



Mode Of Oxygenation In Covid-19 Patients In ICU - A Cross Sectional Observational Study

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Abstract

Introduction: COVID 19 is relatively a new infectious disease which has various stages to it, ranging from mild asymptomatic disease to critical lung involvement causing acute respiratory distress syndrome which can also be fatal. Oxygenation seems to be one of the primary treatment, in order to prevent further complications. There are various methods for oxygen delivery systems are available viz. room air, face mask to intubation. Several studies have been done but no conclusive evidence have been found. With this background we conducted this study.

Aim: to correlate the oxygen requirement related to the symptoms in COVID-19 patients.

Methods: this prospective observational study was done for a period of three months in a M.R. medical College and Basaveshwar teaching and General Hospital. COVID 19 positive patients of either gender in the age group 18 to 85 years were included in the study.

Results: In our study majority of the patients were male patients (65%). It was seen that major to the patients had mild and complicated disease (36%). Nasal prongs were the most commonly used mode of oxygen delivery (38%). 68% of the patients recovered from the disease in our study. We found that there was a significant association between the baseline variables and the code 19 status of the patients on admission.

Keywords: covid 19, oxygenation, covid 19-outcome

Introduction

Covid-19 is a novel disease with varied presentation from asymptomatic to mildly symptomatic to severe lung involvement and ARDS. There are many studies with conflicting results. In a prospective study conducted by Saluja et al, the data of 406 patients admitted to COVID 19 isolation ward was analysed to identify prognostic and diagnostic predictors along with the defining clinical characteristics and severity of disease. It was concluded that geriatric population was more likely to have a poor outcome. [1] Another study stated that patients with older age and associated comorbid conditions may have greater risk for lung injury. [2] In a study by Varghese G M et al, they concluded that the evolving COVID -19

pandemic requires a multifaceted approach. [3] The absence of fever in Covid-19 is more frequent than in SARS-CoV (1%) and MERS-CoV infection (2%), 20 so afebrile patients may be missed if the surveillance case definition focuses on fever detection. [4] some studies suggest Age and disease severity can be correlated with the outcomes of COVID-19. [5] There is also evidence of detectable SARS-CoV RNA until 20 days in many individuals This

has important implications for both patient isolation decision making and guidance around the length of antiviral treatment. [6] And there is only limited evidence regarding mode of oxygenation and its effect on outcomes. Our study will help in conflating the oxygen requirement related to symptoms, clinical

cause, treatment received and outcome. This helps in predicting the appropriate treatment profile and in time reducing the morbidity and hostility.

Aim & objectives:

1. To correlate the oxygen requirement related to the symptoms in COVID-19 patients
2. To study clinical course, treatment received and outcome of COVID-19 patients

Methodology:

The study was conducted as a prospective observational study in M.R. Medical College and Basaveshwar Teaching & General Hospital, Kalaburagi for a period of 3 months. This study was started after obtaining institutional ethics committee approval (HKES/MRMCK/IEC/21021220) and written informed consent from patients.

Inclusion criteria	Exclusion criteria
COVID-19 positive patients (RT-PCR) Age: 18 to 85 years Consent and patience (written and verbal)	Patient’s referred Pregnant patients

All COVID -19 (RT-PCR) positive patients admitted to COVID ICU at BTGH were assessed for eligibility criteria and those who were willing to give consent as mentioned above were included in the study. Patient type at initial admission was categorised according to COVID-19 Government of Indian Ministry of Health and Family Welfare Directorate General of Health Sciences (EMR Division) Version 5 03.07.2020. Development of new symptoms (or) full in oxygen saturation was monitored and treated accordingly. All the data were collected in the google forms. Patients’ vitals was monitored regularly by the duty doctor in ICU. Following O2 requirement, ABG, CSR were assessed and patient was followed up accordingly until the patient gets discharged from ICU.

Statistical analysis:

Descriptive statistics will be used for demographic data and chi square test for categorized data. Data will be represented as percentages, mean ± SD. Spearman correlation test was done to see the association between the baseline characteristics of the patients and the outcome and between baseline characteristics of the patients and COVID-19 status.

P value less than 0.05 was considered significant. All statistical test were done using software SPSS version 20.

Results:

In this study a total of 72 patients with Covid 19 positive status were admitted in the ICU for management. The mean age of the study participants was 54.17±14.73. Majority of the patients were male 65%, and female patients were 35%. Most of the patients, 65% had hospital stay for less than 10 days. 36% of the patients had mild and complicated disease followed by 27% what are asymptomatic and 25% of the patients had moderate Covid 19 disease. Most of the patients 22% had normal chest x-ray, 15.3% had less than 50% and involvement at admission. SP O2 was found to be less than 92 and 5.5% of the patients and it was more than 90 to 137% of the patients. 37.5% of patients received oxygen via natural prongs and 25% of patients receive toxin via face-mask followed by the other modes of oxygen delivery devices. 11% of the patients require intimation during their hospital stay. 44% of the patients recovered while 15.3% of the patients died due to the disease.

