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Clinical characteristics and factors influencing the outcome of hospitalised COVID-19 patients in a semi-urban primary healthcare center

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Abstract

Background and objectives: Various new manifestations and risk factors for COVID-19 have been unveiled in the course of the current pandemic. Understanding the clinical spectrums as well as the risk factors associated with the adverse outcome of the disease is critical to combat this pandemic. This study was conducted to identify the clinical features, overall outcome and the factors associated with adverse outcome of the hospitalised COVID-19 patients in a semi-urban healthcare setting.

Methods: This study was conducted at Debidwar Upazila (sub-district) Health Complex under the Cumilla district from April 2020 to October 2020. Reverse transcriptase-polymerase chain reaction (RT-PCR) positive COVID-19 patients, aged 18 years and above, admitted at the Health Complex were enrolled in the study. All patients were followed till their recovery, referral or death. The data were collected in a pre-designed semi-structured questionnaire that included demographic, epidemiological, clinical and laboratory parameters.

***Result*:** Out of 50 RT-PCR positiveCOVID-19 adult participants, 30 (60%) were males and 20 (40%) were females. Twenty-four percent, 36%, and 40% of the patients had mild, moderate and severe disease respectively. The most common clinical symptom was fever (96%), followed by cough (86%) and shortness of breath (60%). Hypertension (54%), diabetes mellitus (40%), bronchial asthma (20%) and chronic obstructive pulmonary disease (COPD, 14%) were the major co-morbid conditions. Of the total cases, 2 (4%) died and 8 (16%) required referral to tertiary care hospital while 40 (80%) recovered. COPD was associated with poor outcome (OR 19; 95% CI: 2.88, 125.31; $p < 0.05$). Smokers were 7 times more likely to exhibit the negative outcome than non-smokers (95% CI: 1.52, 32.33; $p < 0.05$).

Conclusion: In this study, COPD was associated with a negative outcome. Further study with larger sample should be carried out to determine the spectrum of risk factors.

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Introduction

Coronavirus disease-19 (COVID-19) is caused by an infection from SARS-CoV-2. With the disease spreading rapidly across continents; the World Health Organization declared it a pandemic on March 11, 2020 [1]. Till 12 January 2021, there have been over 88 million reported cases and over 1.9 million deaths globally since the start of the pandemic [2]. In Bangladesh, about over half a

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million cases and 8,094 deaths have been reported till the middle of January 2021 [3]. The viral virulence and the clinical spectrum of the disease are changing over time and vary from region to region [4,5]. The clinical outcome depends on various factors namely age, male gender, smoking, and presence of underlying medical conditions such as hypertension, coronary artery disease, chronic obstructive pulmonary disease (COPD), diabetes, obesity and cancer [6-8]. Compared to Germany and South Korea, the case fatality rate was significantly higher in the United States and Italy [5]. Potentially more transmissible variants of SARS-CoV-2 and various new presentations, namely cognitive defect, various skin manifestations, post-COVID inflammatory disorders have been unveiled as the pandemic progresses [9-13]. A full and thorough understanding of the epidemiological and clinical features of COVID-19 is essential to bring the pandemic under control. The current study aimed to find out the spectrum of clinical features, overall outcome and also to identify the potential risk factor(s) for the adverse outcome of the hospitalized COVID-19 patients in a semi-urban healthcare center.

Materials and methods

***Place of study*:** The study was conducted at Debidwar Upazila (sub-district) Health Complex (UHC) under the Cumilla district from April 2020 to October 2020. This health complex provides healthcare services to over 430,000 residents of Debidwar Upazila. The study was duly approved by the UHC authority. Informed consent was obtained from each participant prior to the enrollment in the study.

***Study design and participants*:** The study was a prospective observational study conducted on hospitalised reverse transcriptase-polymerase chain reaction (RT-PCR) positive COVID-19 patients aged 18 years and above. Patients who died or were referred to the higher were also included.

Data collection and investigations: The data were collected in a pre-designed semi-structured questionnaire that included demographic, epidemiological, clinical and laboratory parameters. All investigations were conducted on the day of admission or the within one day after admission and were recorded. The repeat RT-PCR was performed 10 days after the first positive RT-PCR test. The patients were examined daily and as needed. All data were entered into the SPSS data sheet.

