

STUDY OF ASSOCIATION BETWEEN DAY OF HOSPITAL PRESENTATION AFTER ONSET OF FIRST SYMPTOMS AND OUTCOME IN COVID-19 INFECTED PATIENTS

Guruparan R¹, Vivek U², Safiya Abdul Gafoor³

¹Assistant Professor, Department of Emergency Medicine, Saveetha Medical College, Tamilnadu, India

²Senior Resident Department of Emergency Medicine, Saveetha Medical College, Tamilnadu, India

³Junior Resident, Department of Emergency Medicine, Saveetha Medical College, Tamilnadu, India

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Corresponding Author:

Dr. Vivek U,
Email: 14vivek.u@gmail.com
ORCID: 0000-0001-8028-7475

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Abstract

Background: COVID-19, a high-impact pandemic, has caused panic in the populace, exacerbated by pictures in the media of crowded hospitals. Coronavirus disease 2019 has a broad range of symptoms, severity, and consequences, ranging from asymptomatic carriage to death. This study was done to find the association between the day of hospital presentation after the onset of the first symptoms and the outcome. **Materials and Methods:** Patients who presented with symptoms of COVID-19 were included. Patients were divided into groups based on their day presentation after the onset of 1st symptom: Cases can be classified as mild (symptomatic without clinical evidence of pneumonia), moderate (with clinical indicators of pneumonia but no respiratory distress), or severe (with clinical signs of pneumonia but no respiratory distress). **Result:** In 600 patients, 89.8% came earlier (< 7 days) to the hospital after first symptom of which 89.7% had a mild infection on admission. There is no statistically significant difference in day of hospital presentation and duration of hospital stay {p=0.688}, ICU requirement {p=0.710}, duration of ICU stay {p=0.564} and mortality {p=0.204}. The overall mortality rate was 3.3% in our study. **Conclusion:** The overall outcome is determined by several factors, including the time between exposure and symptom onset, the time between beginning of symptoms and hospital presentation, duration of hospital stay, ICU requirement, and region considerations. In our study, the presentation timing to the hospital after the first symptom did not create a meaningful difference in the overall patient outcome.

INTRODUCTION

The COVID-19 epidemic has spread across the globe, affecting all countries and territories. The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes COVID-19 belonging to Coronaviridae.^[1] It presents a broad spectrum of symptoms ranging from asymptomatic to mild upper respiratory tract infection symptoms and life-threatening sepsis. In 2019, the SARS-CoV-2 outbreak was thought to have started due to a zoonotic transmission linked to a seafood market in Wuhan, China. However, the human-to-human transmission was later discovered to have had a significant role in the ensuing outbreak.^[2] COVID-19 can be divided into three phases corresponding to different clinical stages of the disease.^[3] In an asymptomatic state (initial 1–2 days

of infection), the SARS-CoV-2 inhaled virus attaches to epithelial cells in the nasal cavity and begins multiplying. The virus spreads locally, but there is just a modest innate immune response. Nasal swabs can detect the virus at this stage. These people are infectious, even if their virus burden is minimal. The viral RNA RT-PCR result may be beneficial in predicting viral load, future infectivity, and clinical course. Later, the virus spreads and migrates down the respiratory system along the conducting airways, triggering a more robust innate immune response. The virus (SARS-CoV-2) and early hallmarks of the natural immune response should be found in nasal swabs or sputum. The disease COVID-19 is currently clinically evident. The disease will be mild in around 80% of infected people and largely affect the upper and conducting

airways. These people can be observed at home and treated with symptomatic therapy.