Table 1: Baseline Demographic Characteristics of participants

Parameters	Total n=72 (%)
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Age	54.17±14.73
Gender	
Male	47 (65)
Female	25 (35)
Duration of hospital stay	
<10 days	47 (65)
>10 days	25 (35)
Covid status at admission	
Asymptomatic	20 (27)
Mild uncomplicated	26 (36)
Mild symptomatic	1 (2)
Moderate	18 (25)
Severe	2 (3)
critical	5 (7)
Tobacco use	
Previous tobacco use	47 (65)
Active tobacco use	4 (6)
Comorbidities	
Yes	41 (57)
No	31 (43)
Chest-x-ray	
<50% lung involvement	11 (15)
>50% lung involvement	1 (2)
Normal	16 (22)
Not done	2 (3)
SpO₂	
>92	27 (37)
<92	4 (6)
Not available	41 (57)

Mode of O₂ delivery	
BiPaP	2 (3)
Face mask	18 (25)
HFNC	9 (13)
Intubation	1 (2)
Nasal prongs	27 (38)
Non-rebreathing mask	5 (7)
Room air	9 (13)
Venturi mask	1 (2)
Intubation status	
Yes	8 (11)
No	64 (89)
Outcome	
Recovered	49 (68)
Against medical advice	7 (9)
Transfer to higher centre	5 (7)
Died	11 (15)

Figure:1 Association between mode of oxygen requirement and Covid 19 status

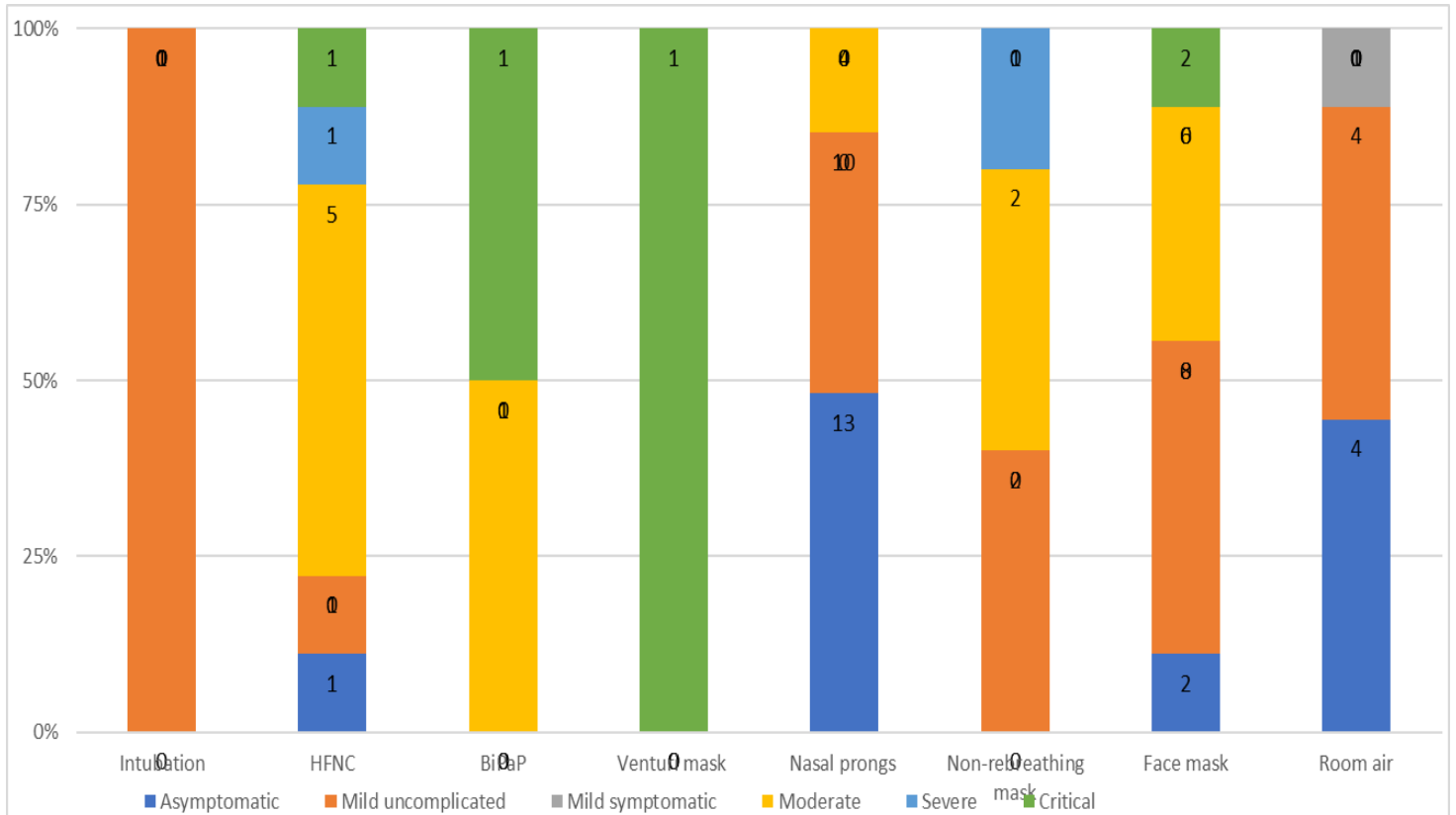


Figure 1 shows association between mode of oxygen requirement and the Covid 19 status of the participants at admission with a P value of 0.01 which is statistically significant.

