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Research Article

Analysis of Epidemiological and Clinical Factors of Patients Admitted to Covid ICU Setup in a Tertiary Care Center during Second Wave in India: A Retrospective Observational Study

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ABSTRACT

Background: Covid-19 has been associated with more than 330 million cases and 5.5 million deaths since December 2019 with many countries witnessing two or three waves of covid -19 cases. In our study we retrospectively analysed data of patients admitted to Intensive Care Unit of a tertiary care hospital in India with moderate to severe disease for association of mortality with comorbidities, gender and age of patients.

Methods: Data of patients admitted to Intensive care unit of our hospital from march 2021 to august 2021 with moderate to severe covid infection was retrospectively collected, patients with incomplete data in records were excluded and data of total of 415 patients was analysed for association of comorbidities (Diabetes, CKD, CAD, Hypertension, Chronic respiratory illness), gender and age for any association with mortality by multivariate binary logistic analysis and chi square test.

Results: There was significant association of increased mortality with age more than 50 yrs having an odds ratio of 1.5 and age more than 70 yrs having odds ratio of 2.46(p= 0.027). There was also significant association between CKD and mortality with odds ratio of 3.117. (p =0.050).

No association between Diabetes, CAD, Hypertension, Chronic respiratory illness and gender was found in our study.

Conclusion: The novel coronavirus infection (COVID-19) has significantly increased mortality in patients of age more than 50 yrs, the risk increases further if age is more than 70 yrs. We also found increased mortality in patients with chronic kidney disease.

Introduction

The novel coronavirus infection (COVID-19), first reported in Wuhan, China in December 2019 is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Since then, it has spread rapidly and was declared a pandemic on March 11, 2020 by World Health Organization (WHO) with over 330 million cases reported worldwide and causing more than 5.5 million deaths till Jan 2022 [1]. There are many limitations to our knowledge as there is much to be learned about this novel virus which continues to evolve. The clinical manifestations of this infection range from mild upper respiratory symptoms to severe acute respiratory distress syndrome with multi organ involvement [2].

COVID-19 has affected people of all age groups, sex and ethnicity worldwide. However, in patients with underlying health conditions and comorbidities, the disease progression is more severe. Patients of older age or having comorbidities like hypertension, diabetes

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mellitus, chronic renal disease, coronary artery disease have increased hospital stay and increased mortality.

With new variants of coronavirus emerging, several countries including India witnessed a two-three wave pattern of COVID -19 infection with different demographic and mortality patterns in each wave [3]. India reported its first wave during October 2020 to November 2020 and second wave in march 2021-june 2021.

In this paper, we retrospectively analysed the data to examine the association of various comorbidities and patient's factors with in hospital mortality of COVID -19 patients who were admitted in Intensive care unit (Moderate to severe Covid-19 infections) during second wave in our hospital.

Methods

After getting clearance from Institutional ethics committee, All RT-PCR(SARS-CoV2) positive patients who were admitted to Intensive care unit of a tertiary care hospital in India with moderate to severe COVID-19 infection from march 2021 till august 2021 were identified by accessing medical records of covid ICU admission. Patients were excluded from the study if inadequate data was available in the medical records or if outcome data was unavailable. Data of total 415 patients was included in the study.

The medical records of the patients were then retrospectively reviewed and data regarding gender, age, individual medical comorbidities (Diabetes, Hypertension (HTN), coronary artery disease (CAD), chronic kidney disease (CKD), Hypothyroidism, Chronic Liver disease (CLD)) and pregnancy was collected along with clinical outcome data. Vaccination history was also noted if available in documents.

Our primary predictor of interest was ICU mortality.

Calculation of risk of death according to burden of comorbidity and age was done using Chi-square test for trend when appropriate.

Adjusted analysis was also performed using multivariate Binary Logistic regression analysis to calculate odds of mortality in various age groups and patients with comorbidities.

Results

Data of total of 415 patients admitted in our covid ICU during second wave of covid was analysed. Total number of deaths were 234 with a mortality rate of 56.39% in our ICU.

Out of total 415 patients 248 were male and 167 were female, mortality was higher in females (60.5%) than males (53.6%) though the difference was not statistically significant.

Increasing Age showed a significant association with mortality with highest mortality of 70.8% in the age group greater than 70 years, 57.9% in 51–70-year age group and 46.8% in less than 50-year age group (Figure 1). Chi-square test of independence revealed a significant association between age and mortality $\chi2$ (2)= 11.564, p= .003. Logistic regression analysis after adjustment for comorbidities showed an odds ratio of 1.503 in 51-70 yr age group patients and 2.462 if age was more than 70 yrs. (p= 0.027).

