Original Article

Clinico-demographic Profile and Outcome of COVID-19 Patients Admitted in the ICU of Enam Medical College Hospital

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Abstract

***Background**: COVID-19 is an acute respiratory disease caused by a novel coronavirus (SARS-CoV-2) which was first emerged in China in December 2019. Then it rapidly spread globally including Bangladesh with devastating damage to the public health. The aim of the study was to describe the demographic characteristics, clinical features and outcome of COVID-19 patients admitted into the ICU of Enam Medical College Hospital (EMCH) from 1 February 2021 to 30 April 2021. **Materials and Methods**: It was a prospective observational study with a convenient sampling technique. Separate preset questionnaire was used to collect the data. RT-PCR for Covid-19 positive cases were included and the patients who did not complete the treatment were excluded from the study. Data regarding demographic, clinical and laboratory parameters, management and outcome of 105 COVID-19 patients were collected and analyzed. **Results**: Total 136 patients were admitted during the study period. Among them 105 patients were RT-PCR positive. The mean age of the patients was 55.12±12.7* years *with 60.9% male and 39.0 % female. Majority of them (70.4%) came from urban areas and 46.6% were from upper socio-economic class; 57.1% were smokers and 42.8% were non-smokers. Fever (95.2%), cough (90.47%), anosmia (61.9%), dyspnea (58.0%), fatigue (40%) and diarrhea (23.8%) were the predominant symptoms. Common comorbidities were diabetes mellitus (89, 84.7%), cardiac disease (88, 83.8%), hypertension (85, 80.9%), chronic obstructive pulmonary disease (72, 68.5%), and renal disease (18, 17.1%). Oxygen was delivered through high flow nasal cannula (38%), non-invasive ventilation (31.4%) and mechanical ventilation (40.9%). Only 16.1% received two doses of COVID-19 vaccine. Majority of the patients (56.1%) stayed for 1−7 days with a mean duration of ICU stay 9.09±5.9 days. Total 61 patients (58.09%) died due to COVID-pneumonia. **Conclusion**: In spite of appropriate care and ICU support, the mortality of COVID-19 was high. So, in order to prevent the disaster of the disease mass education about basic sanitation, personal hygiene, social distancing and mass vaccination should be ensured. Special attention should be provided to aged patients with comorbidities.*

***Key words**: Covid-19; SARS-CoV-2; RT-PCR; Covid pneumonia*

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Introduction

At the end of 2019, a novel coronavirus (SARS-CoV-2) was identified as the cause of atypical pneumonia cases at Wuhan city in Hubei Province of China.[1] The gene sequence of this new virus was 79.5% similar to the previous SARS-CoV-1 which is a member of sarbecovirus subfamily.[2] The first death due to the virus was reported on 9 January 2020 in China.[3] Subsequently, the virus spread quickly across the world and the World Health Organization (WHO) declared the disease as ‘‘Covid-19 pandemic” on 11 March 2020.[4] Since then the epidemic has spread to 123 countries and territories.[3] In Bangladesh, the first confirmed case was reported on 8 March 2020 and as of 22 February 2021, total recorded cases were 543,351 and 8,349 deaths due to this virus.[5,6]

The risk factors of this fatal disease were identified as lack of basic sanitation, poor health hygiene, mass use of public transportation, lack of health insurance, lack of social distancing and so on.[7] Along with the socio-economic perspective, several other factors like advanced age, obesity, hypertension (HTN), heart diseases and diabetes mellitus are associated with higher mortality in COVID-19 cases.[8]

The common symptoms are fever with chills, cough, dyspnea, sore throat, running nose, nausea, vomiting, anosmia, diarrhea, and fatigue[9] for which symptomatic managements are extensively practiced. If not resolved with symptomatic management, infected patients may develop acute respiratory distress syndrome (ARDS), pulmonary embolism, heart failure, multi-organ dysfunction syndrome (MODS) as complications among which ARDS is the most common reason for admission in the intensive care unit (ICU).[8] The common sequel of COVID-19-related ARDS include acute kidney injury (AKI), elevated liver enzymes, cardiomyopathy, pericarditis, pericardial effusion, arrhythmia, and sudden cardiac death.[10]