Figure 2: Association between covid 19 status and Tobacco use

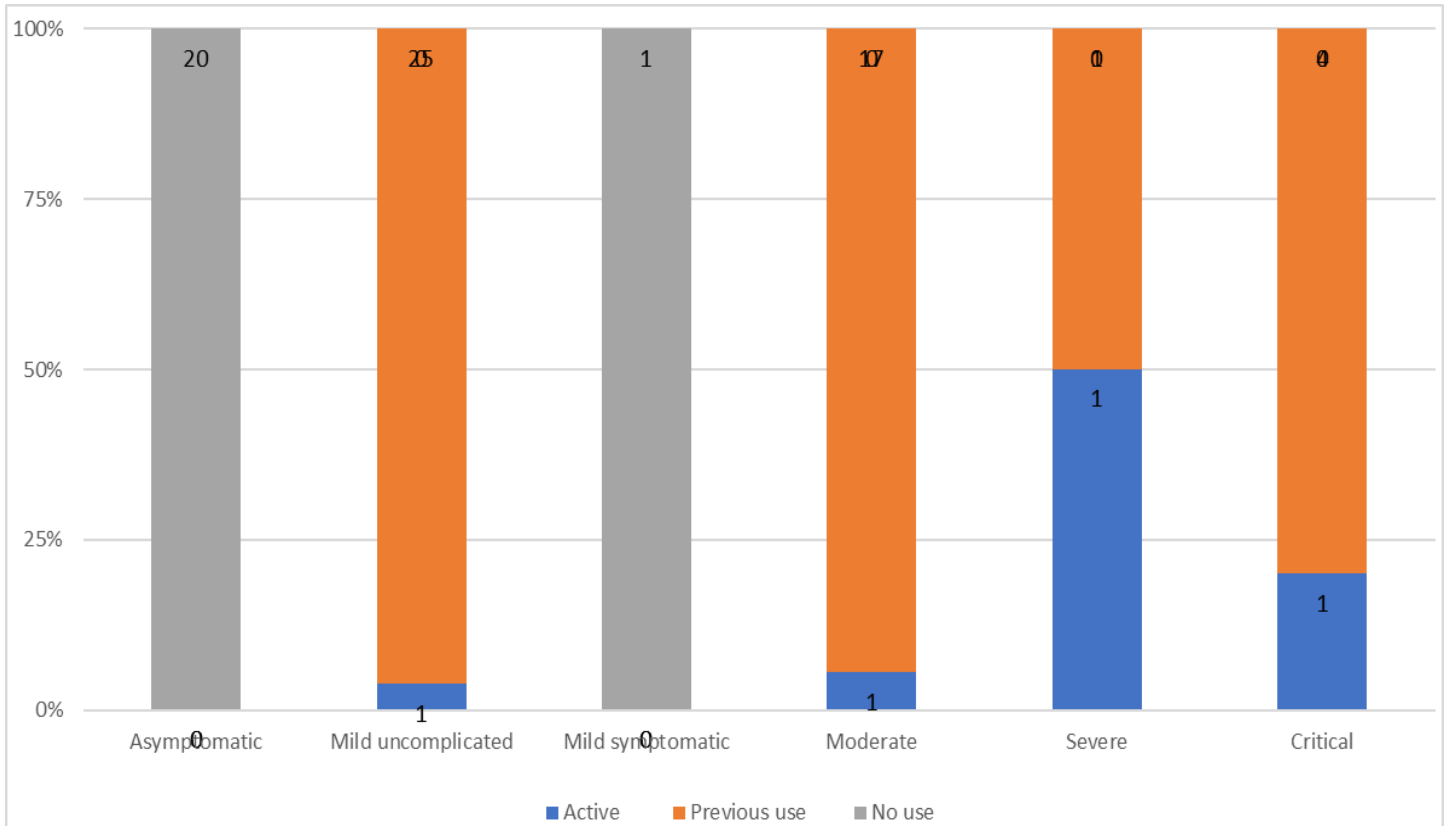


Figure 2 shows the association between tobacco use and COVID 19 status. p value was 0.001 showing that all the categories of Covid 19 status had a significant association of tobacco use except critical state.

