Original Research Article

Clinico-demographic profile of deceased patients with coronavirus disease in a tertiary care centre of central India

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ABSTRACT

Background: The covid pandemic started from Hubei, Wuhan in December 2020 then covered many other countries including India. Understanding the demographic and clinical characteristics of deceased COVID-19 patients could inform public health interventions focusing on preventing mortality due to COVID-19. The present study was done with the objective of studying the socio-demographic and clinical profile of deceased patients with coronavirus disease.
Methods: This is a hospital based cross-sectional study on 1190 deceased patients of coronavirus disease in a tertiary care hospital of central India which is a dedicated covid hospital from 11 March 2020 to 28 February 2021. Socio-demographic and clinical characteristics of deceased patients were recorded.
Results: Overall case fatality rate was 13.24%. Maximum number of deaths occurred in the month of August 2020 and September 2020 were 372 (31.26%) and 477 (40.08%). It was higher in the males 791 (66.47%) as compared to females 399 (33.53%), but the difference was not significant. The most common symptom was fever on hospitalization 924 (77.65%), followed by generalized weakness 771 (64.79%). 352 (29.58%) patients died within 24 hours of the admission to hospital. Hypertension and type 2 diabetes mellitus were the most prevalent morbidity in 557 (46.80%) and 357 (30.00%). It was found that 232 (19.50%) deceased patients had oxygen saturation less than 50% on admission.
Conclusions: Higher age and presence of co-morbidities at the time of admission were significantly associated with mortality.

Keywords: COVID-19, Deaths, Coronavirus, Comorbidities, Symptoms, Duration of stay

INTRODUCTION

In December 2019, the capital of the Chinese province Hubei, Wuhan city, witnessed an outbreak of pneumonia of unknown source attributed to a newly identified culprit, a novel coronavirus.[1] This led the centers for disease control and prevention (CDC) to designate the pathogen as severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 before the WHO termed the disease itself COVID-19 (coronavirus disease in 2019) in January 2020.[2] This epidemic is the third corona virus outbreak in the last 20 years after the SARS-CoV and the middle east respiratory syndrome MERS-CoV.[3]

The first case in India was reported on 30 January 2020, 100th case on 17 March, 1000th case on 30 March and 10,000th case on 14 April.[4] The total number of cases in India till February end is 1,11,12241 with fatality of 1,57,157 with case fatality rate of 1.41%. Maharashtra has reported 21,55,070 cases with 52,154 deaths and case fatality rate was 2.42% till February end. Nagpur has total 151750 covid cases and 3521 deaths and case fatality rate

of 2.32%. After Mumbai and Pune, Nagpur is the third one in Maharashtra to have higher number of cases.[5]

It was noticed that in India the per day cases and deaths peaked during mid-September till 90000 cases after which infection rates started to drop significantly and cases and deaths declined rapidly.[6,7] The same pattern of peak in September 2020 and decline thereafter was observed in Maharashtra and Nagpur.

Patients with SARS-CoV-2 infection may have asymptomatic-mild illness. The clinical findings among most patients were fever, tiredness and dry cough. COVID-19 has incubation period of average 5-6 days, which can extend up to 14 days, with potential asymptomatic transmission.[8] Some patients have aches, nasal congestion, runny nose, sore throat and diarrhea. Around 1 out of 6 people become seriously ill. Older people, people with co-morbid conditions are more likely to develop serious illness and rapidly progress to acute respiratory distress syndrome (ARDS), multi-organ dysfunction syndrome (MODS), septicemia and death.[9-12] Many factors associated with mortality in COVID-19 were identified by various studies all the world. The present study was done with the objective of determining the socio-demographic and clinical factors associated with mortality by COVID-19.

METHODS

This was a hospital based cross-sectional study in the tertiary care hospital of Indira Gandhi government medical college (IGGMC), Nagpur. This is a dedicated covid hospital (DCH) catering large number of seriously ill cases. Dedicated covid hospitals will offer comprehensive care primarily for those who have been clinically assigned as severe and these should either be a full hospital or a separate block in a hospital.[13]

First case of COVID-19 was reported on 11 March 2020. A total of 1432 covid positive deaths were reported during the study period. 242 brought dead patients were excluded from the study. So study include 1190 admitted patients who tested positive on real-time reverse transcriptase polymerase chain reaction (RTPCR) or rapid antigen test (RAT) and died while in the hospital during the period from 11 March 2020 to 28 February 2021.

Demographic data including age, sex, residence of the deceased and clinical data including symptoms at the time of admission, co-morbidities, contact history of COVID-19, the time intervals between symptom onset and hospital admission, admission and death was recorded. Oxygen saturation at the time of admission was taken into consideration.

Statistical analysis

The categorical variables were summarized as frequency and percentages and continuous variables as mean,

standard deviation and median as appropriate. P value <0.05 was considered as statistically significant.

