

A Clinical study and assessment of risk factors for morbidity and mortality in covid 19 patients in a tertiary care ICU

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ABSTRACT

BACKGROUND:

Corona Virus Disease (COVID 19) is an infectious disease caused by SARS-CoV-2. While most people who were infected experienced mild to moderate symptoms and recovered without any specific treatment, only some acquired serious infection that required In-Hospital admission and intensive care unit (ICU) treatment.

OBJECTIVE:

To assess and describe the clinical characteristics and risk factors associated with morbidity and mortality in COVID 19 Patients in a tertiary care ICU .

STUDY DESIGN: *Retrospective Cross sectional study*

A total of 140 COVID19 infected patients with definite outcomes in the period between March-May 2021 were identified and their medical records were obtained from Department of Medical Records, Saveetha Medical College and Hospital. Univariate and Multiple Logistic regression techniques were used to identify the association between potential risk factors, morbidity and mortality.

RESULTS:

A total of 140 COVID 19 positive patients were included in the study, out of which 101 expired and 39 were discharged from the Hospital. There was male predominance in the mortality group (71%). The mean age of the mortality group was 58 years. Increased risk of in hospital mortality was found in patients who were not vaccinated (p value-0.008) and in those who were vaccinated, vaccination with single dose (p value-0.022) had higher risk of mortality. Other independent risk factors were increasing age (p value-0.017), CT chest Severity (p value-0.000), CRP (p value-0.000), D-Dimer (p value-0.001), Serum Ferritin (0.002), LDH Levels (p

value-0.01), Co-morbidities like Diabetes Mellitus (p value-0.015),Hypertension(p value-0.028),COPD and Asthma(p value-0.032).

CONCLUSION:

Age, male sex, Vaccination status, CT chest Severity, CRP and D-Dimer levels, Co-morbidities like Diabetes Mellitus, Hypertension, COPD and Asthma were found to be significant independent risk factors for morbidity and mortality among COVID 19 patients admitted in the tertiary care ICU.

INTRODUCTION:

COVID-19 infection and pandemic is still ongoing which started in december2019 in the city of Wuhan, China. While most people who were infected experienced mild to moderate respiratory illness and recovered , some people acquired serious infection that required In-Hospital admission [Ji W et al.,2020]^[1].Like many respiratory viruses, it spreads through droplet infection by coughing, sneezing, speaking or breathing. It is part of the coronavirus family, which include common viruses that cause a variety of diseases from mild illness to diseases like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) which is rare. Symptoms are variable but most often include fever, cough, fatigueand dyspnea. [Yousef Alimohamadi et al.,2020]^[2]. Other symptoms include Myalgia, loss of smell and taste, sore throat and headache. At least a third of people who are infected do not develop clinical symptoms and of those who develop symptoms, most of them experience mild to moderate disease while some develop severe disease (dyspnea ,hypoxia), more than 50% lung involvement, respiratory failure, shock, and multiorgan dysfunction. Though many preventive measures are highlighted in various literatures, in this study we would like to highlight the major disease characteristics and risk factors associated with clinical deterioration, morbidity and mortality in hospitalized patients and ICU.

METHODS:

STUDY DESIGN: *Retrospective Cross sectional study*

A total of 140 COVID infected patients with definite outcomes in the month of March-May 2021 were identified and their medical records were obtained fromDepartment of Medical Records,Saveetha Medical College and Hospital after obtaining approval from institutional review board and ethics committee. Univariate analysis and Multiple Logistic regression techniques were used to identify the association between potential risk factors, morbidity and Mortality using SPSS software version 19.

The following information were obtained from the medical records of each hospitalized patient to analyze the risk factors: Demographic details which included age and sex, symptoms on admission and date of admission, duration of stay in the hospital, vaccination status, history of

contact and recent travel, treatment, co-morbidities, CT chest Severity, LDH, D-Dimer, CRP, Ferritin levels, cause of death if applicable.