Increased mortality was seen in patients with Renal disease, Diabetes & Hypertension in our study (Figure 2). However statistical significance in multivariate analysis was only found in patients with renal disease (Table 1).

Pre-existing chronic kidney disease was present in 21 patients. Out of them 14 patients underwent dialysis during ICU stay and total 17 patients died (12 of those who received dialysis). The mortality rate was 81% in the CKD group vs 55.1% in the non-CKD group. chi-square test of independence revealed a significant association between renal disease and mortality. $\chi2$ (1) = 5.428, p = .02. Multivariate regression analysis for mortality showed an odds ratio of 3.117. (p =0.050).

Diabetes was present in 150 patients with a mortality of 61.3% which was higher than in non-diabetic group (53.6%). The difference was however not statistically significant. $\chi2$ (1)= 2.338, (p = .126).

Hypertension was present in 159 patients. The mortality rate was higher in hypertensive patients as compared to non-hypertensive (60.4% vs 53.9%) though the difference was not statistically significant. $\chi2$ (1)= 1.670, (p = .196).

Coronary artery disease was present in 28 patients. The mortality was 71.4% in CAD group as compared to 55.3% in the non-CAD group though the difference was not statistically significant. $\chi2$ (1) = 2.763, (p = .096).

Hypothyroidism was found in 44 patients with mortality rate of 52.3% as compared to 56.9% in the non-hypothyroid patients. The difference was not statistically significant. $\chi2$ (1) = 0.339, (p = .561).

Pre-existing respiratory illness was present in 29 patients. No significant difference in mortality rate was found between patients with pre-existing respiratory disease and those without any pre-existing respiratory disease (58.6% vs 56.20%). $\chi2$ (2) = 2.338, (p = .126).

Majority of patients (385) presented with sub-acute respiratory illness (SARI) symptoms. 9 patients presented with non-SARI symptoms and incidental diagnosis of covid- 19 was made in 10 patients. Data of remaining patients was missing.

Total of 6 patients admitted to ICU were pregnant of whom 2 patients died.

Vaccination data of only 102 patients was available, out of which 65 patients were not vaccinated, 31 patients had received a single dose of vaccination whereas only 6 patients had received full 2 doses of vaccination. In the mortality analysis of these 102 patients, mortality rate was 75.38% in the non-vaccinated group, 51.61% in single dose group and 66.67% in fully vaccinated group. The mortality difference found was not significant statistically(P=0.066). we saw a higher mortality in fully vaccinated than in single dose patients, this may have

been because initial vaccination was being done in high-risk group only thus only high risk and older patients had completed the vaccination with vaccination to low-risk group starting late.

Number of patients with preexisting liver disease and pregnancy was low (3 and 6 patients respectively) hence analysis could not be performed.

Table 1- Multivariate Binary Logistic Regression Analysis

	Odds Ratio	Sign (p)
Age < 50 yrs		0.027
Age 51-70 yrs	1.503	0.095
Age> 70 yrs	2.462	0.008
Diabetes	1.155	0.532
Hypertension	0.908	0.684
CKD	3.117	0.050
CAD	1.561	0.324
Hypothyroid	0.826	0.563
CLD	1.679	0.675
Ch resp disease	0.813	0.616
Pregnancy	0.598	0.563