Hypoxia and progression to ARDS occur as the day's progress is termed stage 3. Unfortunately, approximately 20% of infected patients may advance to stage 3 diseases and develop lung infiltrates, some developing very severe diseases. COVID-19 signs and symptoms might occur 2 to 14 days after exposure and include Fever, Cough, Shortness of breath or difficulty breathing. Other signs and symptoms include Tiredness, Aches, Runny nose, Sore throat, Headache, Diarrhea, Vomiting, and the loss of smell or taste.^[4]

The incubation period is an important epidemiological tool. It is also vital in infectious disease surveillance, monitoring, and modelling. The COVID-19 incubation period of 5.74 days is slightly longer than human coronavirus and severe acute respiratory syndrome coronavirus. The incubation duration for COVID-19 varies by age group, with younger (under 14 years) and older (over 64 years) patients having shorter incubation periods. COVID-19 causes fever, cough, myalgia or tiredness, excretion, and dyspnea. The intensity of the condition may vary the symptoms. There are two stages of infection in the host: subclinical and clinical. After the latent phase, the infected person might transfer the virus to others. The latent period can be shorter or longer. The latent period is anticipated to be shorter than the incubation period in moderate and asymptomatic COVID-19 transmission.^[4]

To lower the risk of complications and mortality, a considerable proportion of patients with COVID-19 require prompt hospitalization. Hence the study was done to find the association between the day of hospital presentation after the onset of first symptoms and the outcome in covid-19 patients.

MATERIALS AND METHODS

This retrospective study was conducted at a tertiary care hospital between 1st May to 31st July 2021. 600 COVID -19 cases confirmed by RT-PCR were included.

Inclusion Criteria

- Patients presenting with COVID-19 with symptoms
- age more than 18 years.

Exclusion criteria:

- Age less than 18 years
- Other causes of viral pneumonia.
- COVID-19 patients that were asymptomatic and individuals who refused to participate were excluded from the study.

Patients were divided into groups based on their day presentation after the onset of 1st symptom. Cases can be classified as mild (symptomatic without clinical evidence of pneumonia), moderate (with clinical indicators of pneumonia but no respiratory

distress), or severe (with clinical signs of pneumonia but no respiratory distress).

Data were presented as frequency and percentages. The categorical variables were analyzed using the Pearson chi-square test. Significance was defined by P values less than 0.05 using a two-tailed test. Data analysis was performed using IBM-SPSS version 20.0 (IBM-SPSS Science Inc., Chicago, IL).

RESULTS

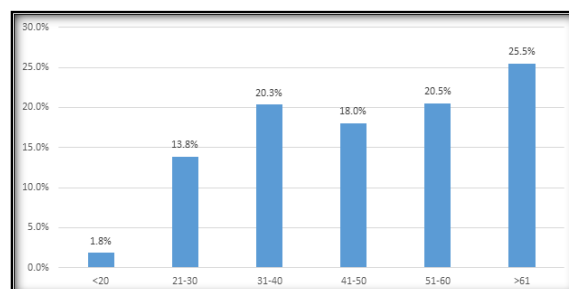


Figure 1: Age distribution

Of the 600 patients hospitalized for Covid 19, the majority (25.5%) belonged to more than 61 years, and male patients were higher (69%).

