Original Article

Demographic, clinical and laboratory findings of severe and non-severe COVID-19 cases: one-year experience at a private set-up of Bangladesh

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ABSTRACT

Background: COVID-19 has emerged in Dhaka city of Bangladesh since March 8, 2020 and rapidly spread throughout the country. Though non-severe cases can be managed in home, severe cases are more likely to be hospitalized and need intensive care unit (ICU) admission. Understanding the common demographic, clinical and laboratory features of severe versus non-severe patients could be quite useful for clinicians and might help to predict disease progression. This study aimed to compare demographic, clinical and laboratory findings among severe and non-severe COVID-19 cases.

Methods: This retrospective study was conducted on confirmed COVID-19 patients who were admitted in a private set-up of Bangladesh, from 1st April 2020 to 31st March 2021. All confirmed COVID-19 cases were categorized into severe (severe/critical) and non-severe (asymptomatic/mild/moderate) group. The demographic, clinical and laboratory parameters were recorded. Patients'outcome was categorized by discharged (recovered), transferred to higher center (referred) and death.

Results: Among 219 COVID-19 patients, 139 (78 males and 61 females) were in non-severe and 80 patients (56 males and 24 females) were in severe group. There was older age and male predominance among severe than non-severe infection (pÂ0.05). The co-morbidities and smoking history showed non-significant differences between the groups. Among the presenting symptoms, cough and dyspnoea were present 91.3% and 61.3% respectively in severe vs 75.5% and 27.3% respectively in non-severe group. There was significantly lower percentages of lymphocyte (19.8 ± 12.6 %); higher values of ferritin (ng/mL) and D-dimer (mg/l) [1384.50 (103 - 2898) and 0.74 (0.03 - 883) respectively] among patients with severe COVID-19, pÂ0.05. On chest x-ray, pneumonitis was present in 69 (95.8%) patient in severe group, whereas 90 (78.3%) in non-severe group and the difference was statistically significant (pÂ0.05). High-resolution computed tomography (HRCT) scan of chest was done, in severe group 28 (80.0%) showed ground-glass opacity (GGO) and in non-severe group it was 41 (65.1%). The average duration of hospital stay was significantly higher in severe group (11.2 ± 8.1 days) than non-severe group (7.0 ± 5.9 days). Death was observed significantly higher in severe versus non-severe group (16.3% vs 1.4%) (p value <.05).

Conclusion: There was older age and male predominance in severe COVID -19 cases. Feritin, D-dimer were significantly higher in severe group and lower percentages of lymphocyte was also noticed in this group. The mortality and longer hospital stay were observed more in severe group than non-severe.

Key words: COVID-19, demographic, clinical, laboratory findings, severe, non-severe.

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INTRODUCTION

The outbreak of coronavirus disease 2019 was first notified in Wuhan, China, has spread rapidly worldwide.[1] This coronavirus was later named as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) by the World Health Organization (WHO) and International Committee on Taxonomy of Viruses.[2] WHO declared COVID-19 disease as pandemic on 11th March 2020.[3] COVID-19 may exhibit a variety of clinical presentations. Some COVID-19 patients remain asymptomatic but they are capable of transmitting the virus.[4,5] A second group of COVID-19 patients express mild symptoms, some of which are indistinguishable from flu and some of them develop moderate symptoms.[6,7] Finally, some patients develop severe complications like respiratory distress and pneumonia resulting in death.[8-10]As the novel corona virus continues to evolve, there are still many limitations to our knowledge in that, who will be infected critically. Older adults and people who have underlying medical conditions, such as hypertension (HTN) and diabetes mellitus (DM), have shown worse prognosis.[11] DM patients have increased morbidity and mortality rates and have been linked to more hospitalization and intensive care unit (ICU) admissions.[11] People with chronic obstructive pulmonary disease (COPD) or any respiratory illnesses are also at higher risk for severe illness from COVID-19.[12] Although the etiological agent of COVID-19 is known, proper insights about its epidemiology, pathogenesis and management strategy are yet to be developed; making it one of the most notorious public health concern. The pathological processes are possibly regulated by interactions of viruses with host immunity. The disease usually starts with mild symptoms such as cough and fever. Some of the patients with mild symptoms experience a sudden deterioration of their condition either in the later stage of the disease or in the process of recovery. If the patients proceed to acute respiratory distress syndrome (ARDS) and multiple-organ failure rapidly, death becomes the usual outcome. Whether the patient is recovered or dead, host immunity to the virus seems to play a cardinal role with many other auxiliary factors. Clinical features and laboratory findings are greatly varied according to severity of the disease. Treatment is almost supportive and symptomatic. For maintaining uniformity of treatment, Directorate General of Health Services (DGHS) of Government of People's Republic of Bangladesh has published National Guidelines on Clinical Management of COVID-19. The aim of the study was to compare demography, clinical features and laboratory findings of severe and non-severe stages of the disease.