Reverse transcriptase polymerase chain reaction (RT-PCR) is frequently used to exclude infection among high risk individuals, such as exposed in-patients and health care providers.[11] Although it is the gold standard test to diagnose COVID-19, the rate of false-negative results is high, particularly in the initial phases of the disease.[12] In addition, some reports claimed that the accuracy of computed tomography scan is higher than that of RT-PCR in detecting COVID-19.[7]

In the ICU, oxygen supplementation is provided by non-rebreather mask, high flow nasal cannula (HFNC), bi-level positive airway pressure (BiPAP), continuous positive airway pressure (CPAP) and mechanical ventilator according to the necessity of the patients. Among the other treatments, intravenous antibiotics, steroid, anticoagulant, anti-fungal, antiviral medications, plasma therapy and so on are provided to the COVID-19 patients.[13] In order to face this complicated pandemic, vaccines play an important role to provide protection against COVID-19. In Bangladesh first vaccination was started on 27 January 2021 among the frontliners, and most vulnerable group of population.[14]

We conducted this study to evaluate the clinico-demographic profile and outcome of the COVID-19 patients admitted to the COVID-ICU in order to identify the possible measures to combat against this deadly disease.

Materials and Methods

This prospective observational study was conducted in the separate ‘COVID ICU’ of EMCH from 1 February 2021 to 30 April 2021. All the critically ill patients with positive RT-PCR for COVID-19 admitted in the ICU during the period were included in the study with a convenient sampling technique. RT-PCR negative patients and the patients who did not complete the treatment were excluded from the study.

All patients underwent RT-PCR on admission either from a naso/oropharyngeal swab or tracheal aspirate. Afterwards CT scan of chest, routine blood works such as complete blood count, inflammatory markers, metabolic panel, arterial blood gas analysis were done. After confirming the diagnosis, treatment regimens were started based on the latest version of the national protocol. The patients who survived and recovered were shifted to separately designed COVID-HDU (high dependency unit).

A separate preset questionnaire was used for each patient to collect the data. Data regarding demographic

profile, clinical symptoms, comorbidities, treatment, duration of ICU stay and outcome were collected. SPSS version 22.0 for Windows (SPSS Inc. Chicago, Ilinois, USA) was used for statistical analysis.

Results

Total 136 patients were admitted during the study period. Among them 105 (77.2%) patients were RT-PCR positive for COVID-19. Number of male patients was 64 (60.9%) and 41 were (39.0%) female patients. Mean age of the patients was 55.12±12.7 years. Majority (28.5%) of the patients were in the age group between the 61−70 years. And 26.6% were in the age group between 41 to 50 years. Below 30 years there was only one (0.9%) patient, and above 80 years there were only two (1.9%) patients (Table I).

Table I: Distribution of the patients according to age (n=105)

Age (years)	Frequency	Percentage
<30	01	0.9
31−40	13	12.3
41−50	28	26.6
51−60	23	21.9
61−70	30	28.5
71−80	08	7.6
>80	02	1.9
Mean ±SD	55.12±12.7 years	

All the patients were distributed into two groups based on their area of residence. Those who resided in the village, union or within the ward territory, were included in the rural group. Those who resided at the level of upazilla and district were considered as urban. Majority of the patients (70.4%) came from urban areas. Majority population (60, 57.1%) in our study were smokers and 45 (42.8%) patients were nonsmokers.

Socio-economic status played an important role in the management. The study population were categorized into three classes based on their socio-economic status. Those having annual income more than 1,00,000 taka were included in the upper income class, those having annual income between 50,000−100,000 taka were included in the middle income class and those having annual income less than 50,000 taka were included in the lower income class. In our study 49 (46.6%) patients came from upper income class, 40 (38.0%) from middle income class and 16 (15.2%) patients came from lower income class (Table II).

Table II: Distribution of the patients according to socio-economic status (n=105)

Socio-economic class	Frequency	Percentage
Upper	49	46.6
Middle	40	38.0
Lower	16	15.2

The presenting symptoms are shown in Fig 1. Fever (100, 95.23%), cough (95, 90.47%), anosmia (65, 61.90%), dyspnea (61, 58.09%), fatigue (42, 40%), and diarrhea (25, 23.80%) were the predominant symptoms among our patients.