RESULTS:

A total of 140 COVID 19 positive patients were included in the study out of which 101 expired and 39 were discharged from the Hospital. Out of 101 in the mortality group, 72 were male and 29 were female. Average duration of stay in the hospital was 11 days. The most common symptoms experienced by the patients on admission was fever(72%), myalgia(52%), breathlessness(51%), cough with expectoration(37%), loss of smell(27%), throat pain(17%), cold and vomiting(3%) in that order.

The mean age of the mortality group was 58.05 years, while it was 51 years in the discharged group. Among the mortality group 70% of the patients were above the age of 50yrs, while among the discharged group 17% of the patients were above the age of 50yrs. Among the mortality group 98% of the patients were not vaccinated and 2% patients were vaccinated with a single dose of Covishield vaccine while 12.8% patients were vaccinated with 2 doses of Covishield among discharged patients.

Increased risk of In-Hospital mortality was found in patients who were not vaccinated (p value-0.008) and in those who were vaccinated, vaccination with single dose (p value-0.022) had higher risk of mortality. Other independent risk factors were increasing age(p value-0.017), higher oxygen requirement at the time of admission(p value-0.001), CT chest Severity(p value-0.000), CRP(p value-0.000), D-Dimer(p value-0.001), Serum Ferritin(0.002), LDH Levels(p value-0.01), Co-morbidities like Diabetes Mellitus(p value-0.015), Hypertension(p value-0.028), COPD and Asthma (p value-0.032).

Analysis by Multivariate logistic regression technique showed increasing odds of In-Hospital deaths with increasing age, CT chest severity, vaccination status and number of doses if taken, CRP and D-Dimer levels, co-morbidities including diabetes mellitus, hypertension, COPD and asthma.

