Short Communication

Epidemiological and Clinical Profile of COVID-19 Patients Admitted in a Tertiary Care Hospital in Western India

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Abstract

Introduction: Ahmedabad city reported the highest number of cases and deaths. In order to guide various interventions and monitor future trends, evidence is required. Hence, we conducted the present study to explore the epidemiological determinants, clinical profile, risk factors, and predictors of mortality of COVID-19. **Methods:** This was a retrospective record-based descriptive study of 2268 confirmed COVID-19 patients admitted in a designated COVID hospital of Ahmedabad city from March to July 2020. **Results:** The median age of patients was 54 years, and 60.9% of them were males. Majority (83.27%) had comorbidities; the most common comorbidity was hypertension (62.59%) followed by diabetes (44.76%). The most common symptoms reported were fever (69.76%), breathlessness (55.47%), and cough (53.18%). Majority (61.12%) of the patients showed lymphocytopenia, and in one-third (34.85%), D-dimer levels were elevated (>1 μg/ml). Odds of inhospital deaths were higher in patients having breathlessness and gastrointestinal symptoms and comorbidities. More of the deceased had leukocytosis and lymphocytopenia, high D-dimer levels, C-reactive protein, and altered liver function tests as compared to the survivors. **Conclusion:** While making decisions such as prevention of exposure of high-risk population to the infection, control of the existing comorbid condition, and prioritization of this population for vaccination, criteria of case definition for surveillance keeping in mind the typical and atypical manifestations of the disease, require robust evidence which the current study could provide insight to.

Keywords: Comorbidities, COVID-19, laboratory findings

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus has led to total 72,221,634 (including 1,612,014 deaths) cases globally, 9,885,100 (including 143,393 deaths) cases in India, and 227,683 (including 4171 deaths) in Gujarat till mid-December 2020.[1]

SARS-CoV-2 causes a respiratory infection with a highly variable clinical course that is dependent on host and organism factors. Pneumonia is the most frequent serious manifestation of infection, characterized primarily by fever, cough, dyspnea, and bilateral infiltrates on chest imaging.[2-5] Although some clinical features (in particular smell or taste disorders) are more common with COVID-19 than with other viral respiratory infections.[6]

The clinical spectrum of SARS-CoV-2 infection ranges from asymptomatic infection to critical and fatal illness. Severe disease (e.g., with hypoxia and pneumonia) has been reported in up to 15%20% of symptomatic infections; it can occur in otherwise healthy individuals of any age but predominantly occurs in adults with advanced age or certain underlying medical comorbidities.[7]

In order to guide various interventions and adequate resource mobilization and allocation and monitor future trends, evidence is required. Hence, this study has been conducted to explore the epidemiological determinants, clinical profile, risk factors, and predictors of mortality of COVID-19.

Materials and Methods

A 1200-bedded hospital was converted into a dedicated COVID hospital designated for isolation and management of COVID

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cases since the start of the pandemic. This is a retrospective record-based descriptive study of epidemiological and clinical features of confirmed COVID-19 patients (confirmed by the microbiology laboratory through RT-PCR – Reverse Transcriptase- Polymerase Chain Reaction test) who were admitted in the various wards of a 1200-bedded hospital from March to July 2020. Data regarding sociodemographic, epidemiological, clinical, laboratory, management, and outcome factors were obtained from patients' medical records. Outcome was defined in terms of demographics, manifestations at the time of presentation, comorbidity, laboratory results, findings of the investigations, and clinical outcomes.

Permission has been taken from the Institutional Ethical Committee. Data were entered and analyzed in Microsoft Excel. Continuous variables were presented as mean and median and categorical variables were presented in the form of proportions. Appropriate statistical tests were applied and those laboratory parameters which were outside the normal range were considered abnormal.

Results

The median age of patients (n = 2268) was 54 years (1 day–96 years) [Table 1]. Most symptoms reported by patients on admission were fever (69.76%), breathlessness (55.47%), and cough (53.18%) [Table 2].

Almost two-third of the patients had normal white blood cell (WBC) count while, in 33.54% of the patients, leukocytosis was present. In majority (61.12%) of the patients, lymphocytopenia was found. Most of the patients (83.41%) had an erythrocyte sedimentation rate ≥30 mm/h. In one-third (34.85%), D-dimer levels were elevated (>1 μg/ml). Forty percent of the patients showed altered renal function tests such as elevated creatinine levels (>1.2 mg/ml). Forty-two percent and 34% of the patients had differing levels of liver function abnormality such as elevated aspartate aminotransferase and alanine aminotransferase, respectively.