Figure 3: Association between covid 19 hospital stay and outcome

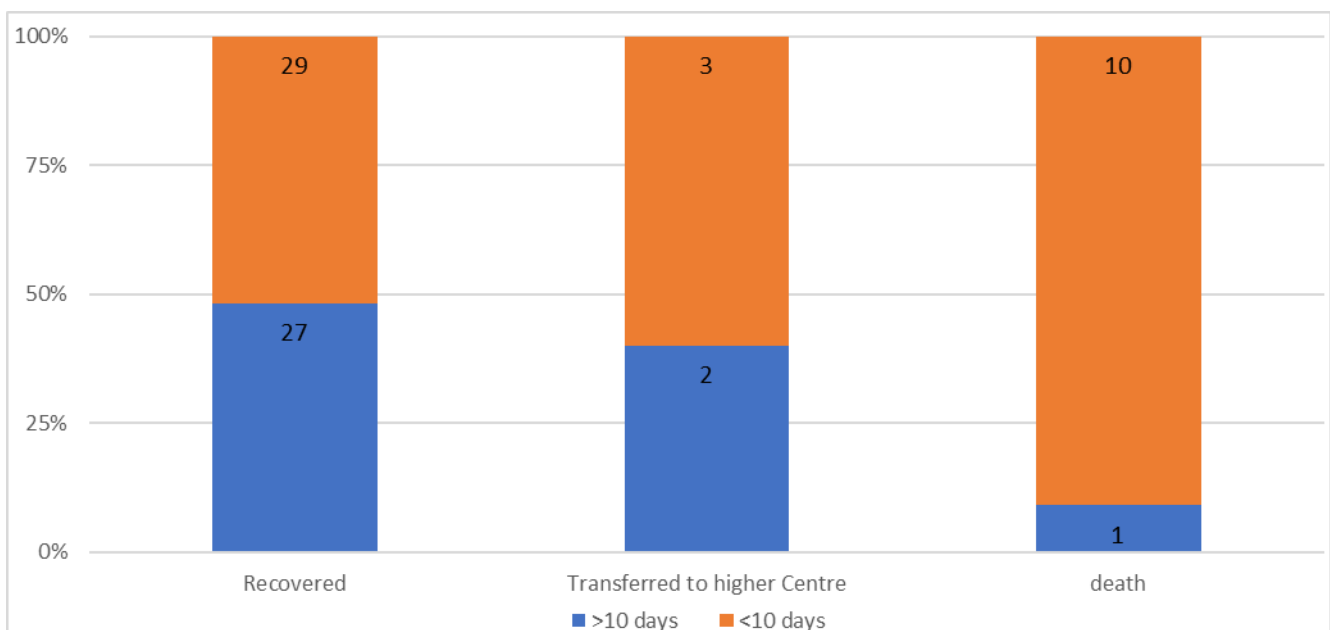


Figure 3 shows the association between Covid 19 Hospital stay and outcome. It was seen that patients who had a hospital stay of less than 10 days had a significant association with the outcome death, with a P value of 0.02.