RESULTS

A total of 8985 patients were diagnosed with COVID-19 from March 2020 to February 2021 at IGGMC, Nagpur and 1190 patients died during treatment giving the case fatality rate of 13.24%. The case fatality rate was highest in the month of September 2020 followed by month of October 2020 (Table 1). It was higher in the males 791 (66.47%) as compared to females 399 (33.53%) (Table 2). The difference was however not significant (χ^2=0.00, df=1, p=0.9818). Highest fatality was observed in the age group of 61-75 age group, that is, 476 (40.60%) and lowest in the age group of 16-30 years. No deaths were observed among children aged less than 15 years. The mean age was 59.45±13.45 years with a range of 16-100 years. Maximum deceased patients were from Nagpur region 1168 (98.15%) and remaining 22 (1.85%) were from out of Nagpur (Table 3). 228 (19.23%) patients acknowledged history of contact with COVID-19 patients at the time of admission. 174 (14.62%) deceased patients were referred from private hospitals.

352 (29.58%) deceased patients died within 24 hours of admission in the hospital. Median for duration of stay in hospital was 3 days (with range of 0-28 days). The difference for age, residence as well as the duration of stay in the hospital between males and females was not significant (Table 3).

Presenting symptoms

The most common symptom was fever on hospitalization 924 (77.65%), followed by generalized weakness 771 (64.79%), dry cough 723 (60.75%) and breathlessness 667 (56.05%). Diarrhoea was presenting symptom in 58 (4.87%) deceased patients (Table 4). At least one abnormal chest CT manifestation (including ground-glass opacities, pulmonary infiltrates and interstitial disorders) was identified in more than 70% of patients (Table 4).

Pre-existing co-morbidities

833 (70%) deceased have one or more co-morbidities at the time of admission. Out of them 451 (54.14%) had one, 299 (35.89%) had two and 85 (10.20%) had more than two co-morbidities at the time of admission. Hypertension was the most prevalent morbidity associated with 557 (46.80%) of deceased patients followed by 357 (30.00%). Other co-morbidities include road traffic accidents (RTA) in 8 (1.01%) males, COPD in 3 (0.37%) males and 1 (0.25%) females, HIV in 2 (0.50%) females, also myasthenia gravis. 5 (1.25%) and 2 (0.50%) females were PNC and ANC respectively at the time of admission. Significantly higher co morbidities were observed among elderly deceased patients as compared to younger patients. Presence of co-morbidities was observed to increase with increasing age.

419 (75.22%) hypertensive subjects and 248 (69.65%) diabetic patients were in the age group of 46-75 years (Table 4).

It was found that 232 (19.50%) deceased patients had oxygen saturation less than 50% on admission. While 192

(24.27%) males and 75 (18.80%) females had oxygen saturation more than 90% on admission. This difference was statistically significant (χ^2=4.57, df=1, p=0.032) (Table 4).
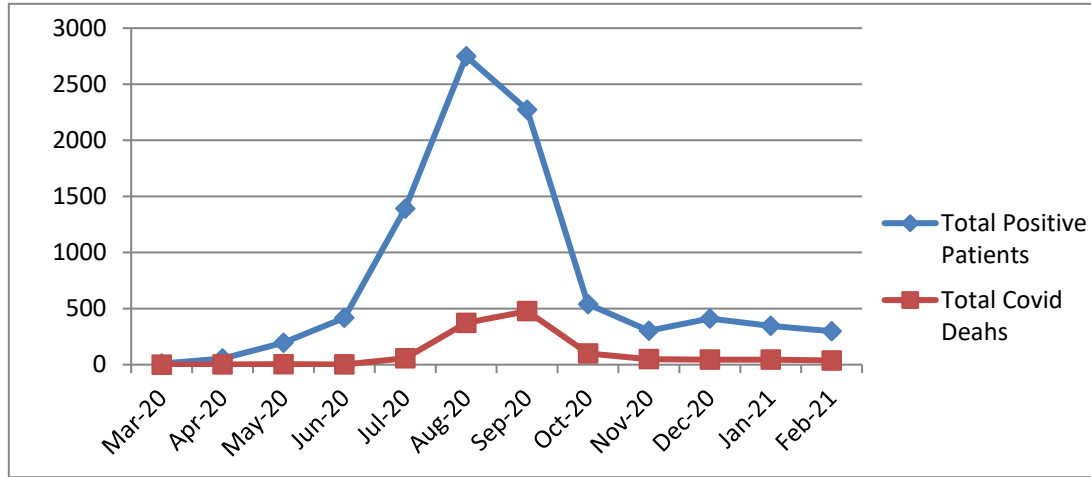

Figure 1: Month-wise distribution of COVID-19 positive patients and deaths.

Table1: Month-wise distribution of COVID-19 positive patients and deaths.