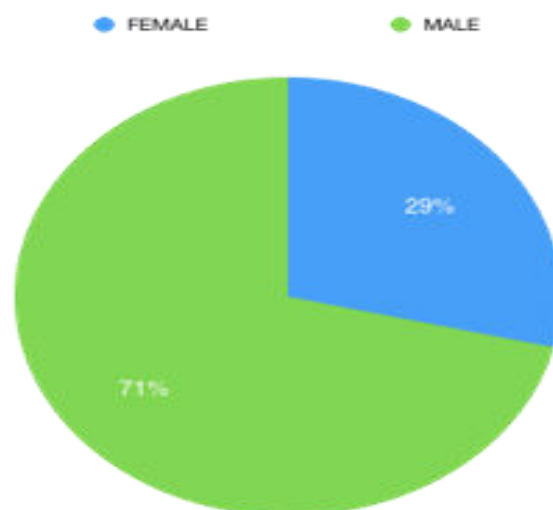


FIGURE 1: SEX PREDOMINANCE AMONG MORTALITY GROUP PATIENTS

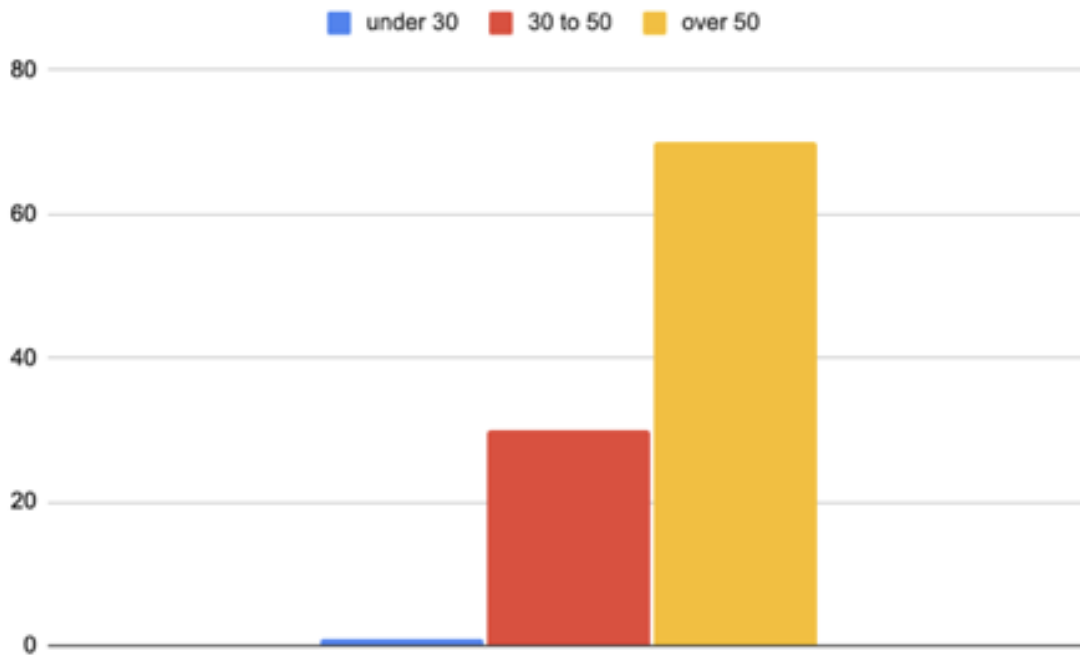


FIGURE 2: AGE DISTRIBUTION AMONG MORTALITY GROUP PATIENTS

Age in years

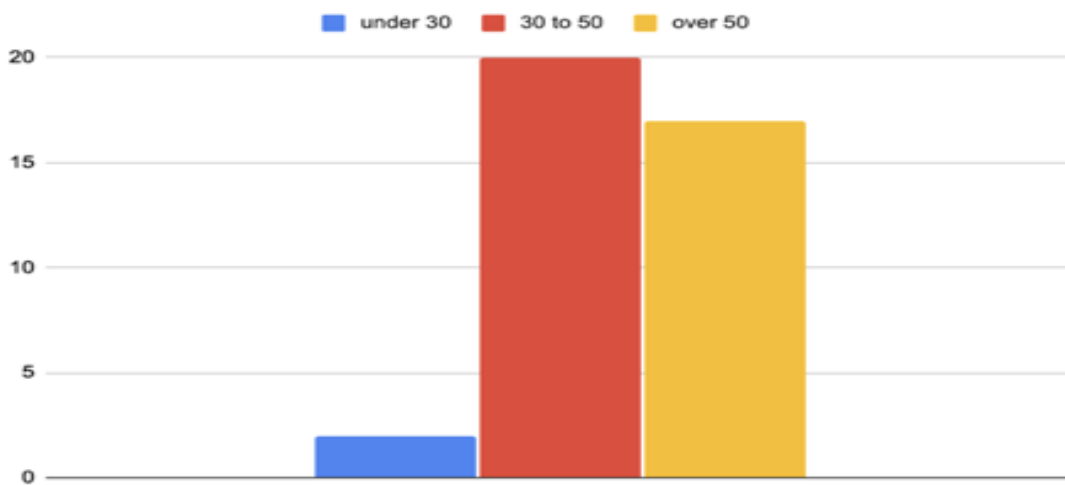


FIGURE 3: AGE DISTRIBUTION AMONG DISCHARGED GROUP PATIENTS

AGE IN YEARS	MORTALITY GROUP	DISCHARGED GROUP
LESS THAN 30	1	2
30 TO 50	30	20
MORE THAN 50	70	17

TABLE 1: COMPARISON OF PREDOMINANCE OF AGE GROUPS AMONG MORTALITY AND DISCHARGED PATIENTS

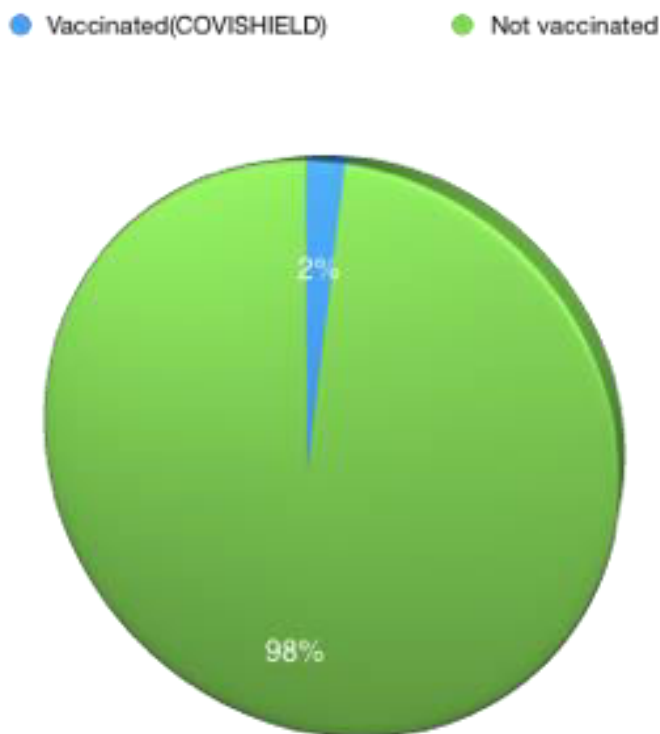


FIGURE 4: PERCENTAGE OF VACCINATION STATUS AMONG MORTALITY GROUP PATIENTS

	Mean +_ SD
Age (years)	58.04(4.85)
CT Severity Score Index	14.84(4.758)
CRP (mg/L)	131.16(84.549)
D-Dimer(ng/ml)	1500.73(1504.405)
Serum Ferritin Levels (mg/L)	867.02(1173.172)
LDH levels (IU/L)	549.47(286.786)
Heart Rate (beats per min)	96(12)
Blood pressure (mm of Hg)	Systolic-136(14) Diastolic-92(11)
Respiratory rate (breath per minute)	24(6)

TABLE 2: CLINICAL CHARACTERISTICS OF MORTALITY GROUP PATIENTS

	P VALUE(UNIVARIATE ANALYSIS)
CRP (mg/L)	0.000
D-Dimer (ng/ml)	0.001
Serum ferritin(mg/L)	0.002
LDH(IU/L)	0.010