Ventilatory support was required in (589/2268) 25.97% while only BiPAP support was needed in (89/649) 13.51% and BiPAP plus invasive ventilation was required in (570/659) 86.49%. 78.22% of them received the antibiotic treatment while few 8.24% of them received the antiviral treatment.

The median age of survivors was 50 years (range of 1 day–96 years) while that of the deceased was 61 years, and the difference was found to be highly significant. The most common symptoms on admission in the case of deceased persons were breathlessness, fever, and cough while, among survivors, it was fever followed by cough and breathlessness. Odds of inhospital deaths were higher in patients having breathlessness and gastrointestinal symptoms. Odds of inhospital deaths were higher in patients with diabetes, hypertension, and chronic lung diseases. Leukocytosis was found in 60.19% of the deceased persons as compared to 17.49% of the survivors, and the difference was found to be highly significant. Lymphocytopenia was observed in 84.74% of the deceased persons as compared to the 47.57% of the nondeceased persons, and the difference was highly significant. Levels of D-dimer, C-reactive protein, aspartate aminotransferase, and alanine aminotransferase were more elevated among the deceased as compared to the survivors, and the difference was found to be highly significant.

Table 1: Sociodemographic profile of the COVID-19 patients

Sociodemographic variables	Deceased (n=765), n (%)	Survivors (n=1503), n (%)	OR (95% CI)	P
Age group (years)				
0-14	2 (0.26)	65 (4.32)	0.06 (0.01-0.24)	<0.0001
15-44	80 (10.45)	533 (35.46)	0.21 (0.17-0.27)	<0.0001
45-59	239 (31.24)	475 (31.6)	0.98 (0.82-1.19)	0.8608
60-74	344 (44.96)	362 (24.08)	2.58 (2.14-3.09)	<0.0001
≥75	100 (13.07)	68 (4.52)	3.17 (2.30-4.38)	<0.0001
Gender				
Male	489 (63.92)	892 (59.34)	1.21 (1.01-1.45)	0.0349
Female	276 (36.08)	611 (40.65)		
Residence				
Urban	737 (96.34)	1443 (96.0)	1.09 (0.69-1.73)	0.6989
Rural	28 (3.66)	60 (3.99)		
Comorbidity (any)				
Yes	637 (83.27)	384 (25.54)	14.50 (11.61-18.12)	<0.0001
No	128 (16.73)	1119 (74.45)		
Specific comorbidity (multiple response)				
Diabetes	322 (42.09)	135 (8.98)	7.37 (5.87-9.25)	<0.0001
Hypertension	383 (50.06)	256 (17.03)	4.88 (4.02-5.94)	<0.0001
Chronic lung disease	36 (4.71)	13 (0.86)	5.66 (2.98-10.74)	<0.0001
Any cardiac disease	170 (22.22)	19 (1.26)	22.32 (13.76-36.19)	<0.0001

OR: Odds ratio, CI: Confidence interval

Table 2: Clinical manifestations of COVID-19 patients at the time of admission

Presenting symptoms (multiple response)	Deceased (*n*=765), *n* (%)	Survivors (*n*=1503), *n* (%)	OR (95% CI)	*P*
Breathlessness	633 (83.74)	431 (28.67)	11.93 (9.59-14.84)	<0.0001
Fever	496 (64.83)	842 (56.02)	1.45 (1.21-1.73)	0.0001
Cough	380 (49.67)	640 (42.58)	1.33 (1.12-1.59)	0.0013
Sore throat and/or running nose	55 (7.19)	71 (23.6)	1.56 (1.09-2.25)	0.0161
General weakness	57 (7.45)	110 (7.31)	1.02 (0.73-1.42)	0.909
Headache	25 (3.27)	52 (3.45)	0.94 (0.58-1.53)	0.812
GI symptoms*	87 (11.37)	29 (1.92)	6.52 (4.24-10.03)	<0.0001

*Diarrhea, vomiting/nausea, abdominal pain. GI: Gastrointestinal, OR: Odds ratio, CI: Confidence interval

The median duration between onset of illness and hospitalization was 3 days (range: 0–67 days) among the deceased as well as survivors while the duration between onset of symptoms and outcome was 7 days (range: 0–30 days) for the deceased and was 11 days (0–75 days) for survivors, and the difference was significant. The median duration between hospitalization and outcome was 3 days (range: 0–24 days) for the deceased and 8 days (range: 0–70 days) for survivors, and the difference was significant.