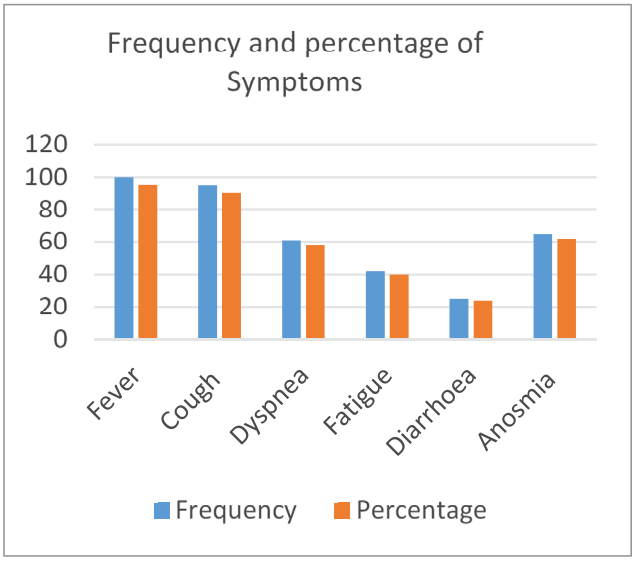

Fig 1. Distribution of the patients according to presenting symptoms (n=105)

Most common comorbidity was diabetes mellitus (89, 84.7%) followed by cardiac diseases (88, 83.8%). Other comorbidities were hypertension (85, 80.9%), asthma (72, 68.5%), CVD (27, 25.7%), renal disease (18, 17.1%), hepatic disease (03, 2.8%), obstetric complications (03, 2.8%) and malignancy (03, 2.8%) (Fig 2).

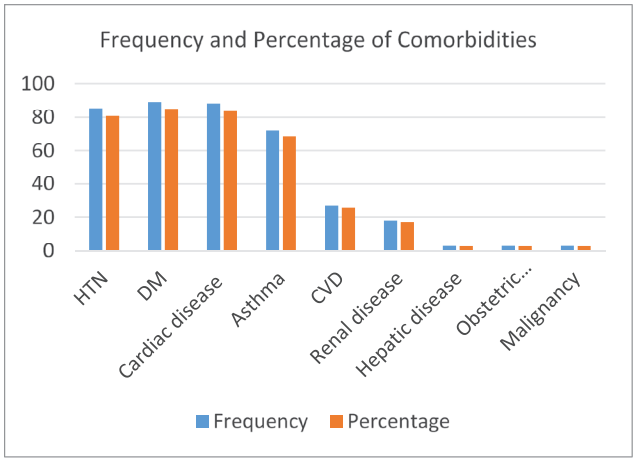

Fig 2. Distribution of the patients according to co-morbidities (n=105)

Regarding the vaccination against COVID-19, we found majority of them (88, 83.8%) non-vaccinated (Table III); only 17 patients (16.1%) received two doses.

Table III: Distribution of the patients according to vaccination status (n=105)

Status	Frequency	Percentage
Vaccinated	17	16.1
Non-vaccinated	88	83.8

Table IV: Distribution of the patients according to the methods of oxygen delivery

Oxygen delivery	Frequency	Percentage
HFNC	40	38.0
Non-invasive ventilation	33	31.4
Mechanical ventilation	43	40.9

*Some patients needed more than one methods

Table V: Distribution of the patients according to duration of ICU stay (n=105)

ICU stay (days)	Frequency	Percentage
1−7	59	56.1
8−15	30	28.5
>15	16	15.2
Mean ± SD	9.09±5.9 days	

Table VI: Distribution of the patients based on outcomes (n=105)

Outcome	Frequency	Percentage
Expired	61	58.10
Recovered	44	41.90

All the patients were managed by intravenous steroids, anticoagulant and antiviral therapy. Along with these, some of them required advanced respiratory support−HFNC (38%), CPAP (31.4%) or mechanical ventilation (40.9%) (Table IV).