Age (in years)	0.017
CT Severity	0.000
Vaccination status	0.008
No.of doses of vaccine taken	0.022
CO-MORBIDITIES (Diabetes Mellitus)	0.015
CO-MORBIDITIES (Systemic Hypertension)	0.028
CO-MORBIDITIES (CAD)	0.446
CO-MORBIDITIES (Pulmonary TB)	0.653
CO-MORBIDITIES (COPD/Asthma)	0.032

CO-MORBIDITIES (Dyslipidemia)	0.669
CO-MORBIDITIES (Cerebrovascular Disease)	0.562
CO-MORBIDITIES(CKD)	0.577
CO-MORBIDITIES(Malignancy)	0.562
CO-MORBIDITIES (Hypo/Hyperthyroidism)	0.253
CO-MORBIDITIES (Obesity)	0.735

TABLE 3: RISK FACTORS OF MORTALITY GROUP PATIENTS

	MULTIVARIATE ANALYSIS		
	P VALUE	ODDS RATIO	CONFIDENCE INTERVAL
CRP	0.040	2.65	0.986-3.009
D-Dimer	0.005	2.8	0.991-4.998
Serum ferritin	-	-	-
LDH	-	-	-
Age	0.025	3.2	0.867-4.582
CT Severity	0.007	2.50	0.003-5.653
Vaccination status	0.032	6.611	0.000-193740614.175
No.of doses of vaccine taken	0.047	3.408	0.000-8075.612
CO-MORBIDITIES (Diabetes Mellitus)	0.023	3.72	2.198-8.361
CO-MORBIDITIES (Systemic Hypertension)	0.014	2.89	1.654-12.826
CO-MORBIDITIES(CAD)	-	-	-
CO-MORBIDITIES (Pulmonary TB)	-	-	-
CO-MORBIDITIES(COPD/Asthma)	0.045	1.89	1.23-7.456
CO-MORBIDITIES(Dyslipidemia)	-	-	-