Discussion

Globally, the increase in the burden of respiratory tract infections has been significantly contributed by the human coronaviruses.[8] Although the cases have shown a decline in the past few weeks in the Southeast Asian region, still India is one of the three countries reporting high number of cases and deaths.[9] As on February 18, 2021, India has reported 10,900,000 cases and 156,000 deaths. Most cases have mild symptoms of fever, cough, sore throat, and myalgia. However, some cases can present with severe conditions such as multiple organ failure, acute respiratory distress syndrome, pulmonary edema, and pneumonia.[10]

We observed that COVID-19 occurred in all age groups ranging from infant to elderly, but majority of cases were in middle or older age groups. This is consistent with the findings of other studies where middle or elderly age group is more affected.[3,10-14] The present study showed the male preponderance in COVID-19 cases. This is comparable to other studies showing high proportion of cases among males.[3,8,12] One of the reasons for the male preponderance could be the more exposure of the males as compared to the females who usually stay at home in India. However, the male preponderance to infection has been explained by some studies that mast cells in females are able to trigger a more active immune response, which may help them fight infectious diseases better than males and other genetic components such as X chromosomes and hormones, typically estrogens, both predominantly found in females which play an important role in innate and adaptive immunity to provide some significant level of protection against SARS-CoVs.[3,8]

Majority of the patients were from the urban area. The reason for this was that initially the cases were more in the urban Ahmedabad and also because of lockdown there was restriction in movement from urban to rural area, so cases were not there in the rural area. Similar findings were reported by other studies.[15]

The main clinical manifestations in COVID-19 are fever and cough. However, the studies carried out during initial phase of the pandemic mainly reported the fever and cough as the predominant symptoms and gastrointestinal symptoms were uncommon.[16,17] Apart from fever, breathlessness, cough, and sore throat, the present study also reported the gastrointestinal manifestations such as diarrhea, vomiting, and abdominal pain in few of the cases. Gastrointestinal manifestations have also been reported by other studies.[4,10,18] Diversity in the presentation of COVID-19 may lead to difficulty in diagnosis as sometimes patients may not always manifest fever and it may be missed during surveillance as the case definition includes fever.

Studies conducted in different parts of the world have shown that the presence of comorbidities increases the chance of COVID-19.[18] People with underlying uncontrolled medical conditions such as diabetes, hypertension, chronic lung disease, liver disease, or renal disease and patients on immunosuppressant are at increased risk of COVID-19 infection. Underlying medical conditions also affects the severity of symptoms, clinical outcome, and the length of stay in the hospitalized patients. The most common comorbidity in the present study was hypertension followed by diabetes, cardiovascular diseases, and chronic lung diseases which are aligned with the data that have been previously reported.[4,10,11,18]

As per the research carried out on the SARS-CoV, the virus acts mainly on lymphocytes, especially on T-cells, and in most of the patients, a decrease in absolute value of lymphocytes can be found.[19] Lymphocytopenia in COVID-19 suggests that SARS-CoV-2 also mainly acts on T-lymphocytes. In clinical practice, a low absolute value of lymphocytes could assist as a reference index in diagnosing new cases of coronavirus infections.[10] Lymphocytopenia was observed in 61% of the total patients. This laboratory finding has also been reported by other studies.[3,10,11] One-third of the patients in our study also showed elevated D-dimer levels, altered renal function tests, and altered liver function tests (LFTs).

We compared the sociodemographic profile, clinical manifestations, presence of comorbidities, and

laboratory parameters among the deceased and survivors to predict the risk factors for severe disease or deaths. Older age, breathlessness and gastrointestinal symptoms, and presence of comorbid conditions were associated with increased risk of death. The defects in T-cell and B-cell function and the excess production of cytokines which is dependent on age, can lead to deficiency in control of viral replication and more prolonged pro-inflammatory responses, potentially leading to poor outcomes.[11] Multiple comorbidities are associated with the severity of COVID-19 disease progression. Studies have shown that diabetics with poorer blood glucose control required increased interventions for their hospital stay and had an increased mortality rate.[18]

Virus particles induce a cytokine storm in the body resulting in generation of a series of immune responses, and cause changes in peripheral WBCs such as lymphocytes.[3] Activation of coagulation cascade may lead to increased D-dimer levels. Among the laboratory parameters, leukocytosis, lymphocytopenia, elevated D-dimer levels, elevated CRP levels, and elevated LFTs were associated with increased odds of death. Similar findings were reported by other studies.[3,6,8,10,11,18,20,21]

There was a significant difference in the median duration between onset of symptoms and the outcome among discharged and deceased persons. The median duration between the hospitalization and outcome was less in the deceased as compared to the survivors. This could be explained by the fact that the patients must have reported late during the illness.