Figure 4: Association between covid 19 status and outcome

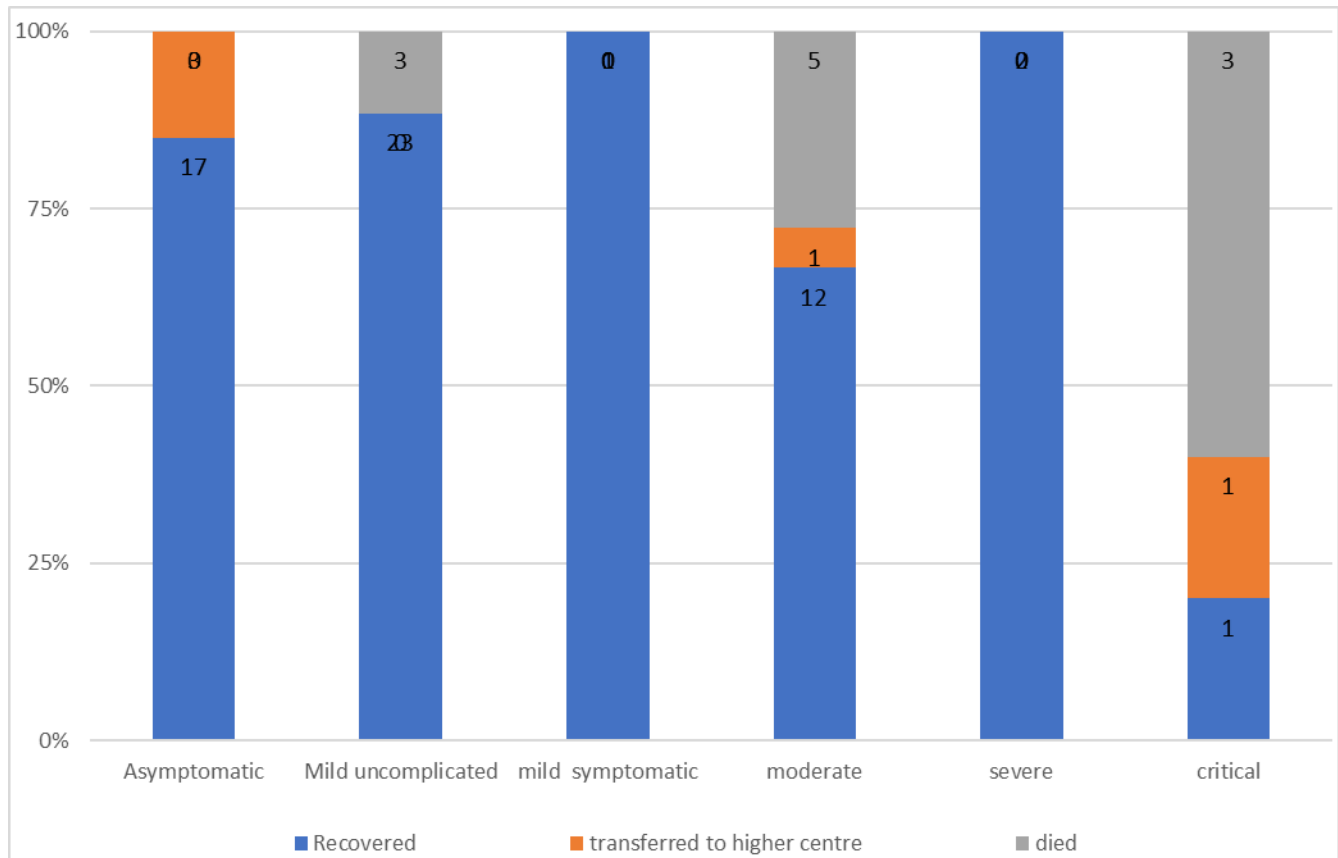


figure 4 shows the association between COVID 19 status and outcome, it was seen that there was a statistically significant association between death and mild uncomplicated, moderate and critical disease with the P value of 0.02.

Figure 5: Association between chest-X-ray and outcome in covid 19 patients

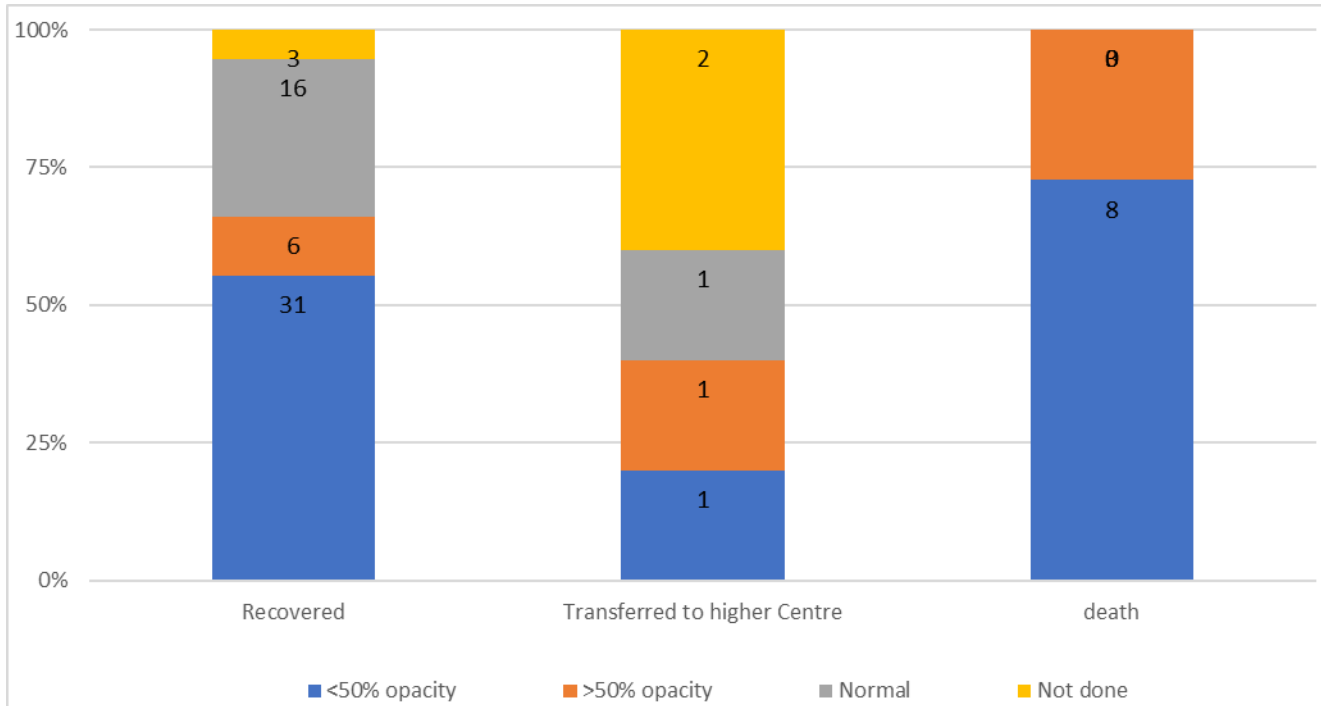


Figure 5 shows the association between chest x-ray on admission and outcome in covid 19 patients, it was seen that those patients for whom chest x-ray was not done were transferred to higher centres for further management. The P value is 0.01, which is statistically significant