METHODS

This retrospective study was conducted on admitted COVID-19 patients in 'Health and Hope Hospital', a 100-beded General Hospital with a dedicated COVID unit (outpatient department and 18 beded in-patient service) situated at Panthopath, Dhaka, Bangladesh during the period from 1st April 2020 to 31st March 2021. Ethical approval was taken from the Hospital authority. Informed written consent from the patients or relatives was obtained. All patients of this study were tested positive for SARS-CoV-2 from nasal swab by Real-time Polymerase Chain Reaction (RT-PCR) . Confirmed COVID-19 cases were categorized as severe (severe/ critical) and non-severe (asymptomatic/mild/moderate) according to National Guidelines on Clinical Management of COVID-19. Detailed medical history of every patient was recorded as age, gender, presenting symptoms (fever, dry cough, dyspnea, sore throat, malaise, diarrhea, or headache), co-morbidity (eg, diabetes mellitus, hypertension, ischemic heart disease or others) and smoking history of every patient was taken. Laboratory findings at diagnosis were recorded in the form of complete blood count, C-reactive protein (CRP), serum ferritin, creatinine, D dimer and liver function tests etc.

Clinical case definition– (as per National Guidelines on Clinical Management of COVID-19)[4]

Asymptomatic: Patients who were tested for SARS CoV-2 positive without any symptoms.

Mild: The clinical symptoms are mild and there is no sign of pneumonia on imaging.Symptoms may be: fever, cough, sore throat, malaise, headache, muscle pain without shortness of breath or abnormal chest imaging.

Moderate: Fever and respiratory symptoms with radiological findings of pneumonia.

Respiratory distress with respiratory rate (RR) < 30 breaths /min.

Pulse oximetry showing oxygen saturation >93% at ambient air.

Severe: Cases meeting any of the following criteria - Respiratory distress (RR ≥30 breaths/ min).

Finger oxygen saturation ≤93% at rest.

Arterial partial pressure of oxygen (PaO2)/fraction of inspired oxygen (FiO2) ≥300 mm Hg.

Critical: Cases meeting any of the following criteria - Respiratory failure and requiring mechanical ventilation

Sepsis

Septic shock

ARDS

Any organ failure that requires ICU care

Operational definition:

Severe group: Severe + critical cases

Non-severe group: Asymptomatic +Mild + Moderate cases

All patients received standard of care (SOC) management as per "National Guidelines on Clinical Management of COVID-19"[4] based on their clinical conditions and pathological evaluations. These included antipyretic drugs to control fever, pain killers for alleviating pain, oxygen for controlling respiratory distress and saline for maintaining proper hydration. Anti-viral medications (oral/IV), steroid, anticoagulants, antibiotics (in special cases) were given according to National Guidelines on Clinical Management of COVID-19.[4] Invasive mechanical ventilator support were not available at this center, so patients requiring invasive ventilator supports were referred to higher centers. Patient's outcome was categorized by discharged (recovered), transferred to higher center (referred)and death. The criteria for discharge was resolution of fever without antipyretic drugs and significant improvement in the symptoms (e.g., cough, shortness of breath etc.) for at least 3 days. Patients' informations were collected in a preformed data sheet. All the available data were analyzed by statistical package for the social sciences (SPSS) version 23.

RESULTS

This study included a total of 219 confirmed COVID-19 patients among them 80 were in severe group and 139 were non- severe. There was older age and male predominance in severe group. The mean age in severe group was 60.83 ± 12.71yrs and in non-severe it was 53.71 ± 13.71 (Table I,II)

Table I Distribution of the COVID 19 patients according to age (n-219)

Age (years)	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
21 – 30	2 (2.5)	12 (8.6)	
31 – 40	2 (2.5)	11 (7.9)	
41 – 50	9 (11.3)	29 (20.9)	
51 – 60	27 (33.8)	40 (28.8)	
61 – 70	29 (36.3)	34 (24.5)	
>70	11 (13.8)	13 (9.4)	
Mean ± SD	60.83 ± 12.71	53.71 ± 13.71	<0.001

Unpaired t test was done

Table II Distribution of the COVID 19 patients according to gender (n-219)

Gender	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
Male	56 (70.0)	78 (56.1)	0.042
Female	24 (30.0)	61 (43.9)	

Chi-Square test was done

The co-morbidities (DM, HTN, Ischemic heart disease, Chronic Kidney Disease, Bronchial asthma/COPD, Malignancy) and smoking history showing non-significant differences between the two groups. (Table III)