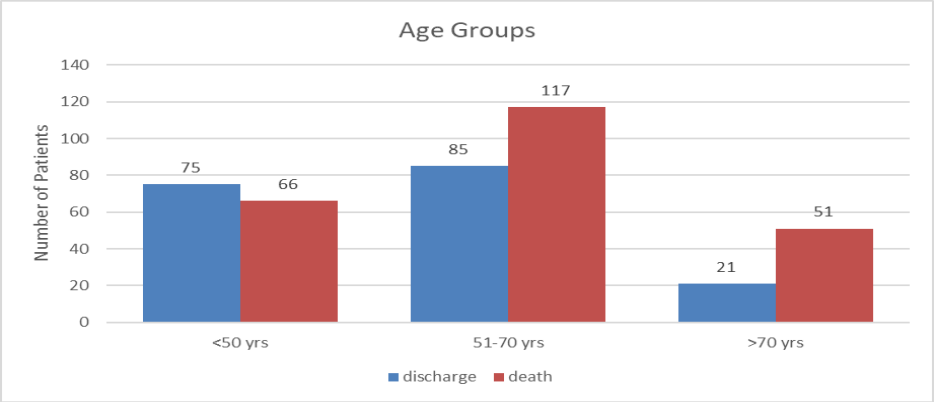
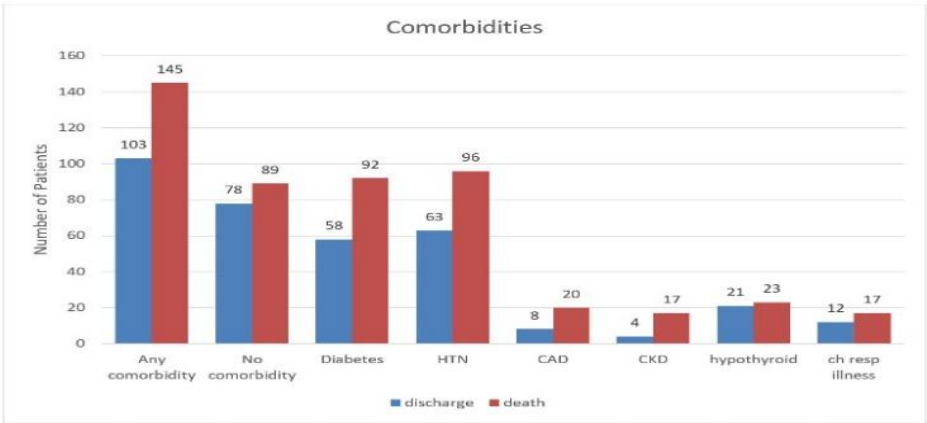


Figure 1- Mortality In Various Age Groups: Mortality was found to be 47% (66 deaths in 141 pt's) in less than 50 yrs age grp, which increased to 58%(117 deaths in 202 pt's) in 51-70 yrs age group and 71% in more than 70 yrs age grp (51 deaths in 72 pt's).



comorbidities	Any comorbidity	No comorbidity	Diabetes	HTN	CAD	CKD	hypothyroid	Ch. Resp illness
discharge	103	78	58	63	8	4	21	12
death	145	89	92	96	20	17	23	17
Total patients	248	167	150	159	28	21	44	29
Mortality	58%	53%	61%	60%	71%	**81%**	52%	59%

Figure 2: Mortality In Various Comorbidities: Mortality was 81% in patients with Chronic renal disease (P= 0.05) and 53% in patients without any comorbidities. Mortality was also higher in patients with diabetes (61%), HTN (60%), CAD (71%), hypothyroid (52%), chronic respiratory illness (59%) however statistical significance was not seen.

Discussion

The second wave of covid 19 in India was devastating with its high death toll and affected not only the health but socio-economic sectors. Till date no definitive treatment has been developed and due to the rapid mutagenicity of corona virus it continues to pose a deadly risk to health of human population. In our analysis of 415 patients the mortality rate exceeded 56%.

Higher age group is a well observed risk factor for adverse outcome. In our study also we found significant association between age and mortality with an odd of 1.5 times higher mortality if age was more than 50yrs and odds ratio of 2.46 if age was more than 70 yrs. Age was found to be the most significant risk factor for higher mortality in our study. This evidence is in concurrence with other studies conducted which showed increased mortality with increasing age groups [4].

We also found significant association between mortality in covid 19 patients if they had pre-existing renal disease (odds ratio 3.1), there was also higher mortality if patients required dialysis for renal support during ICU stay. Similar findings were there in a cohort study of 1821 patients in Spain where they found that the raw in-hospital mortality rate was higher in patients with increased SCr (32.4%), patients with previous CKD (41.1%), and patients who developed AKI during hospitalization (15.9%) compared to patients with normal SCr (5.8%) [5].

Globally, gender related difference in mortality rate was found with higher mortality in men as compared to women [6]. However, the situation is reversed in some countries, including India where higher mortality was seen in females in the second wave [7]. We too found similar results however results were not statistically significant.

We could not find significant association between mortality and pre-existing coronary artery disease, respiratory disease and hypertension, however previous studies have shown their association with higher mortality in covid 19 patients [8-10].

Among other comorbidities hypothyroidism was also analyzed in our study, results showed no significant association between hypothyroidism in covid 19. This collaborates with other studies which have showed no definitive association of covid 19 disease and severity with hypothyroidism.

Our study was retrospective in nature with data collected from hospital medical records, and patients were excluded if data was missing, presence of data from those patients might have changed study findings. Also, number of patients having coronary artery disease and respiratory disease were less which may have led to statistical non significance.

Conclusion

The novel coronavirus infection (COVID-19) has significantly increased mortality in patients of age more than 50 yrs, the risk increases further if age is more than 70 yrs in patients having moderate to severe covid infection.

Presence of chronic renal disease is also associated with increased risk of death in patients with moderate to severe covid-19 infection.

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