

Death analysis of COVID-19 patients admitted in dedicated COVID hospital in Mumbai

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ABSTRACT

Introduction: COVID-19 poses a great threat globally and also a huge burden on developing countries due to its expensive, less effective, and toxic treatment. India is one of the countries with large number of confirmed cases. This study is done to assess the death due to COVID-19 on various parameters so that necessary action can be taken to reduce the disease burden of COVID-19. **Aim and Objective:** I) To find sociodemographic and other factors associated with mortality. II) To study various comorbidities related to the death due to COVID-19 infection. III) Recommendation for reducing mortality in COVID-19 patients. **Material and Method:** Data related to COVID-19 death was taken from MRD (Medical Record Department) & e-Health records from HMIS and was analyzed by Bivariate analysis in SPSS. **Results:** Results showed that people with 1-2 comorbidity have 62% death. Mortality was found to be more in elderly, that is, >60 years age group with 67.5% of total mortality. And in males (68.6%) as compared to female. **Conclusion:** People with comorbidities have significant association. Also, it showed that death was more common in male and elderly age group as compared to female and youngsters.

Keywords: Comorbidity, COVID-19, deaths, dedicated COVID hospital

Introduction

The rapid expansion of COVID-19 infection has jeopardized its global control. This exacerbating grim of COVID-19 pandemic infection poses a great threat globally and also it incurs a huge burden on developing countries due to its expensive, less effective, and toxic treatment.

According to World Health Organization, globally there were about 12,85,40,982 confirmed cases of COVID-19, including 28,08,308 deaths.^[1] India reported over 12 million confirmed cases of coronavirus (COVID-19) as of March 30, 2021. Out of these, over 162 thousand cases were fatal. The number of people infected with virus was growing across South Asian countries and the government had swung into action to curtail further spread the outbreak. India currently has the largest number of confirmed cases in Asia, and as of March 2021, has the third highest number of confirmed cases in India. This study is done to assess the death due to COVID-19 on various parameters so that necessary action can be taken to reduce the disease burden of COVID-19.

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Aim and Objective

- I) To find sociodemographic & other factors associated with mortality.
- II) To study various comorbidities related to the death due to COVID-19 infection.
- III) Recommendation for reducing mortality in COVID-19 patients.

Subjects and Methods

1. **Study Design:** Observational study
2. **Study Setting:** Dedicated COVID-19 Hospital (DCH), in Mumbai, India run by MCGM
3. **Study Duration & Inclusion Criteria:** All patients with outcome as death since 1st April 2020-31st March 2021
4. **Sampling Technique:** Complete enumeration of all deaths in study period.
5. **Sample size:** Universal sample size
6. **Inclusion criteria:** Only COVID confirm cases
7. **Exclusion criteria:** Non-COVID and suspected case.
8. **Data collection:** Data was taken from MRD & e-Health records from HMIS.
9. **Data entry and Analysis:** Data was entered in MS Excel sheet with variables:
Sociodemographic, Patients clinical status on admission, duration of hospital admission, Use of special medicine (Remdesivir, Tocilizumab), Requirement of mechanical ventilation, Direct/Indirect admission
10. **Ethical consideration:** Study was approved by IEC of Seven Hills Hospital, Marol, Mumbai.

Results

This DCH was first started as quarantine center for International passengers arriving from various countries in the month of March 2020 and later since 28th March 2020 it was transformed into one of largest isolation centre in Mumbai urban agglomeration.

Total patient managed during this period were 21,348 out of which death rate was 61 per 1,000 and discharge rate was 89%. In our study, about 68.6% (897) of the death were in male and rest were female. Nearly 67.6% (883) of the deaths belonged to the age group of >60 years. Majority of the deaths had PCR status positive (96.2%) on admission. Also, maximum patients had more than 2 comorbidities (83.8%). (64.6%) were on NIV on admission and also (64.6%) were given either incomplete dose or were not given Special medicine (Remdesivir, Tocilizumab) before admission to ICU. (61.4%) of the admission to ICU were from other hospital while (38.6%) were from in house (Isolation ward of Seven Hills Hospital). Only 3.3% required admission up to 24 hr while others required either 1--7 days (33.1%), 8--14 days (33.4%), or >15 days (30.2%) [Table 1].