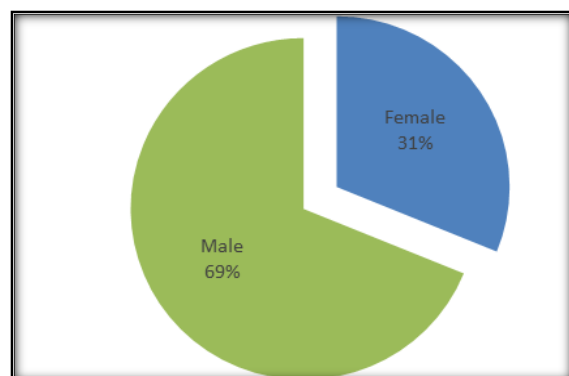


Figure 2: Gender distribution

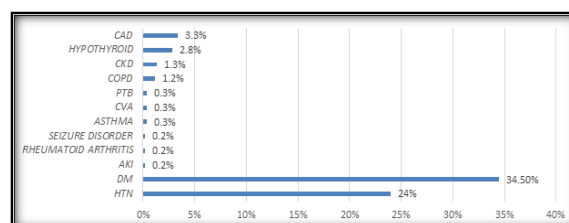


Figure 3: Distribution of co-morbidities

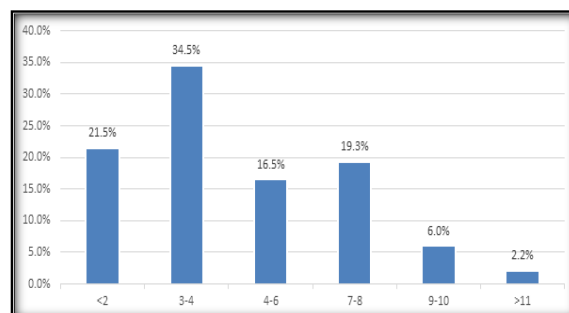


Figure 4: Distribution of day of hospital presentation

Diabetes mellitus (34.5%) was the most common co-morbidity followed by hypertension (24%), CAD (3.3%), asthma (0.3%), hypothyroid (2.8%) and COPD (1.2%) among hospitalized patients. [Figure 3]
89.8% of the patients included in this study were presented to the hospital in less than 7 days. [Figure 4]

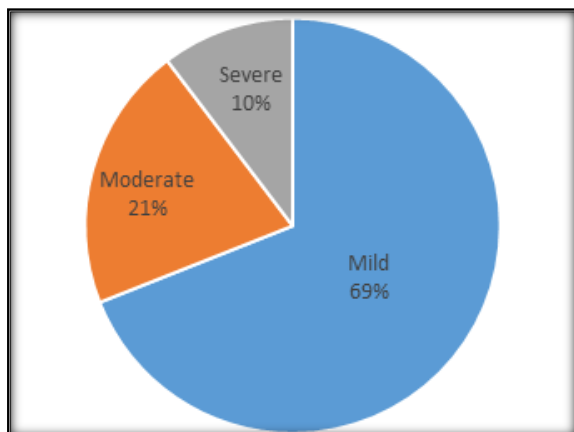


Figure 5: Distribution of admission severity of COVID

Based on the severity of the disease, the highest number were mild cases, while severe cases were the least reported.

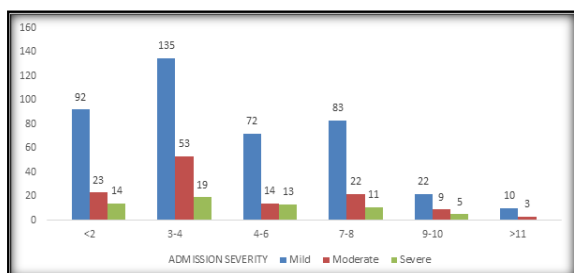


Figure 6: Distribution of day of hospital presentation after the onset of first symptoms with admission severity

There is no significant association between the admission severity and day of hospital presentation ($p=0.467$).

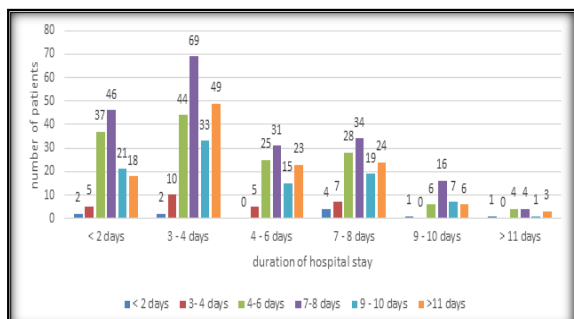


Figure 7: Day of hospital presentation and duration of hospital stay

There is no significant association between the day of hospital presentation and the duration of hospital stay ($p=0.688$).

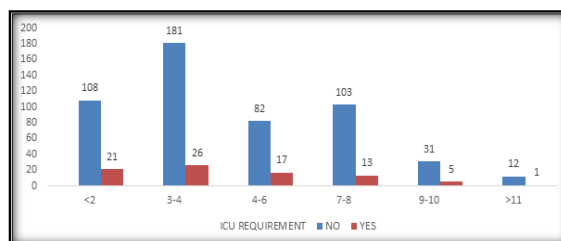


Figure 8: Distribution of day of hospital presentation after the onset of first symptoms with ICU requirement

There is no significant association between the day of hospital presentation and ICU requirement ($p=0.710$).

