



Admission Hypoxemia as An Outcome Predictor in Covid 19 Patients

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: This study aims to recognize admission hypoxemia as an outcome predictor in COVID 19 patients. **Methods:** This study included 652 adult patients hospitalized in a tertiary care hospital with RT-PCR confirmed COVID 19 between March 2021 to May 2021. Statistical analysis done and p value was calculated by Chi square test.

Results: Among the 652 patients, 530 (81.29%) patients were discharged and 122 (18.71%) patients died during hospitalization. Of the 652 patients, 340 were male and 312 were female. The patients were divided into five groups - those with admission oxygen saturation of 90-100%, 80-89%, 70-79%, 60-69%, less than 60% and mortality rates for these groups calculated. Hypoxemia at admission was also correlated with age and gender. **Conclusion:** Age more than 60 years and admission hypoxemia below 60% were concluded to be predictors of in-hospital death in COVID-19. There was no gender preponderance. These predictors can help physicians to prognosticate and can be utilized to modify the management strategies

Keywords: admission hypoxemia, outcome predictor, mortality rates

INTRODUCTION

On March 2020, the World Health Organization declared corona virus disease 2019 (COVID-19), a pandemic ^[1]. Although most of the COVID 19 patients develop mild illness which would gradually recover after two weeks, about 15-20% of patients develop severe interstitial pneumonia ^[2,3,4]. Patients with severe illness usually develop acute respiratory distress syndrome (ARDS) that requires invasive mechanical ventilation therapy in the intensive care unit, and the mortality rate reported was around 50-60% ^[5]. This study aims to recognize admission hypoxemia as an outcome predictor in COVID 19 patients.

METHODS

STUDY DESIGN

INCLUSION CRITERIA:

This study included 652 adult patients who were hospitalized with RT-PCR confirmed COVID 19 disease at a tertiary care hospital between March 2021 to May 2021.

EXCLUSION CRITERIA:

Those with the below conditions were excluded.

(a) Known respiratory Illness e.g., Chronic obstructive pulmonary disease/Bronchial asthma/Pulmonary Tuberculosis/Interstitial lung disease / Lung carcinoma.

(b) Volume overload states e.g., Chronic kidney disease, Congestive cardiac failure

(c) Intake of noxious substances

Pulse oximeter was used to measure oxygen saturation. Based on the inclusion and exclusion criteria, 652 patients were selected.

STATISTICAL ANALYSIS

Statistical analysis was computed using SAS, version 9.4 (SAS Institute Inc.). Counting data is represented as percentages. Values were rounded off to two decimals. The Chi-Square test was used to compare the categorical variables. Two-sided p-value of <0.05 was accepted for statistical significance.

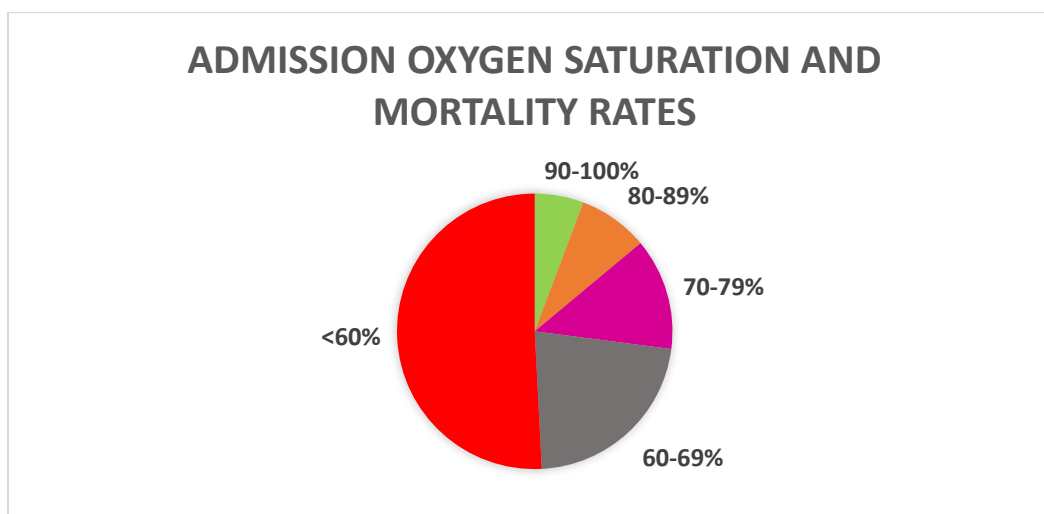
RESULTS

Among the 652 patients, 530 (81.29%) patients were discharged and 122 (18.71%) patients died during