In this study, mortality was found to be more in elderly, that is, >60 years age group with 67.5% (791) of total mortality followed by 45--60 years age group and was minimum with 0.6% in <30 years age group. Mortality was high in males (68.6%) as compared to female [Table 2].

In our study, mortality was found to be more in-house patients (618; 52.8%) group as compared to referral patients from outside (553;47.2%) but there was no significant difference ($P = 0.685$) as shown in [Table 3].

Also mortality was seen more in patients in whom special medications (Inj Remdesivir or Inj Tocilizumab or both) was not given as compared to patients in whom these medications were given. But the result is not significant [Table 4.1].

9.1% patients were given complete doses of Remdesivir and Tocilizumab before death [Table 4.2].

Comorbidity presence found to be the most important factor in causation of death in a COVID-positive patient as compared to patients with no comorbidity. Mortality in a COVID-positive patient admitted with pneumonia & those having 1--2 comorbidity (62.3%) or more than two comorbidity (16.7%) were much higher as compared to patients without comorbidity (20.9%). The result is statistically significant with a $P = 0.027$ ($P < 0.05$) [Table 5].

Mortality in any illness is always determined by the severity with which patient has presented to hospital. In our study, we found maximum deaths occur in patients who required high flow or higher fio2 of oxygen (NRBM, NIV, HFNC, or Intubation) on admission which was 93.5% of total mortality and the result is not significant at $P < 0.05$ as shown in [Table 6].

Of all the patients, 40.8% (478) of patients died within 7 days of hospital stay, 31.93% (374) had stayed between 8 and 15 days, also 27.2% (319) patients had stayed for more than 15 days; this was statistically significant [Table 7].

More than 68.2% (799) patients were in intubated state before death also 22.2% (260) were on NIV or HFNC and 9.5% was on NRBM/FM prior to the time of death which includes death due to sudden cardiac events which is part of coagulopathy and cardiac arrhythmia due to COVID infection [Table 8].

56.9% patients required inotropic support during their ICU stay.

Discussion

In the beginning of COVID-19 pandemic, it has been observed that elder persons with comorbidities were at the higher risk of getting infected and also it continued throughout the pandemic. Evidence from the global outbreak has demonstrated that individuals with pre-existing comorbidities are at a much greater risk of dying from COVID-19.^[2,3]

Table 1: Characteristics of the patients who died due to Covid-19 pneumonia as underlying and immediate causes

Parameters	Categories	Numbers	Percentage
Age	<30 yrs	08	0.6
	30-60 yrs	416	31.8
	More than 60 yrs	883	67.6
Sex	Male	897	68.6
	Female	410	31.4
Duration of stay	Upto 24 Hr.	43	3.3
	1-7 days	432	33.1
	8-14 days	438	33.4
	More than 15 days	394	30.2
Patient admission	In house from Isolation ward of SevenHills hospital	504	38.6
	Referral from other hospitals	803	61.4
On Admission PCR Status	Positive	1257	96.2
	Suspect	50	3.8
Special Medication before admission to ICU	Complete doses of Remdesivir, Tocilizumab and others:	463	35.4
	Incomplete doses or Not given at all.	844	64.6
Co morbidities	Yes (Maximum patients had more than Two co-morbidities)	1095	83.8
	No Co-morbidity	212	16.2
Status of patient On admission (Mode of ventilation)	NIV	864	64.6
	NRBM and nasal prongs	396	30.3
	Intubated	65	5.1

Table 2: Age and sex distribution

	Gender		Total
	Male	Female	
Age			
<30	4 (0.5%)	3 (0.8%)	7
30-45	50 (6.2%)	15 (4%)	65
45-60	218 (27.2%)	90 (24.5%)	308
>60	531 (66.1%)	260 (70.7%)	791
Total	803 (68.6%)	368 (31.4%)	1171