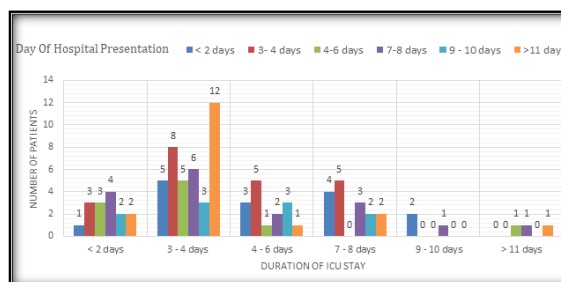


Figure 9: Distribution of Day of Hospital Presentation With Duration Of ICU Stay

Regarding days in ICU admissions, 20% of cases were admitted for more than 11 days. There is no significant association between the day of hospital presentation and duration of stay in ICU ($p=0.564$).

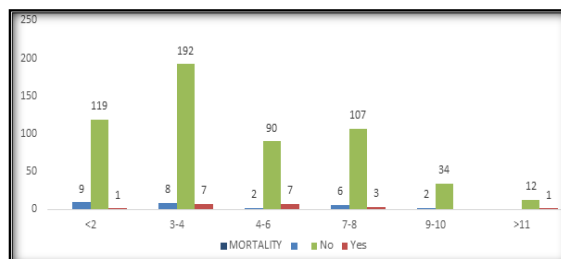


Figure 10: Distribution of day of hospital presentation after the onset of first symptoms with mortality

There is no significant association between the day of hospital presentation and mortality ($p=0.204$).

DISCUSSION

SARS-CO-V-2, a member of the Beta coronavirus family, causes Coronavirus Disease 2019. This disease had a moderate to severe clinical range. The most prevalent moderate of COVID-19 infections were fever, cough and weakness. Adequate care and infection prevention require SARS-CoV-2 diagnostic tests and clinical interpretation of data. Clinical sensitivity is influenced by pre-analytical factors and the patient's disease status. The clinical sensitivity varies as the infection clears and the immune response arises. The study compared the impact of day of hospital presentation with outcomes in COVID-19 infected patients.

Most of the 600 patients registered for the study belonged to the age group above 61 years (25.5%). The next mainly significant infected age group was found to be 51-60 and 31-40 years. In a study by Hsieh et al,^[5] patients ranged from age group 3-68 years, with predominant infection observed within 39-51 years. Richardson et al,^[6] also reported patients aged 52-75 years in their study on Covid-19 patients in New York.

The study population among Covid-19 patients was predominantly male (69%). Female covid patients were found to be lower (31%) in number compared with males. Richardson et al,^[6] reported the preponderating occurrence of covid-19 among males (60.3%). However, Hsieh et al,^[5] reported equal distribution of covid infection among male and female patients. While Amrane et al,^[7] reported a dominant number of female patients among the covid 19 study population.

With rapid progress in the number of COVID-19 patients, the link between co-morbidities and COVID-19 patients is still unclear. COVID-19 individuals with co-morbidity had a bad prognosis, according to previous research. In our study, Diabetes mellitus (34.5%) was the most common co-morbidity, followed by hypertension (24%), CAD (3.3%), asthma (0.3%), hypothyroid (2.8%) and COPD (1.2%) among hospitalized patients. When deciding on an anti-2019-nCoV medication, it's critical to identify the most important risk categories. A similar correlation between the intensification of Covid-19 and diabetes mellitus was previously reported by Li et al.^[8] Diabetes has previously been identified as a significant risk factor for an abrupt aggravation of a lower respiratory tract infection. Around 75% of COVID-19 deaths are caused by one or more chronic diseases, which are diabetes and hypertension. The actual mechanisms behind the link between blood glucose levels and viral illnesses are still unknown. It's worth emphasizing that in diabetic patients, high blood glucose levels might impair immunity, resulting in aberrant immunological regulation and a reduced immune response.^[8]

Lippi et al,^[9] have also reported a significant association between Covid severity and hypertension. They have reported that hypertension is linked to a 2.5-fold greater risk of severe illness and death. In a meta-regression, they discovered that this effect is primarily ascribed to persons over the age of 60. While additional research is needed, they recommend that patients with hypertension be subjected to stricter public health precautions. In elderly patients, hypertension should be considered a clinical predictor of COVID19 severity.

