generalizability. Secondly, some comorbidity and symptom data may have been missed due to the retrospective nature. Thirdly, the study did not differentiate between vaccine types in the second wave. Finally, the relationship between comorbidities and age could not be established due to higher comorbidity rates in older populations.

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