Table III Distribution of the COVID 19 patients according to co-morbidities and smoking history (n-219)

	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
DM	51 (63.7)	76 (54.7)	0.190
HTN	52 (64.0)	7 (54.7)	0.150
Bronchial asthma/COPD	10 (12.5)	17 (12.2)	0.953
Chronic Kidney Disease	5 (6.3)	7 (5.0)	0.704
Ischemic heart disease	15 (18.8)	13 (9.4)	0.05
Malignancy	1 (1.3)	3 (2.2)	1.000
Smoking	5 (6.3)	4 (2.9)	0.226

Chi-Square test was done

The symptoms were presented in Table IV. Among the presenting symptoms, fever and cough were more common. But cough and dyspnoea were present significantly more in severe [73 (91.3%) and 49 (61.3%) respectively]vs [105 (75.5%) and 38 (27.3%) respectively] in non-severe group.

There were significantly lower percentages of lymphocyte among severely infected COVID 19 patients. This study also showed significantly higher values of ferritin and D-dimer among patients with severe COVID-19 when compared with non-severe (Table V)

Those who underwent chest x-ray, pneumonitis was present in 69 (95.8%) patient in severe group (Table VI). Among patients of severe group whose HRCT scan of chest was done, 28 (80.0%) showed GGO and in non-severe group it was found in 41 (65.1%). Chest X-ray and HRCT chest both were not done in some of the patients. Moreover some patients did HRCT scan directly without doing Chest x-ray before hospital admission and they were not advised chest x-ray further. Some patients also refused to do HRCT chest for their financial problem.

Table IV Distribution of the COVID 19 patients according to symptom (n-219)

Symptoms	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
Fever	76 (95.0)	125 (89.9)	0.188
Cough	73 (91.3)	105 (75.5)	0.004
Altered sense of taste	3 (3.8)	18 (12.9)	0.026
Altered sense of smell	13 (16.3)	39 (28.1)	0.048
Fatigue	5 (6.3)	26 (18.7)	0.011
Dyspnoea	49 (61.3)	38 (27.3)	<0.001
Anorexia	4 (5.0)	7 (5.0)	0.991
Vomiting	1 (1.3)	5 (3.6)	0.419
Sore throat	1 (1.3)	3 (2.2)	1.000
Diarrhoea	1 (1.3)	3 (2.2)	1.000
Nasal congestion	1 (1.3)	2 (1.4)	1.000
Headache	2 (2.6)	1 (0.7)	0.556

Chi-Square test and Fisher's Exact test was done

Table V Laboratory findings of the COVID 19 patients (n-219)

	COVID 19 severity		p-value
	Severe	Non-severe	
Hb(g/dl)	12.02 ± 1.85	12.28 ± 1.91	[a]0.324
WBC(/cumm)	6400 (1700 - 27000)	6600 (1700 - 99000)	[b]0.472
Lymphocyte (%)	19.8 ± 12.6	26.1 ± 11.7	[a]<0.001
Platelet(/cumm)	179000 (13000 - 374000)	180500 (12600 - 500000)	[b]0.558
Na(mmol/l)	134.44 ± 8.60	136.20 ± 8.56	[a]0.206
Kmmol/l)	3.97 ± 0.58	3.99 ± 0.47	[a]0.788
CI(mmol/l)	100.0 ± 4.90	100.44 ± 5.71	[a]0.626
ALT(u/l)	33.00 (15 - 316)	34.50 (13.00 - 174.00)	[b]0.455
CRP(mg/L)	48.70 (1.30 - 296)	19.50 (0.50 - 198.00)	[b]0.164
D-dimer(mg/l)	0.74 (0.03 - 883)	0.46 (0.00 - 276.00)	[b]<0.001
Serum creatinine (mg/dl)	1.03 (0.30 - 9.36)	1.00 (0.04 - 12.00)	[b]0.083
Serum Ferritin (ng/ml)	1384.50 (103 - 2898)	730 (23 - 2326)	[b]<0.001

[a]Unpaired t test and [b]Mann Whitney U test was done

Table VI Distribution of the COVID 19 patients according to CXR P/A findings (n-219)

Pneumonitis (CXR P/A view)	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
Pneumonitis present	69 (95.8)	90 (78.3)	0.001
Pneumonitis absent	3 (4.2)	25 (21.7)	

Table VII Distribution of the COVID 19 patients according to CT scan findings (n-219)

HRCT scan of chest (GGO)	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
GGO present	28 (80.0)	41 (65.1)	0.121
GGO absent	7 (20.0)	22 (34.9)	

Chi-Square test was done

The average duration of stay in Hospital is significantly higher in severe group (Table VIII)

Table VIII Duration of hospital stay of the COVID 19 patients (n-219)

	COVID 19 severity		p-value
	Severe	Non-severe	
Duration of hospital stay (days)	11.2 ± 8.1	7.0 ± 5.9	<0.001

In non-severe group,135 (97.12%) patients were recovered compared with 59 (73.75%) in severe group (p-value <.001).