Figure 6: Association between Intubation status and outcome in covid 19 patients

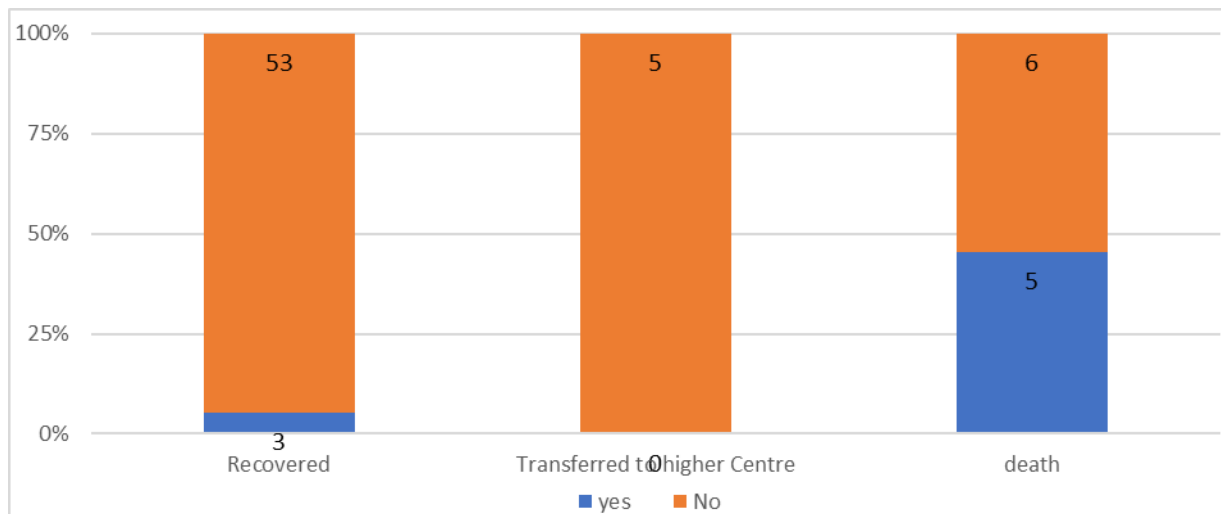


Figure 6 shows that there was a significant association between intubation status and transport to higher centres in Covid 19 patients with a P value of 0.001. It was seen that those patients who did not undergo to intubation were most commonly transferred to higher centres