Months	Total covid positive patients (%)	Total deaths (%)	CFR (%)
March 2020	10 (0.11)	0	0
April 2020	55 (0.61)	2 (0.17)	3.63
May 2020	195 (2.17)	4 (0.34)	2.05
June 2020	417 (4.64)	2 (0.17)	0.47
July 2020	1391 (15.48)	57 (4.79)	4.09
August 2020	2749 (30.60)	372 (31.26)	13.53
September 2020	2272 (25.29)	477 (40.08)	20.99
October 2020	539 (5.99)	100 (8.40)	18.55
November 2020	302 (3.36)	49 (4.12)	16.23
December 2020	411 (4.57)	45 (3.78)	10.95
January 2021	346 (3.86)	45 (3.78)	13.01
February 2021	298 (3.32)	37 (3.11)	12.42
Total	8985 (100)	1190 (100)	13.24

Table 2: Month-wise and gender-wise distribution of COVID-19 deaths.

Month	Male (%)	Female (%)	Total (%)
April 2020	2 (0.25)	0	2 (0.17)
May 2020	1 (0.13)	3 (0.75)	4 (0.33)
June 2020	2 (0.25)	0 (0)	2 (0.17)
July 2020	37 (4.68)	20 (5.01)	57 (14.29)
August 2020	236 (29.84)	136 (34.09)	372 (31.26)
September 2020	322 (40.71)	155 (38.85)	477 (40.08)
October 2020	69 (8.72)	31 (7.77)	100 (8.40)
November 2020	32 (4.04)	17 (4.26)	49 (4.11)
December 2020	37 (4.67)	8 (2.01)	45 (3.75)
January 2021	29 (3.67)	16 (4.01)	45 (3.75)
February 2021	24 (3.03)	13 (3.26)	37 (3.11)
Total	791 (100)	399 (100)	1190 (100)

Table 3: Baseline characteristics of COVID-19 deaths.

Characteristics	Male (n=791) (%)	Female (n=399) (%)	Total (n=1190) (%)	P value
Age (in years)				
<15	0	0	0	
16-30	16 (2.02)	17 (4.26)	33 (2.77)	
31-45	103 (13.02)	41 (10.28)	144 (12.10)	χ^2=0.27
46-60	266 (33.63)	150 (37.59)	416 (34.96)	P=0.6059
61-75	321 (40.58)	155 (38.85)	476 (40.00)	
75-90	83 (10.49)	36 (9.02)	119 (10)	
>90	2 (0.26)	0	2(0.17)	
Residence				
Urban	640 (80.91)	329 (82.47)	969 (81.43)	χ^2=0.01
Rural	132 (16.69)	67 (16.81)	199 (16.72)	P=0.9342
Out of Nagpur	19 (2.40)	3 (4.22)	22 (1.85)	
Duration of stay				
Less than 24 hours	239 (30.21)	113 (28.32)	352 (29.58)	
2-7 days	364 (46.02)	207 (51.88)	571(47.98)	χ^2=0.46
8-14 days	155 (19.59)	67 (16.79)	222 (18.66)	P=0.4991
15-28 days	31 (3.91)	12 (3.01)	43 (3.61)	
>28 days	2 (0.25)	0	2 (0.17)	

Table 4: Clinical parameters of deceased COVID-19 positive patients.

Clinical characteristics	Male (n=791) (%)	Female (n=399) (%)	Total (n=1190) (%)
Symptoms at presentation			
Fever	612 (77.37)	312 (78.19)	924 (77.65)
Generalised weakness	526 (66.50)	265 (66.42)	771 (64.79)
Cough	456 (57.61)	267 (66.92)	723 (60.75)
Breathlessness	432 (54.61)	235 (58.90)	667 (56.05)
Myalgia	325 (41.08)	178 (44.61)	503 (42.27)
Diarrohea	44 (5.56)	14 (3.51)	58 (4.87)
Others	92 (11.63)	49 (12.28)	141 (11.85)
Co-morbidities			
Hypertension	369 (46.65)	188 (47.12)	557 (46.80)
Diabetes	234 (29.58)	123 (30.83)	357 (29.8)
Coronary artery disease	57 (7.21)	18 (4.51)	75 (6.00)
Chronic alcoholic disease	24 (3.03)	0	24 (1.8)
CKD	26 (3.29)	6 (1.50)	32 (2.30)
CVE	16 (2.02)	3 (0.75)	19 (1.40)
Carcinoma	12 (1.51)	11 (2.75)	23 (1.80)
Hypothyroidism	6 (0.75)	15 (3.75)	21 (1.76)
Asthma	14 (1.77)	6 (1.50)	20 (1.68)
Anemia	3 (0.37)	2 (0.50)	5 (0.50)
TB	14 (1.77)	4 (1.01)	18 (1.10)
Oxygen saturation on admission			
≤50%	154 (19.46)	78 (19.55)	232 (19.50)
51-75%	208 (26.30)	132 (33.08)	340 (28.56)
76-90%	237 (29.97)	114 (28.57)	351 (29.50)
>90%	192 (24.27)	75 (18.80)	267 (22.44)

Table 5: Distribution of deceased covid positive patients according to saturation of oxygen on admission and duration of stay in the hospital.

