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Determinants of Severity of Covid 19 Positive Cases in ICU: A Hospital Based Study

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Abstract

Introduction: A mutated variant of COVID 19, B. 1.617.2 was first identified in India, also known as the delta variant. This delta variant was largely responsible for the second wave of pandemic in India. The second wave was epidemiologically different from first wave with very high death rates. This study was done during the second wave to estimate the determinants of severity of COVID 19 cases admitted in ICU. The Findings of the study may support in prevention and management of severe cases of COVID 19.

Methodology: This was a hospital-based cros- sectional study conducted from April to June 2021, among 100 COVID-19 positive patients admitted in ICU of a tertiary care center, Level-3(L3) facility of COVID-19 in North India. A telephonic conversation was done with patients/attendants for data collection after explaining to them the purpose. Those who gave consent were interviewed. A pre-designed, pre-validated, and semi-structured questionnaire was used for data collection. Data analysis was done using R software and Chi square ($\chi 2$) test was used as test of association.

Results: Out of 100 patients admitted in ICU, 41% patients were under the age of 45 years mostly from urban set up. Of all 64% had no co-morbidities, 83% had no addiction, 66% were not on any medication. Majority of them were either incompletely vaccinated or not vaccinated for Covid-19. 54% of ICU cases under study died. There was no significant statistical association between mortality and age, gender, occupation, comorbidities, addiction, medication, blood group, and residence. Lesser mortality of vegetarian patients was the only variable found to be statistically significant ($\chi^2 = 0.037$ and $p < 0.05$).

Conclusion: Delta variant responsible for the second wave of COVID 19 pandemic in India had no favorites; it caused severe infection and death despite the young age and good health, but it was found in our study that vegetarians had higher chances of survival than non vegetarians. Hence everyone should be vaccinated and must follow the COVID appropriate behavior.

Keywords: COVID-19; Pandemic; Severity; Delta variant; ICU, Mortality

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Introduction

Coronavirus disease 2019 (COVID-19) is caused by SARS CoV-2, a newly emergent coronavirus, that was first recognized in Wuhan, China in early December 2019 with confirmed cases all over the world.[1] WHO declared it is pandemic in 11 March 2020.[2] Generally, viruses have properties that allow them to change their genetic structure from time to time, and they mutate to new strains. This are the natural properties of all viruses i.e. Mutation. When the old viruses strain mutate to new strain, then viruses become either more contagious or having different features from the previous strain. There are many variants of Covid 19 all over the World and every variant has many mutations. The variant identified in India which is technically known as B. 1.617.2, be described as a delta variant.

This Delta variant was responsible for Second wave of Pandemic in India.[3] In India, from 3 January, 2020 to 30 july, 2021, there have been 3,15,26,628 confirmed cases of COVID-19 with 4,22,695 deaths, reported to WHO.[4] Likewise in India, many countries are now suffering from second wave of corona virus. This second wave was started from the month of March through June. In this second wave, the maximum number of cases were recorded in the mid of May. According to the official government statistics, the total number of confirmed cases reported in India until the end of July was nearly 3.14 crores, with a mortality of 4.21 lakh.[5]

This second wave was different from the first wave, as it affected the young age population too. A study conducted in Brazil shows the same, younger age group is at high risk in second wave.[6] The death rate was much more in second wave in comparison to first. The cases were divided into three category Mild, Moderate and severe diseases according to AIIMS, New Delhi guidelines and also followed clinical guidance for Management of COVID 19 patients.[7] In mild cases patients was reported positive but they were asymptomatic and without shortness of breath and they were recovered at home isolation. In moderate cases patients need oxygen support and their saturation were < 93% on room air and respiratory rate >24/min. The severe cases patients need intensive critical-care support and they were admitted to hospital and their saturation was below 90% on room air and respiratory rate >30/min and they needed to high flow oxygen, Bipap support, and ventilator support.

This study was done on severe patients who landed up in the ICU. The study aimed to understand the epidemiology of severe cases of COVID-19. The Findings of the study may support the prevention and management of severe cases of COVID-19.

Methodology

This study was a hospital based cross sectional study that was carried out over a period of three months from April 2021 to June 2021, among 100 severe COVID-19 positive patients admitted in ICU of a tertiary care center (L3) level facility in Meerut, Uttar Pradesh, India. The study was carried out after taking permission from the Institutional Ethical Committee. Prior consent was taken from hospital administration. The Patients attendants/ relatives were explained telephonically about the reason for asking questions and purpose of the study. Those who gave consent were included in the study. A pre-designed, pre-validated and semi-structured form was used for data collection. Only one investigator was assigned for data collection to reduce the interviewer's bias. Data analysis was done using R software and χ^2 test was used as a test of association.

Operational definitions

Severe cases: Those patients who had saturation below 90% on room air and respiratory rate >30/min also had a need to high flow oxygen, BiPAP support, and ventilator support.[7]

Incomplete vaccination: Those patients who have taken only one dose of COVID-19 vaccination viz Covishield/ Covaxin.

Not vaccinated: patients who had not taken even a single dose of COVID-19 vaccination viz Covishield/ Covaxin.

Results

For enrolling 100 participants in our study in total 166 patients/relatives were approached. Those who consented were included in our study.