CO-MORBIDITIES (Cerebrovascular Disease)	-	-	-
CO-MORBIDITIES(CKD)	-	-	-
CO-MORBIDITIES(Malignancy)	-	-	-
CO-MORBIDITIES(Hypo/Hyperthyroidism)	-	-	-
CO-MORBIDITIES(Obesity)	-	-	-

TABLE 4:RISK FACTORS OF MORTALITY GROUP PATIENTS**DISCUSSION:**

In this study, we evaluated the possible risk factors for morbidity and mortality among covid infected patients who were hospitalized in ICU.

Increasing age was found to be a risk factor for mortality in this study in which the mean age of mortality was 58.05 compared to a study done by Rama Ballouze et al.,2020 in which the mean age was 49.4 with a standard deviation of 20.9^[3].

There was male predominance in the mortality group (out of 101, 72 patients were male) whereas in a study done by Olga Laosa et al., out of 375,207 patients were men^[4].

The most common symptoms experienced by the patients on admission was fever(72%),myalgia(52%),breathlessness(51%),cough with expectoration(37%),loss of smell(27%),throat pain(17%),cold and vomiting(3%) in that order in comparison to a study done by Hafiz Abdul Sattar Hashmi et al.,2020 which also stated fever and cough with expectoration as predominant symptoms^[5].

Furthermore, increased risk of in hospital mortality was observed in patients with associated co-morbidities including diabetes mellitus, hypertension, COPD and asthma compared to a study done by MariumAyed et al.,2020 which stated that pre-existing hypertension and moderate/severe acute respiratory distress syndrome had increased risk of mortality^[6].

Co-morbidities like Coronary artery disease, obesity, malignancy, Chronic Kidney Disease, cerebrovascular diseases, dyslipidemia and thyroid disorders were not associated with increased mortality compared to a study done by paddy ssetnongo et al.,2020 which showed Cardiovascular disease, hypertension, diabetes, congestive heart failure, chronic kidney disease and cancer have a greater risk of mortality compared to patients with COVID-19 without these comorbidities^[7].In another study done by omar ariel et al.,it stated that higher the prevalence of comorbidities the higher the odds that the COVID-19 patient will need intensive care or will die, especially if the pre-existing disease is hypertension, heart disease, or diabetes^[8].

Patients who were not vaccinated was at higher risk of mortality compared to the ones who were vaccinated. Vaccination still proves to be protective against severe disease according to a study done by katarzyna et al.,2021^[9].

Patient's CT severity score was directly proportional to the risk of mortality.

Other independent risk factors were oxygen saturation at the time of death, CRP and D-Dimer levels in comparison to the study done by Fellipe Lazar Neto et al.,2021 which also stated low oxygen saturation, CRP, LDH, urea and Neutrophil-lymphocyte ratio was associated with mortality^[10].

There are a few limitations of this study which has to be noted. Relatively small sample size of this study could have reduced the accuracy of the results by causing type 2 error. All the data of each patient may not have been recorded in the same way or with same accuracy and consistency.

CONCLUSION:

Older age, Male sex, Vaccination status, CT Severity, CRP, D-Dimer, Co-morbidities like diabetes mellitus ,Hypertension, COPD and Asthma were found to be significant independent risk factors for mortality among COVID 19 patients and extra attention is to be given for patients with such risk factors in the Hospital which can alter the outcomes.

CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest for this study.

FUNDING SUPPORT:

The authors declare that they have no funding support for this study.

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