Figure 7: Association between Chest-X-ray and covid 19 status

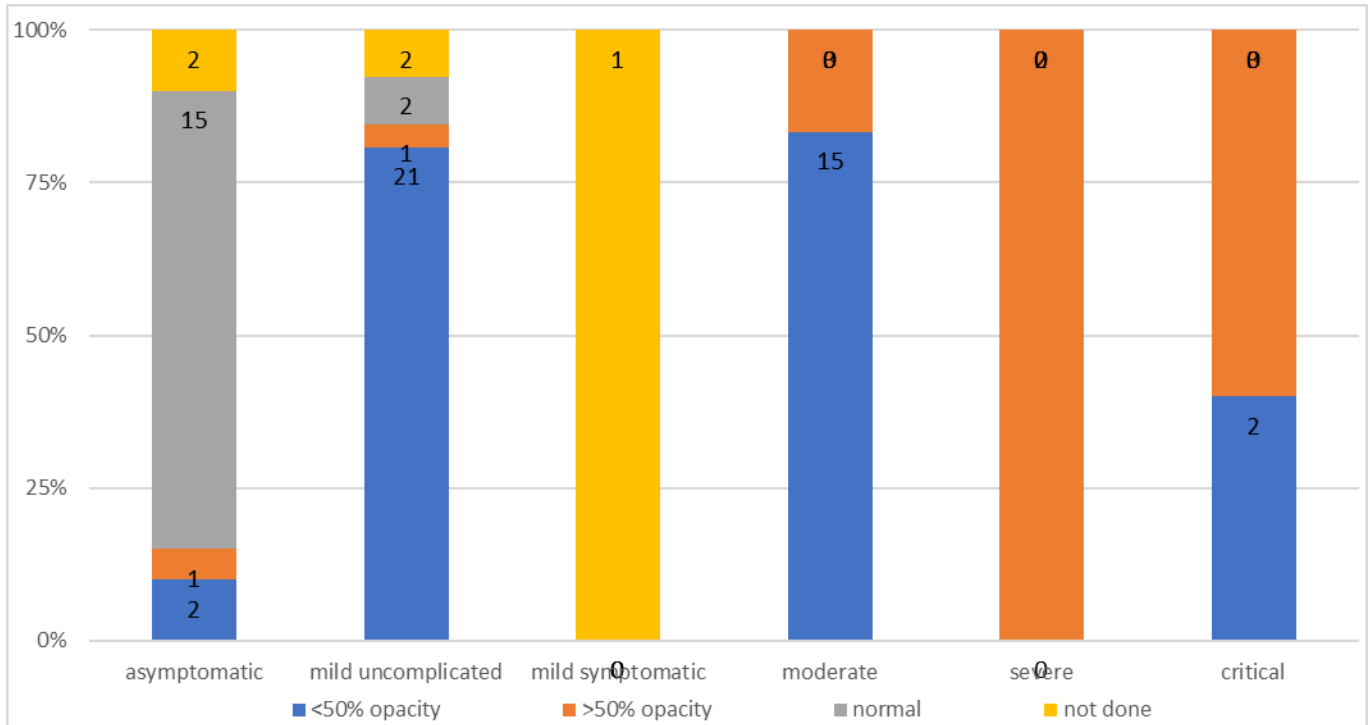


Figure 7 shows that there was statistically significant association between chest x-ray and the Covid 19 status of the patients at admission with a P value of 0.001

Figure 8: Association between SPO2 and covid 19 status

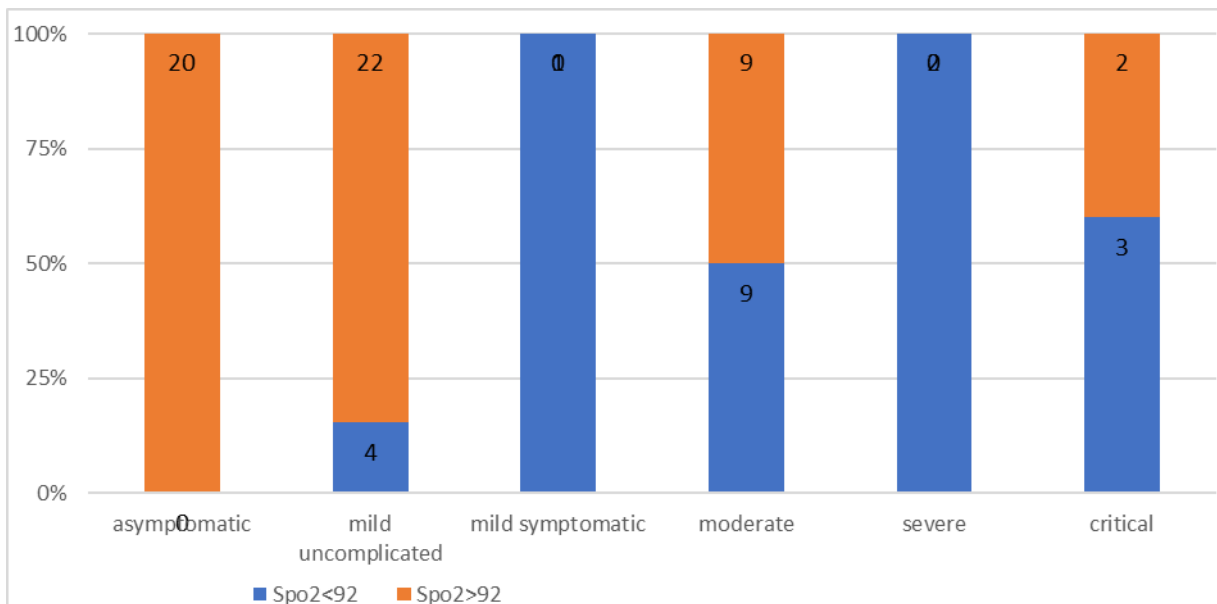


Figure 8 shows the association between oxygen saturation and the status of Covid 19 of the patients on admission. The P value was 0.001 which was a statistically significant association.

Table 2: Association between baseline characteristics and Covid 19 status of study participants

Association between covid 19 status and other variables	Asymptomatic	Mild uncompllicated	Mild symptomatic	moderate	severe	critical
Chest-X-ray	0.01	0.02	0.002	0.003	0.04	0.001
SPO2	0.001	0.02	0.005	0.001	0.001	0.001
Intubation	NS	NS	NS	NS	NS	NS
Mode of O2 delivery	0.001	0.002	0.001	0.001	0.001	0.001
Tobacco use	0.001	0.02	0.001	0.002	0.001	0.001
Hospital stay	NS	NS	NS	NS	NS	NS

NS- Not significant, P-value<0.05 significant

Table 3: Association between baseline characteristics and outcome in study participants

Association between Outcome and other variables	Recovered	Transferred to higher center	Died
Covid 19 status	NS	NS	0.02
Tobacco use	NS	NS	NS
SPO2	NS	NS	NS
Hospital stay	NS	NS	0.03
Chest-X-ray	NS	0.01	NS
Intubation	NS	0.01	NS

Discussion:

Covid 19 pandemic has necessitated many researchers to invest their resources in this field for helping the physicians by aiding them in effective management of the patients. In previous studies there is evidence that people in geriatric age and comorbidities require longer hospital stay and hence had more guarded prognosis when compared to younger individuals with covid 19 who require lesser hospital stay time.¹ It is also seen that the former patients had a greater risk lung injury as suggested by chest-X-ray.² And our study is also concordant with these findings from previous studies. As per the study done by Varghese et al they have suggested a multifaceted approach for covid 19 effective management which is again evident from our study.³ But the Chinese study done by Lai et al showed most patients were symptomatic which is discordant with our study findings were most were asymptomatic and mild uncomplicated without fever.^{4,5,6} Again covid 19 positivity is given emphasis in previous studies which our study doesn't. Among the studies most of them were available from China and their reproducibility and generalisability to general population is questionable. Our study has found out significant association and correlation between O₂ requirement and covid 19 symptomatology. This could be used in triaging the patients and allocating them necessary O₂ requirements were this had produced havoc in recent times. And chest-X-ray and SPO₂ could be used as effective tools for predicting patient outcome. Again, patients exposed to nicotine of any form had a much guarded prognosis when compared to patients who were not exposed to them, this appears to follow the similar trend to most other pulmonary disorders when it comes to nicotine exposure. So, our studies are in concordant with studies from Nicolaou et al who suggested that chest-X-rays could be cheap and effective methods to diagnose and manage covid 19 effectively.⁸ In a study done by Shrestha et al says intubation is associated with a much guarded prognosis in covid 19.⁹ Tobacco use has contradictory results. A lancet review showed it to be not significantly influencing the outcome.¹⁰ But our study is synchronous with WHO statement regarding tobacco use in covid 19 patients.¹¹ With the existing knowledge that is so merger in covid 19 this study has added up to the existing evidence with this new information.

This study was conducted in a tertiary care centre so this might not be extrapolated to all population especially in Indian scenario were there is a very fragile health care setup and most people are unaffordable to the expensive treatments. Only very limited centres provide Quality treatment free of cost. The age studied was middle aged population and impact of covid 19 on geriatric population were not given emphasis.

Conclusion:

The havoc caused by covid 19 pandemic is innumerable and this has produced a global impact in all walks of life. Research is going on with full-fledged swing in management and other aspects of the disease in different parts of the globe. Our study is a part of it to generate evidence along with existing other studies. From our study we conclude that there was a significant association with the baseline characters like chest x-ray, oxygen saturation, mode of oxygen delivery and tobacco use with the severity of the Covid 19 disease. It was also seen that there was a significant correlation between chest x-ray and intubation status and transfer of the patients to higher centre as the outcome of the disease. This has also cleared some controversies and paved way for newer approaches and triages that could be followed if another pandemic of the similar virus might ensue.

References:

1. Revised guidelines for home isolation of very mild/ pre-symptomatic/ asymptomatic COVID19, Govt MOHFW 2 July2020.
2. Manoj Saluja1, Drishya Pillai, Shivcharan Jeliya, Nitesh Baudhh, Rahul Chandel. COVID 19-Clinical Profile, Radiological Presentation, Prognostic Predictors, Complications and Outcome: A Perspective from the Indian Subcontinent. Journal of The Association of Physicians of India 2020; 68, 13-8.
3. Arun Gaur, Surender Kumar Meena, Ramavtar Bairwa, Daulat Meena, Rajan Nanda, Shiv Raj Sharma, Govind Singh Rajawat. Clinico-radiological Presentation of COVID-19 Patients at a Tertiary Care Center at Bhilwara Rajasthan, India. Journal of the association of physicians of India 2020; 68:13-7.
4. Varghese GM, John R, Manesh A, Karthik R, Abraham O C. Clinical management of COVID19. Indian J Med Res 2020; 151: 401-10

5. W. Guan, Z. Ni, Yu Hu, W. Liang, C. Ou, J. He, L. Liu, H. Shan, C. Lei, D.S.C. Hui. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med* 2020; 382:1708-20.
6. Chih-Cheng Lai a, Yen Hung Liu b, Cheng-Yi Wang b, Ya-Hui Wang c, Shun-Chung Hsueh d, Muh-Yen Yen e,f, Wen-Chien Ko g, Po-Ren Hsueh h,i. Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): Facts and myths. *Journal of Microbiology, Immunology and Infection* 2020;53:404-412.
7. Fei Zhou, Ting Yu, Ronghui Du, Guohui Fan, Ying Liu, Zhibo Liu, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet* 2020; 395:1054-62.
8. Nikolaou V, Massaro S, Fakhimi M, Stergioulas L, Garn W. COVID-19 diagnosis from chest x-rays: developing a simple, fast, and accurate neural network. *Health Inf Sci Syst.* 2021 Oct 12;9(1):36.
9. Shrestha, Gentle S, Ninadini S, Ritesh L, Saurabh P, Anil S, Robert C. "Emergency Intubation in Covid-19." *New England Journal of Medicine* 384, no. 7 (February 18, 2021): e20.
10. Smit, Richard N. van, Guy Richards, and Frank T. Leone. "Tobacco Smoking and COVID-19 Infection." *The Lancet Respiratory Medicine* 8, no. 7 (July 1, 2020): 664–65.
11. "WHO Statement: Tobacco Use and COVID-19." Accessed April 29, 2022. <https://www.who.int/news/item/11-05-2020-who-statement-tobacco-use-and-covid-19>