Table 1: Distribution of Patients according to their Socio-demographic factors:

Variables	Expired	Recovered	Total	X2	p-value
Gender					
Male	35(53.1%)	31(46.9%)	66	0.786	
Female	19(55.9%)	15(44.1%)	34		p>.05
Age					
<45 years	19(46.4%)	22(53.6%)	41	0.200	
>45 years	35(59.3%)	24(40.7%)	59		p>.05
Occupation					
Working	33(52.4%)	30(47.6%)	63	0.6716	p>.05
Housemade worker	21(56.7%)	16(43.3%)	37		
Addiction*					
Yes	8(47.1%)	9(52.9%)	17	0.529	p>.05
No	46(55.4%)	37(44.6%)	83		
Exercise					
Irregular	32(60.4%)	21(39.6%)	53		
Regular	7(38.9%)	11(61.1%)	18	0.275	p>.05
No Exercise	15(51.7%)	14(48.3%)	29		
Diet					
Vegetarian	45(60%)	30(40%)	75	0.037	p<.05
Non-vegetarian	9(36%)	16(64%)	25		
Co-morbidities					
Yes	19(52.7%)	17(47.3%)	36	0.854	p>.05
No	35(54.7%)	29(45.3%)	64		
Medication					
Yes	18(52.9%)	16(47.1%)	34	0.879	p>.05
No	36(54.5%)	30(45.3%)	66		
Blood group					
A+	17(53.2%)	15(46.8%)	32		
A-	1(50%)	1(50%)	2		
B+	20(55.5%)	16(44.6%)	36		
B-	0(0%)	1(100%)	1		
AB+	4(66.6%)	2(33.4%)	6		
O+	11(52.4%)	10(47.6%)	21		
O-	1(50%)	1(50%)	2		
Vaccination**					
Incomplete	51(54.8%)	42(45.2%)	93		p>.05
Complete	3(42.8%)	4(57.2%)	7		
Area					
Rural	10(55.6%)	8(44.4%)	18	0.884	
Urban	44(53.6%)	38(46.4%)	82		p>.05

* It was seen that 83(83%) patients had no history of any addiction, and out of those, 46(55.4%) expired. On the contrary, people with addiction were 17(17%), out of which 8 (47.1%) expired.

** In view of the data accumulated by around 100 patients, in accordance with COVID infection and mortality, on the basis of their vaccination. It was seen that 93 were tested covid positive who had received a single dose of vaccination or none, out of which 51(54.8%) expired. On the other hand, out of the 7 patients who were fully vaccinated, 3(42.8%) expired. From the data, it appears that fully vaccinated patients had a 42.8% death rate.

Discussion

This study was done at the peak of the second wave of covid-19 in a tertiary care setup of North India from April to June 2021.

In our study 66 patients (66%) were male and 34% female i.e. male patients were more prone to severe infection in comparison to females. The Same findings was found in study done by Jin JM, Bai P, He W, et al. that men with COVID-19 are more at risk for worse outcomes and death.[8]

In this study, it was found that in ICUs, vegetarians had higher chances of survival than non vegetarians. The finding was in coherence with the results of a study done by Kim H, et al. who found patients taking a plant-based diet had a lower prevalence of moderate and severe COVID 19.[9] This could be attributed to the fact that a plant-based diet is rich in nutrients, specially phytophagous, carotenoids, fiber, vitamin A,C,E and folate.[10,11] They also have abundant minerals like iron and potassium, which together with the other nutrient boost our immune system and hence decrease the propensity of severe COVID infection.[12,13]

In our study there was no significant role of co- morbidities in mortality of admitted patients. In contrast, Liu H, Chen S et al. in their study observed that co- morbid chronic diseases were strongly correlated with disease severity among COVID-19 patients.[14] In our study, there was no relationship of age with death in ICU patients of COVID 19. In 1918 "Spanish flu" struck different age groups, typically with two spikes in children and the elderly, healthy young adults were affected, and young adults had a higher-than-expected mortality rate.[15] A study done by Jin, Jian-Min et al. found that old age was associated with higher severity and mortality in patients with COVID-19 patients.[16] Another study, by Clara Bonanad et al, was found to be reciprocal to ours, i.e. age played a significant role in the severity of covid patients.[17]

We found that addiction like smoking, alcohol, and tobacco chewing were of no significance in predicting the mortality of a patient suffering from COVID 19. From the Result, it may appear that mortality was lower in the patients with addiction as compared to those without. This result doesn't fit into the logic of medical science and this strange finding could be because of misinformation bias as the interview was taken from family members and there are high chances that they may not know about the addiction in person because in India only few people disclose their habits to family. The study by Mahua Jana Dubey et al. found the significant role of addiction and addiction in causing major public health threats.[18]

In our study, we found that there is no association of blood group with death in ICU patients. The findings were in adherence with another study done by Michael Zietz, Jason Zucker et al. that showed blood type and Rh factor may increase risk of severity and mortality in COVID-19 patients.[19]

In terms of vaccination, we discovered in our study that the majority of patients who landed up in the ICU were either incompletely vaccinated or not vaccinated at all for COVID vaccines. Among those who were vaccinated, the mortality was lesser than those who were incompletely or not vaccinated. This results might be falsely positive or unclear as the number of patients in the fully vaccinated category was only 7. The findings were consistent with a study by Bibhudatta pradhan, which found that Vaccinations Reduce the risk of COVID death in India by 0.4%.[20]

Conclusion

The Delta variant responsible for the second wave of COVID 19 pandemic in India had no favorites; it caused severe infection and death despite the young age and good health with no co morbidities. But it

was found in our study that vegetarians had higher chances of survival than non vegetarians. Vaccination is the only way to be protected from severe COVID infection. Hence everyone should be vaccinated and must follow the COVID guidelines for appropriate behavior.

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Conflict of Interest: Nil

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