The majority of the patients (59, 56.1%) stayed in the ICU for a period of 1−7 days; 30 patients (28.5%) stayed in the ICU for 8−15 days and 16 (15.2%) patients stayed in the ICU for more than 15 days. Mean duration of ICU stay was 9.09 ± 5.9 days (Table V).

There were 61 deaths among our study patients in the ICU. Total 44 (41.9%) patients recovered completely and was shifted to the COVID HDU from the ICU (Table VI).

Table VII shows that among the males, 37.5% survived and 62.5% died whereas among the females 48.8% survived and 51.2% died (Table VII).

Table VII: Comparison of outcomes (survival and death) between male and female

Gender	Frequency	Percentage	Survived	Percentage	Death	Percentage
Male	64	60.9	24	37.5	40	62.5
Female	41	39.0	20	48.8	21	51.2

Discussion

In this study, total 105 patients were positive RT-PCR for COVID-19 accounting for 77.2% of total ICU admission with suspected COVID-19. Majority (28.5%) of them belong to the age group between 61 to 70 years which is comparable to the study conducted by Momen et al[15] (51−60 years). The mean of age of

our patients were 55.12±12.7 years which is almost similar to the studies conducted by Olivas-martinez et al[7] (51.9±13.9 years), Hossain et al[5] (57.10 years) and Momen et al[15] (57.4±13.1 years). However, it is a little higher than that of Mohan et al[16] (40.1±13.1 years). Males were mostly affected in the studies of Olivas-Martinez et al[7] (61%), Rieg et al[10] (61%), Abkhoo et al[8] (67.8%), Hossain et al[5] (75.59%), Momen et al[15] (71.1%) and Mohan et al[16] (93.1%). Similarly, in our study 60.9% were male.

Well connected urban areas were among the first exposed to the pandemic. At the beginning of the pandemic some of the largest global cities had the highest incidence of COVID-19 cases.[17] Majority of our patients (70.4%) came from urban areas which is also confirmed by a WHO report stating that the evolution of COVID-19 outbreaks mainly affected the capital cities and large urban areas in many countries.[18] Mainstream of our patients were from upper socio-economic class (46.6%) which is inconsistent with the study conducted by Zhang et al[19] who reported that disadvantaged social circumstances were associated with greater risk of hospitalization and intensity of disease. Both smokers and non-smokers were equally affected by the pandemic. In our study 57.1% were smokers which is inconsistent with Mohan et al[16] (6.3%) and Olivas-Martinez et al[7] (14%).

Spectrum of clinical manifestations can be seen in COVID-19 patients ranging from asymptomatic infection to severe disease resulting in mortality. Understanding the various clinical presentations can help clinicians diagnose COVID-19 in an early stage and ensure appropriate measures to be undertaken in order to prevent fatal outcome. In our study, 95.2% patients presented with fever, which is parallel to that of Momen et al[15] (94.5%), Rahman et al[20] (100%) and Olivas-Martinez et al[7] (87%) nevertheless, higher than that of Hossain et al[5] (62.84%) and Yazdi et al[21] (59.4%). Conversely, Mohan et al[16] reported only 17.4% of their patients presented with fever. The second most common symptom was cough. In our study 90.47% patients had a history of cough which is comparable to the findings of Olivaz-Martinez et al[7] (90%), Momen et al[15] (83.6%), Rahman et al[20] (80%), Hossain et al[5] (79.96%). Nonetheless, Yazdi et al[21] and Mohan et al[16] reported 69.8% and 34.7% of their patients presented with cough respectively. In our study, anosmia was the third most common symptom of COVID-19 patients (61.90%) which is higher than that of Olivas-Martinez et al[7] (15%), Yazdi et al[21] (12.5%), Momen et al[15] (12.6%) and Hossain et al[5] (10.20%). 58.09% of our patients presented with dyspnea which is equivalent to that of Yazdi et al[21] (57.9%) but less than that of Olivas-Martinez et al[7] (80%), Momen et al[15] (80.9%) and Hossain et al[5] (98.54%). However, Mohan et al[16] reported very less percentage of their patients (5.6%) had dyspnea. Another symptom of COVID-19 was diarrhea. 23.8% of our study patients had diarrhea which is similar to that of Olivas-Martinez et al[7] (31%). However, it is higher in Momen et al [15](60.2%) and less in Mohan et al[16] (2.8%). 40% of our study patients presented with extreme fatigue similar to findings (45.3%) of Yazdi et al[21]. Contrarily, Mohan et al[16] presented only 1.4% of their patients with fatigue.