hospitalization. Of the 652 patients, 340 (52.15%) were male and 312 (47.85%) were female. The highest age was 78 years and lowest age was 24 years. The patients were divided into five groups - those with oxygen saturation of 90-100%, 80-89%, 70-79%, 60-69%, less than 60% and mortality rates for these groups calculated. Admission oxygen saturation below 60% had the highest mortality rate of 50.82%. Chi square test was applied and p value was found to be <0.00001 and was statistically significant. Hypoxemia at admission was correlated with age and gender and mortality rates were calculated. Age more than 60 years had the highest mortality rates of 34.43%. On comparing the mortality rates of males and females there was no statistical significance.

ADMISSION OXYGEN SATURATION	90-100%	80-89%	70-79%	60-69%	<60%
TOTAL NO. OF CASES	148	215	114	102	73
DISCHARGED	141	205	98	75	11
DIED	7	10	16	27	62
MORTALITY RATES	5.74%	8.20%	13.11%	22.13%	50.82%

Table 1 Admission oxygen saturation and mortality rates



Graph 1 Mortality rates correlated with admission hypoxemia

ADMISSION OXYGEN SATURATION	90-100%	80-89%	70-79%	60-69%	<60%	MORTALITY RATES
20-30 YEARS	1	0	2	1	3	5.74%
31-40 YEARS	0	4	3	5	8	16.39%
41-50 YEARS	2	1	5	7	15	24.59%
51-60 YEARS	1	3	2	6	11	18.85%
>60 YEARS	3	2	4	8	25	34.43%