The Chi-square statistic is 3.9871. The $P=0.262857$. The result is not significant at $P<0.05$

Table 3: Admission types- genders distribution

Admission types	Gender		Total
	Male	Female	
IN-HOUSE	427 (53.2%)	191 (51.9%)	618
REFERRAL	376 (46.8)	177 (48.1%)	553
TOTAL	803 (100%)	368 (100%)	1171

The Chi-square statistic is 0.1642. The $P=0.685327$. The result is not significant at $P<0.05$

Multiple comorbidities are associated with the severity of COVID-19 disease progression. Many of the poorer outcomes for COVID-19 have been related to hypertension, diabetes mellitus, cardiovascular comorbid conditions, chronic obstructive pulmonary disease (COPD); these diseases were observed to be the more significant risk factors in subjects when compared with other underlying disease.^[4] Diabetic individuals have an increased susceptibility to infection.^[3] In our study, amongst all died patients those having 1--2 comorbidity (62.3%) or more than two co-morbidity (16.7%) were much higher as compared to patients with no comorbidity (20.9%). The health ministry's data once again confirms that people who have underlying health conditions such as cardiovascular disease, diabetes, kidney disease, high blood pressure, or cancer are at greater risk of dying due to COVID-19.

Pre-existing diabetes is significantly associated with greater risk of severe/critical illness and in-hospital mortality in patients admitted to hospital with COVID-19^[4]

Amongst demographic factors which have been consistently associated with greater mortality in COVID-19 infection are age and male sex.^[5] In a study by Yanez ND *et al.*^[6] shows that death rate in individuals with age group of 55--64 years had 8.1 times higher than in individuals younger than 55 years. In our study, mortality was found to be more in elderly, that is, >65 years age group with 67.5% with high rates in males (68.6%) but the result was not significant. In a study by Pijls BG, Jolani S J *et al.*, meta-analyses on 59 studies comprising 36,470 patients showed that men and patients aged 70 and above have a higher risk for COVID-19 infection, severe disease, ICU admission, and death.^[7]

Evidence globally has shown that patients who have been able to be hospitalized in early stage of disease progression or got early oxygen therapy had better prognosis as compared to the others. COVID-19 patients often have unrecognized hypoxemia without experiencing overt respiratory symptoms^[8,9] resulting in a missed opportunity to institute early, potentially life-saving treatment. Mortality in any illness is always determined by the severity with which patient has presented to hospital; in our study, we found that maximum deaths occurred in those patients who required high flow or higher FiO₂ of oxygen (NIV, HFNC or Intubation) on admission which was 92% of total mortality, this result is not significant at $P < 0.05$. Another study by Chatterjee *et al.*^[10] showed both hypoxemia and tachypnoea were associated with mortality risk. Compared to normoxemic patients, those who were hypoxemic (oxygen saturation <92%) had a 1.8- to 4.0-fold increased mortality risk, depending on initial oxygen saturation of hospitalization.

Table 4.1: Usage of specific special medicine in both genders

Special medicine	Gender		Total
	Male	Female	
NO	505 (62.9%)	229 (62.2%)	734
YES	298 (37.1%)	139 (37.8%)	437
TOTAL	803 (100%)	368 (100%)	1171

The Chi-square statistic is 0.0471. The P=0.82815. The result is not significant at P<0.05

Table 4.2: Special medicine used in both genders

Special medicine	Gender		Total
	Male	Female	
REMDESVIR	265 (66.7%)	132 (32.3%)	397
REMDESVIR_+ TOCI	30 (75%)	10 (25%)	40
TOTAL	295	142	437

The Chi-square statistic is 1.1274. The P=0.288339. The result is not significant at P<0.05

Table 5: Numbers of comorbidities in both genders

Number of co-morbidities	Gender		Total
	Male	Female	
0	186 (23.2%)	59 (16%)	245 (20.9%)
1-2	493 (61.4%)	237 (64.4%)	730 (62.3%)
>2	124 (15.4%)	72 (19.6%)	196 (16.7%)
TOTAL	803 (100%)	368 (100%)	1171

The Chi-square statistic is 9.0617. The P=0.010771. The result is significant at P<0.05

So, early detection of hypoxia with early hospitalization and early intervention can have a significant impact over decreasing the of cause mortality in acute respiratory condition like COVID-19.