Diabetes mellitus is the most common comorbidity in our study (84.7%). Likewise, Hossain et al[5] (18.39%), Momen et al[15] (50.3%), Rahman et al[20] (60%) showed diabetes mellitus as the most common co-morbidity in their studies. However, Abkhoo et al[8] (41.3%), Yazdi et al[21] (28.4%), and Olivas-Martinez et al[7] (30%) presented HTN as the most common comorbidity. The second most common comorbidity in our study was cardiac diseases (83.8%). Several other studies also reported cardiac disease as one of the significant comorbidities.[7,10,15,16] 68.5% of our patients had asthma. Abkhoo et al[8] , Reig et al[10], Olivas-Martinez et al[7] and Momen et al[15] showed 8.7%, 6%, 1.4% and 33.3% of their patients had asthma or COPD. Approximately, 17% patients had renal disease in our study. But study conducted by Olivas-Martinez et al[7] reported lower percentage (3%) of population having renal disease. Only 2.8% of our patients had hepatic disease which is consistent with that of Olivas-Martinez et al[7] (0.8%). However Momen et al[15] reported 9.5% of their patients had hepatic disease. In our study 25.7% patients had cerebrovascular disease (CVD), which is similar to Momen et al[15] (24.1%). Hossain et al[5] reported only 1.09% of their patients had CVD. We found 2.8% and Hossain et al[5] found

0.54% had obstetric complications.

In our study, 38% received oxygen supplementation through HFNC which is less than that of Rieg et al[10] (43%), Hossain et al[5] (51.91%), Momen et al[15] (58.50%). In our study 33 patients (31.4%) received oxygen supplementation through non-invasive ventilation whereas Hossain et al[5] reported 14.2%, Momen et al[15] reported 27.5%, Rieg et al[10] reported 43% of their patients received non-invasive ventilation. In our study 40.9% required mechanical ventilation whereas other studies such as Rieg et al[10], Rahman et al[20], Momen et al[15], Hossain et al[5], Olivas-Martinez et al[7], Mohan et al[16] reported 81%, 70%, 12.02%, 28.41%, 18%, 0.8% of their patients required mechanical ventilation.

In our study, 59 patients (56.1%) stayed in the ICU for a period of 1−7 days, 30 patients (28.5%) stayed for 8−15 days which is comparable to the study conducted by Momen et al[15] (63.6% and 32.3% respectively). In our study 16 patients (15.2%) stayed more than 15 days which is not comparable to Momen et al[15] (4.1%). In our study, the longest duration of stay was 30 days and shortest duration of stay was one day. The mean duration of ICU stay of our patients was 9.09±5.9 days which is comparable to the study of Abkhoo et al[8] (9.5 days), Momen et al[15] (7.0±4.1days) but less comparable to Hossain et al[6] (12.33 days).

The mortality rate of the COVID-19 patients in our study was 58.09% which was comparable to the study conducted by Momen et al[15] (63.60%), Abkhoo et al[8] (66.11%), Mohan et al[16] (50%) Hossain et al[5] (63.75%) but incomparable to the studies conducted by Rieg et al[10] (23.94%), Olivas-Martinez et al[7] (30.1%).

Our study delineates that in spite of appropriate care and ICU support, COVID-19 related mortality was high. So, in order to prevent the catastrophe of the disease, mass education about basic sanitation, personal hygiene and method of transmission of the disease should be ensured. Our study showed that aged patients with comorbidities had high mortality. Majority of our study population were non-vaccinated as vaccination was just started in our country, so we could not evaluate the effectiveness of mass vaccination; nevertheless, mass vaccination against COVID-19 should also be established.

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