This study recorded the time of hospital presentation of covid patients. 89.8% of the patients were presented to the hospital in less than 7 days. This is probably attributed to the fear and increased awareness of COVID -19 complications within the community. The delayed beginning of supportive treatment may have an impact on clinical outcomes,

as well as the host's immunological, inflammatory, and thrombotic responses. However, there was no significant link between admission severity and the day of admission. The severity of COVID-19 must be determined to estimate the efficacy of mitigation efforts and plan for healthcare demands as epidemics develop. Crude case fatality ratios (CFRs) derived from dividing deaths by cases, on the other hand, can be deceiving.^[10] About the magnitude of the disease, the patients in our study were categorized into mild, moderate and severe cases. Most of the patients (69%) were characterized to have mild infections, followed by 21% of them with moderate and very low number of patients with severe forms of infections. In a previous study conducted by Thai et al,^[11] patients with severe infection were recorded in lower cases. As per Lescure et al. 15's reports, only a very low number of patients required intensive care. However, a significant association existed between admission severity and hospital stay duration.^[12] Our study recorded the hospitalization of 35.5% of patients among the severity group for a longer time. In a study conducted by Wu et al,^[13] it was reported that among the factors influencing the length of stay of patients at the hospital, those with adverse disease symptoms such as cold and fever were admitted for days longer than those with no severe symptoms.

The median length of hospital stays due to COVID-19 has been reported in several studies and varies depending on several factors, including the time elapsed between exposure and symptom onset and the time elapsed between symptom onset and hospital admission as country-specific factors.^[11] The hospital stay duration of the patients ranged from less than to more than 7 days. Most of the patients were discharged within 7 days of admission and most of these patients had a mild infection and presented early to the hospital. 10% had an extended stay of more than 7 days. However, there is no significant association between the day of hospital presentation and the duration of hospital stay ($p=0.688$). Rees et al,^[14] reported the average length of hospital stay for covid 19 patients as 4-53 days. Nonetheless, hospital stays in the US and several European countries are shorter, with an average of 7-8 days.^[15]

The covid-19 pandemic wreaked havoc on the healthcare system, threatening an ICU bed shortage that would have resulted in increased mortality. Despite the fact that epidemiological analyses offered correct early information on the epidemic's progression, they could not forecast its evolution at the crisis's climax (including the number of ICU beds required). Our study has no significant association between the day of hospital presentation and ICU requirement. It was stated in an earlier report that only 20% of the hospitalized patients required ICU. Their study reported that 63.51% of ICU patients only needed mechanical ventilation, indicating an insignificant relationship between admission severity and duration of admission in

ICU. In our current study, only 3% of patients that displayed signs of disease severity required ICU admission for a shorter period. Henceforth it was affirmed that the onset of symptoms was directly associated with ICU admission.^[15]

Regarding days in ICU admissions, in our study, 20% of cases were admitted for more than 11 days. However, there is no significant association between the day of hospital presentation and the duration of stay in the ICU. Rees et al,^[14] report an average of 5-19 days of ICU stay in Covid patients with adverse rates of infection included in their study.

In our study, patients' survival rates were extremely high (97%), with only 3% mortality rates. Our current study looked at potential risk factors for severe COVID-19 and factors linked to death in severe instances. It was evident that there was no significant association between the day of hospital presentation and mortality. Li et al,^[8] instated the death of a significant number of patients with adverse Covid severity. According to our study, a significant association existed between the onset of symptoms and age group. In a study reported by CDC16, adults aged 65 and above accounted for more percentage of COVID-19-related deaths, with those aged 85 and up having the most significant percentage of severe outcomes.

In contrast, no ICU hospitalizations or deaths among people under the age of 19 were reported. Like others from other nations, this finding implies that the risk of severe disease and mortality from COVID-19 is higher in the elderly. Another study from China showed that over 80% of deaths occurred in people under the age of 60 years.^[17]

CONCLUSION

The overall outcome is determined by several factors, including the time between exposure and symptom onset, the time between beginning of symptoms and hospital presentation, duration of hospital stay, ICU requirement as well as region considerations. In our study timing of presentation to the hospital after the first symptom did not create a meaningful difference in the overall patient outcome.

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