Saturation of oxygen on admission	Duration of stay in the hospital		
	Less than 24 hours	2-7 days	More than 7 days
<50%	140 (39.77)	88 (15.41)	4 (1.53)
51-75%	134 (38.07)	156 (27.32)	50 (19.16)
76-90%	44 (12.50)	198 (34.68)	109 (41.76)
>90%	34 (9.66)	129 (22.59)	104 (39.85)
Total	352 (100)	571 (100)	267 (100)

(χ^2=177.51, df=1, p<0.001).

352 (29.58%) patients died within 24 hours of the admission to hospital. 274 (77.84%) of deceased who died within 24 hours of admission had oxygen saturation less than 75%. While 298 (35.82%) deceased who died after 24 hours had saturation less than 75%. This difference was statistically significant. (χ^2=177.51, df=1, p<0.001) (Table 5).

The complications in the deceased acute respiratory failure in 1190 (100%), type 1 respiratory failure 88 (7.39%), septicemia in 195 (16.38%), acute kidney injury 109 (9.16 %), cardiogenic shock in 14 (1.17%), encephalopathy in 51 (4.29%), metabolic acidosis in 29 (2.44%).

DISCUSSION

The present study was conducted in a tertiary health care hospital which is a DCH and hence a large number of referred and severe cases were admitted here. Moreover as per the national guidelines only symptomatic and patients with abnormal CT or X-ray findings were admitted in DCH. The case fatality rate which is much higher than the national average can be attributed to this. This study described the demographic and clinical characteristics of deceased COVID-19 patients and estimated the time intervals between symptoms onset to hospital admission and death, which are critical for developing specific public health interventions focusing on reducing the mortality.

In this study mean age of deceased patients was found to be 59.45±13.45 years. In a study by Asirvatham ES et al the mean age was 62.5 years (SD=13.7 years) and was 65 years in a study by Chen T et al.[14,15] It is known fact that with increasing age, mortality in covid increases which is again confirmed in this study. The increasing death rate with age is expected and it could be due to the higher prevalence of co-morbidities, the reduced and less responsive innate and adaptive immune system among the elderly.[16,17]

The study reveals 791 (66.47%) deceased patients were male while 399 (33.53%) were females. Similar findings were observed in a study by Asirvatham ES et al and

Chen et al.[14,17] The less mortality among women has been reported in many studies which could be due to the protection of X chromosome and sex hormones, which play an important role in providing innate and adaptive immunity.[18] The higher mortality among men could be due to the behavioral risk factors such as smoking and alcohol consumption, which are relatively higher among men in India.[19] Median duration of hospital admission to death is 3 days in our study. While median duration of symptom onset to admission is 4 days which is within the range mentioned in studies from Tamil Nadu, Asirvatham EW (4 days), China (4, 10 days), Singapore (4 days), Italy (7 days) that indicated a range of 3–10 days. [14,15,20-22]

833 (70%) deceased were having one or more co-morbidities at the time of admission. The CDC and prevention reported 12 times higher deaths among patients with reported underlying conditions compared with those without reported underlying conditions (19.5% versus 1.6%).[23] Hypertension (46.8%) was the most common co-morbidity followed by diabetes (30%) and coronary artery disease (7.21%). No significant difference was found in the co-morbidities between males and females. Asirvatham ES et al 85% deceased had one or more co-morbidities, diabetes (62%) being most common.[14] A study by Chen T et al found 48% of deceased had at least one co-morbidity. The CDC reported 12 times higher deaths among patients with reported underlying conditions compared with those without reported underlying conditions (19.5% versus 1.6%).[23-27]

In the study fever (77.65%) and generalized weakness (60.75%) were the commonest symptom in the deceased at the time of admission. It was followed by the cough (64.79%) and breathlessness (56.05%). These are in line with existing literature that fever, cough, breathlessness are common symptoms. A study on 24,410 covid positive patients found fever and cough being most common symptoms in 78% and 58%.[28]

In this study the deceased patients with oxygen saturation less than 75% were significantly associated with mortality within 24 hours of admission. This finding was consistent with the finding by Mejıa et al.[29,30]

Thus mortality in COVID-19 disease was higher in older patients, male gender, those with co-morbidities and those having less oxygen saturation on admission. The findings are consistent with many similar studies.[30]

CONCLUSION

We concluded from this study that higher age and presence of co-morbidities at the time of admission were significantly associated with mortality.

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