In our study, we have also calculated the days of hospital stay in order to predict the severity with which the disease progressed in seriously ill patients. We found of all the patients 40.8% of patients died within 7 days of hospital stay, 31.93% had stayed between 8 and 15 days also 27.2% patients had stayed for more than 15 days, suggesting the rapid clinical course of the disease causing to a drastic outcome as a death.

It has been a major debatable area of whether the medications such as injection Remdesivir, injection Tocilizumab which are being used in treating moderate to severe infection has any impact in preventing all-cause mortality.

A study by Chen-Yang Hsu.^[11] showed that Remdesivir treatment group as opposed to the control group led to a statistically significantly 29% (95% CI: 22--35%) reduction of death from COVID-19. The treated group also revealed a 33% (95% CI 28--38%) significantly higher odds of discharge than the control group.

In our study, mortality was less in group given special medications (inj Remdesivir or injTocilizumab or both) as compared to the group where these were not given, although the result was not statistically significant.

Table 6: Conditions on admission- gender distribution

Condition on admission	Gender		Total
	Male	Female	
ON Room Air			
NP	55 (6.8%)	20 (5.4%)	75
NRBM			
BI-PAP			
HFNC	734 (91.4%)	347 (94.3%)	1081
NIV			
Emergency intubation	14 (1.7%)	1 (0.3%)	15
Total	803 (100%)	368 (100%)	1171

The Chi-square statistic is 5.2831. The P -0.071251. The result is not significant at P<0.05

Table 7: Duration of stay gender distribution

Duration of stay	Gender		Total
	Male	Female	
<7 days	322 (40%)	156 (42.4%)	478
8-15 days	273 (34%)	101 (27.4%)	374
>15 days	208 (26%)	111 (30.2%)	319
Total	803 (100%)	368 (100%)	1171

The Chi-square statistic is 5.3976. The P=0.067285. The result is not significant at P<0.05

Table 8: Mode of ventilation used in both gender

Mode of ventilation	Gender		Total
	Male	Female	
FM, NP, NRBM	80 (9.97)	32 (8.7%)	112
HFNC NIV	181 (22.5%)	79 (21.5%)	260
INTUBATED	542 (67.5%)	257 (69.8%)	799
TOTAL	803	368	1171

The Chi-square statistic is 0.7569. The P=0.684911. The result is not significant at P<0.05

So, the present study shows that comorbidity is the risk factor for death due to COVID-19 and among which it is found that those having comorbidities (e.g, diabetes, hypertension, diabetes & hypertension, diabetes & hypothyroidism, etc.) were at more risk than those with no comorbidities. Males are having more death compared to female. Death rate was higher in female with comorbidities. Special medicine (Remdesvir, Tocilizumab) is found to decrease the chances of death.

Therefore, this study shows that every primary care physician should screen, diagnose, and provide adequate treatment to the patients with comorbidities (hypertension, diabetes, hypothyroid, IHD, etc.) so that these diseases do not prove to be the risk factors for exaggerated mortality rates due to infectious diseases during pandemic.

Conclusion

The present study on patients with COVID-19 pneumonia revealed that death was more common in male as compared to female and in severely diseased patients with comorbidities.

In our Hospital, we practice 5E's, that is, early diagnosis, early treatment, early HDU/ICU transfer, and early all medications treatment.

Early detection of hypoxia with early hospitalization and early intervention can have a significant impact over decreasing the cause of mortality in an acute respiratory condition like COVID-19.

We recommend these 5E's to be followed in order to reduce death due to COVID-19 infection in this grave pandemic.

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Conflicts of interest

There are no conflicts of interest.

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