Table IX Distribution of the COVID 19 patients according to outcome (n-219)

Treatment required	COVID 19 severity		p-value
	Severe (%)	Non-severe (%)	
Recovered	59 (73.75)	135 (97.12)	<0.001
Referred to higher center	8 (10.0)	2 (1.4)	
Death	13 (16.3)	2 (1.4)	

Chi-Square test was done

DISCUSSION

Several studies have also reported that elderly patients with COVID-19 are more likely to progress to severe COVID-19 disease in comparison with young and middle-aged COVID-19 patients.[13-15] This could be explained by the age-dependent decline in cell-mediated immune function and reduced humoral immunity.[16] Though other studies found a non-significant difference as regard of gender between the groups[17] despite significantly male predominance presented in this study.

Among the co-morbidities associated with COVID-19 in this study, DM and HTN were most prevalent and the group differences were not significant (Table III). These findings were similar with studies which reported that hypertension, cardiovascular diseases, and diabetes mellitus were most prevalent underlying diseases among hospitalized COVID-19 patients.[17-19] There is a higher risk for COVID-19 among diabetic patients because of the associated dysregulation of angiotensin-converting enzyme 2 (ACE2), liver dysfunction, and chronic inflammation.[20] A systematic review included five studies and reported that smoking may be associated with a negative outcome.[21] But our study revealed the lack of significant difference between two groups in regards of smoking (Table III). This heterogeneity could be due to differences in sample size or regions with the studies in the above mentioned systematic review.

This study revealed that dyspnea and cough were significantly associated with COVID-19 severity (Table IV). Other presenting symptoms had no significant difference in severe vs non-severe group. In accordance, a study reported that there is a significant positive association of shortness of breath/dyspnea with COVID-19 progression to severe illness and death as well as cough.[22] Additionally, a meta-analysis reported similar findings and recommended dyspnea rather than fever as an indicator of poorer outcome in COVID-19 patients.[23]

Present study revealed lower percentages of lymphocyte count among severely infected COVID-19-patients (Table V). Additionally, lymphopenia was noticed more in severe than mild infection in many other studies.[24-26] The increase in the serum ferritin levels following bacterial or viral infection could be attributed to iron release into the reticuloendothelial system, and

increased intracellular ferritin synthesis and release, with the decreased ability of ferritin transport into spleen and liver.[27] In a study done at department of Biochemistry, School of Medicine, Shiraz University of Medical Sciences, showed significant increase in the D-dimer [WMD = 0.18 mg/L; 95% CI 0.10, 0.27($P < 0.001$) among severe COVID 19 patients. [28]Current study also revealed there were significantly higher values of ferritin and D-dimer among patients with severe COVID-19. (Table V)

The use of HRCT chest and chest X-ray for the diagnosis of viral pneumonia allows patients with suspected SARS-CoV-2 infection to be isolated and treated in time for recovery, thus optimizing patient management.[29] Additionally, CT chest findings were a significant predictor for the severity of COVID-19 infection.[30,17] But the results of the current study failed to show significant group difference for HRCT chest findings (p-value 0.121) as only a small percentage of population underwent HRCT chest imaging (Table VI & VII).

The average duration of stay in Hospital is significantly higher in severe group (11.2 ± 8.1 days) than non-severe group (7.0 ± 5.9 days) (Table VIII). In non-severe group, 135 (97.12%) patients were recovered compared with 59 (73.75%) in severe group (p-value <.001).Death was found significantly higher in severe group (16.3%vs 1.4% with p-value <.001) in this study which was similar to other study.[17]

Conclusion

It can be concluded that, Severe COVID-19 affected predominantly elderly patients. Most of them were diabetic and hypertensive. Cough and shortness of breath are predominant in severe group. Lymphopenia, high D-dimer, high ferritin and bilateral shadows on lung imaging indicates COVID 19 severity. And most of the patients of non-severe group are recovered.

Limitations

Some of our patients were shifted to ICU/HDU. Therefore, we could not follow up them properly. Chest X-ray and HRCT chest both were not done in some patients. Extended follow up could provide more information about the clinical progression, treatment course and disease outcome. And a further multicenter, large-scale study will strengthen the findings of this study.

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