Table 2 Age wise mortality rates based on admission hypoxemia

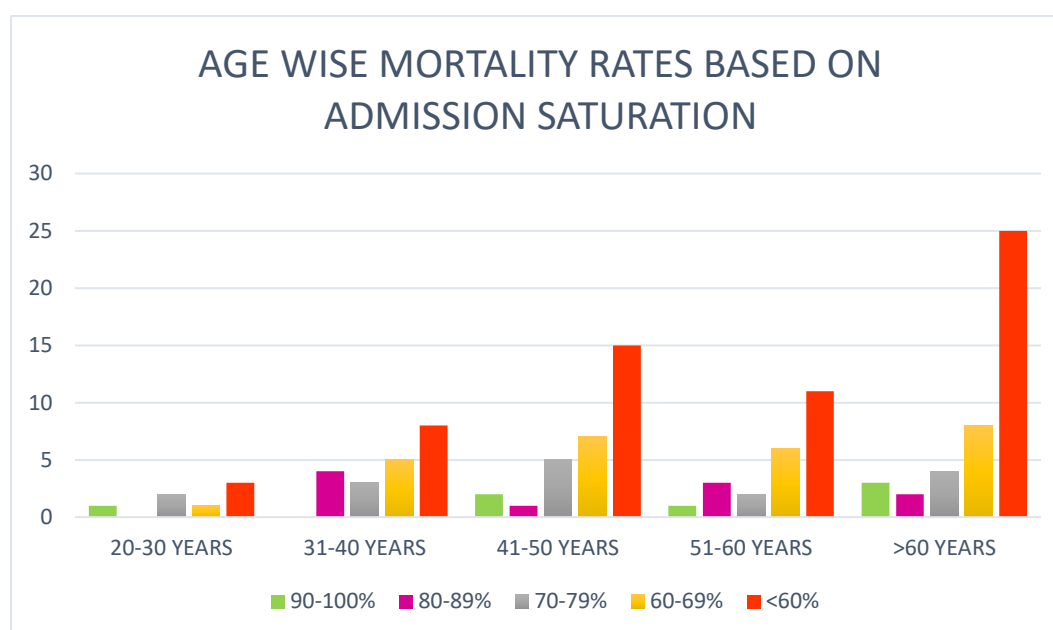


Figure 2 Age wise mortality rates based on admission saturation

ADMISSION OXYGEN SATURATION	90-100%	80-89%	70-79%	60-69%	<60%
MORTALITY RATES IN MALES	5.34%	8.43%	12.45%	23.41%	50.37%
MORTALITY RATES IN FEMALES	5.22%	7.96%	11.98%	22.69%	52.15%

Table 3 Gender wise mortality rates based on admission hypoxemia

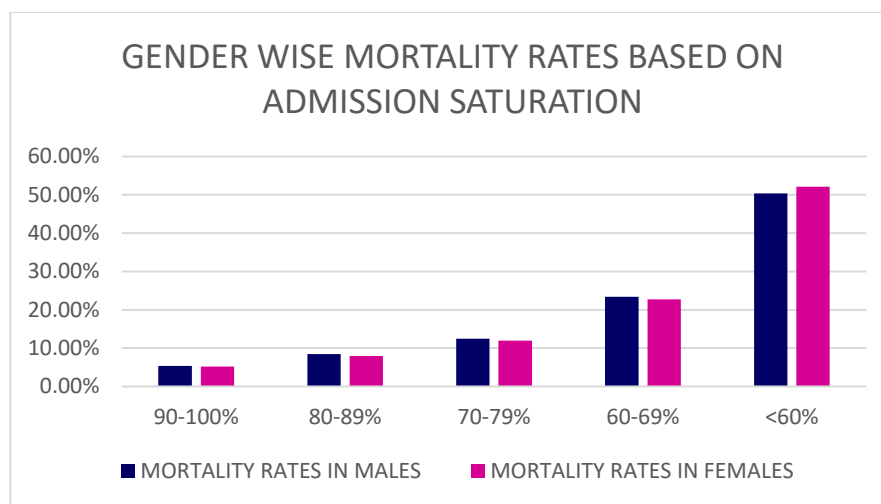


Figure 3 Gender wise mortality rates based on admission saturation

DISCUSSION

This study is the first report of associating admission hypoxemia as an outcome predictor in a large population of hospitalized COVID 19 patients in India between March 2021 to May 2021. From the results, admission hypoxemia below 60% and age more than 60 years has higher mortality.

Previous studies worldwide have revealed multiple risk factors associated with poor prognosis such as older age, male sex, lymphocytopenia, elevated levels of CRP, PCT, LDH and D-Dimer [6]. According to the Chinese center for disease control, the mortality rate is largely influenced by the age of patients (more than 60 years) reaching 14.8% in those with > 80 years [7].

Study by Neal et al., has also shown markedly increased mortality risk with hypoxemia [8]. Public awareness regarding assessment of oxygen saturation at home for COVID-19 patients can therefore decrease the mortality rates.

The weaknesses of advanced age are related to the function of defence cells T and B, and to the excess production of type 2 cytokines, which can lead to prolonged pro inflammatory response, potentially leading to poor results [9]. This plus the high expression of angiotensin-converting enzyme genes in different parts of the body, such as heart and lungs, may also increase death risk in this group.

The main limitation of the study is that those who were hospitalized belong to moderate and severe disease hence the exact mortality rates would be lower. Also, the results were obtained from a single tertiary center.

CONCLUSION

Age more than 60 years and admission hypoxemia below 60% were concluded to be predictors of in-hospital death in COVID-19. There was no gender preponderance. Hypoxemia may be asymptomatic and may result in a delay in accessing life-saving treatment. Hence hypoxemia should be an indication for COVID-19 patients to seek medical care. Early identification of hypoxemia and timely access to care are crucial for decreasing the number of deaths and increasing survival. These predictors can help physicians to prognosticate and can be utilized to modify the management strategies.

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