Conclusion

The common symptoms, risk factors, and predictors of mortality identified in the study, would be able to give an insight to the clinicians while making a diagnosis and also stratification of the patients according to the risk. It will also be helpful in early identification and timely treatment of critical cases and prompt administration of antibiotics to reduce complications and mortality in high-risk groups.

While making decisions such as prevention of exposure of high-risk population to the infection, control of the existing comorbid condition, and prioritization of this population for vaccination, criteria of case definition for surveillance keeping in mind the typical and atypical manifestations of the disease, require robust evidence which the current study could provide insight to.

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Conflicts of interest

There are no conflicts of interest.

References

1. Centers for Disease Control and Prevention – The New York Times. Available from: https://www.nytimes.com/topic/organization/centers-for-disease-control-and-prevention. [Last accessed on 2021 Jun 09].
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.
3. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al*. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet 2020;395:507-13.
4. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, *et al*. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA 2020;323:1061-9.
5. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, *et al.* Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020;382:1708-20.
6. Struyf T, Deeks JJ, Dinnes J, Takwoingi Y, Davenport C, Leeflang MM, *et al.* Signs and symptoms to determine if a patient presenting in primary care or hospital outpatient settings has COVID-19 disease. Cochrane Database Syst Rev 2020;7:CD013665.
7. COVID-19: Clinical Features – UpToDate. Available from: https://www.uptodate.com/contents/covid-19-clinical-features. [Last accessed on 2021 Jun 09].
8. Owusu M, Sylverken AA, Ankrah ST, El-Duah P, Ayisi-Boateng NK, Yeboah R, *et al*. Epidemiological profile of SARS-CoV-2 among selected regions in Ghana: A cross-sectional retrospective study. PLoS One 2020;15:e0243711.
9. Weekly Epidemiological Update; February 16, 2021. Available from: https://www.who.int/publications/m/item/weekly-epidemiological-update---16-february-2021. [Last accessed on 2021 Jun 09].
10. Shahriarirad R, Khodamoradi Z, Erfani A, Hosseinpour H, Ranjbar K, Emami Y, *et al*. Epidemiological and clinical features of 2019 novel coronavirus diseases (COVID-19) in the South of Iran. BMC Infect Dis 2020;20:427.
11. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, *et al*. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet 2020;395:1054-62.
12. Sherwal B, Makkar N, Jain A, Dogra V, Prasad S, Sachan A, *et al*. Trends and clinico-epidemiological profile of COVID-19 patients at a designated COVID-19 hospital in Delhi, North India. Fam Med Prim Care 2020;9:6261.
13. de Souza WM, Buss LF, Candido D da S, Carrera JP, Li S, Zarebski AE, *et al*. Epidemiological and clinical characteristics of the COVID-19 epidemic in Brazil. Nat Hum Behav 2020;4:856-65.
14. Kaur N, Gupta I, Singh H, Karia R, Ashraf A, Habib A, *et al*. Epidemiological and clinical characteristics of 6635 COVID-19 patients: A pooled analysis. SN Compr Clin Med 2020;2:1048-52.
15. Dave M, Sharma M, Poswal L, Bedi V, Deval N, Vijayvargiya R. Epidemiology, clinical profile and outcome of COVID-19 patients admitted in dedicated COVID hospital in Southern Rajasthan. Int J Curr Res 2020;12;11914-8. Available from: https:// www.journalcra.com. [Last accessed on 2021 Jun 09].
16. Sanyaolu A, Okorie C, Marinkovic A, Patidar R, Younis K, Desai P, *et al.* Comorbidity and its impact on patients with COVID-19. SN Compr Clin Med 2020;2:1069-76.
17. Gupta N, Agrawal S, Ish P, Mishra S, Gaind R, Usha G, *et al*. Clinical and epidemiologic profile of the initial COVID-19 patients at a tertiary care centre in India. Monaldi Arch Chest Dis 2020;90:193-6.
18. Jin ZJ, Dong X, Yuan CY, Dong YY, Bin YY, Qin YY, *et al*. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. Allergy Eur J Allergy Clin Immunol 2020;75:1730-41.
19. Liu WJ, Zhao M, Liu K, Xu K, Wong G, Tan W, *et al.* T-cell immunity of SARS-CoV: Implications for vaccine development against MERS-CoV. Antiviral Res 2017;137:82-92.
20. Bialek S, Boundy E, Bowen V, Chow N, Cohn A, Dowling N, *et al*. Severe outcomes among patients with coronavirus disease 2019 (COVID-19) – United States, February 12–March 16, 2020. MMWR Morb Mortal Wkly Rep 2020;69:343-6.
21. Velavan TP, Meyer CG. Mild versus severe COVID-19: Laboratory markers. Int J Infect Dis 2020;95:304-7.