Admission criteria: Admission criteria included dyspnea with oxygen saturation of less than 94%, presence of multiple co-morbidities, requiring intravenous medication, enoxaparin (anti-coagulants) and isolation. Criteria for cure or recovery from illness were (a) oxygen saturation over 94% for three consecutive days, (b) resolution of fever and afebrile state for at least three days without antipyretics and (c) optimisation of treatment of co-morbidities. Patients who fulfilled the above criteria were discharged from the hospital. Criteria for referral to a higher center included refractory hypoxemia, acute respiratory distress syndrome (ARDS), thromboembolic complications or septic shock.

***Case definition*:** COVID-19 was defined and classified based on clinical management of COVID-19: interim guidance by WHO [14] and national guideline [15]. The cases were categorized as:

- Mild: The clinical symptoms were mild, and there was no sign of pneumonia on imaging.
- Moderate: Fever and respiratory symptoms with radiological findings of pneumonia. Respiratory distress with < 30 breaths/min, pulse oximetry showing saturation > 93% at ambient air.
- Severe: Respiratory distress (≥ 30 breaths/min) or finger oxygen saturation ≤ 93% at rest or arterial partial pressure of oxygen (PaO_2)/fraction of inspired oxygen (FiO_2) ≤ 300 mmHg.
- Critical: Respiratory failures and requiring mechanical ventilation or presence of shock with organ failures that require intensive care unit (ICU) care.

***Study outcomes*:** The primary endpoint of the study was defined as "discharge after recovery" or

death/referral to higher center. The secondary endpoint was the duration of hospital stay of the recovered patients. Discharge after recovery was considered a positive outcome whereas death/referral was considered a negative outcome.

***Statistical analysis*:** Continuous variables were expressed as the mean ± standard deviation (SD) for the normally distributed data or the median for the skewed data. Similarly, the independent t-test and Mann-Whitney U-test were used to determine the difference between the groups. Categorical variables were described as number (%). Binary logistic regression was performed to determine the potential risk factors associated with the endpoint. The statistical significance was defined as $p < 0.05$.

Result

Total of 50 RT-PCR positive COVID-19 patients fulfilling the inclusion criteria were included in the study. Out of 50 cases, 20 were females and 30 males. Mean age of the study population was 46.00 ± 16.45 years (95% CI: 41.3, 50.7). Table-1 shows that 18 (36%) and 20 (40%) cases had moderate and severe diseases respectively. The prevalence of co-morbidities among the study population is shown in Table-2. Other than the COPD, the prevalence of co-morbidities was not significantly different between sexes. All the COPD patients were male and smokers. There was a significant association between smoking and COPD ($p < 0.05$ by chi-square).

Table-1: *Disease severity category of the study population*

Category	n (%)
Mild	12 (24.0)
Moderate	18 (36.0)
Severe	20 (40.0)
Total	50 (100.0)

Fever was the most common symptom (48/50, 96%) followed by cough (43/50, 86%). About half of the patients had tachypnea; however, only one patient had a respiratory rate of more than 30/minute. Glasgow coma scale (GCS) was impaired in two cases; both were hypoxemic (SpO_2: 84% and 88%). Their illness began 1 to 16 days before admission (Table-4).

Detail haematological and biochemical parameters are shown in Table-5. The overall mean haemoglobin level was 11.6 ± 1.5 g/dl; however, the haemoglobin level was significantly ($p < 0.05$) lower in female patients compared to males (10.9 ± 1.09 gm/dl *vs* 12.8 ± 1.41 gm/dl, 95% CI: -2.99, -0.758). No patient had absolute lymphocytopenia (lymphocyte count < 1000 cells/µL), 4 patients had total white cell count (WBC) count of more than 11000 cells/µL and only one patient had thrombocytopenia (platelet count < 150,000 cells/µL). Chest X-Ray revealed bilateral consolidation of lungs in 36 (72%) cases while 13 (26%) had no lung abnormalities (Table-6). Only 7 (14%) patients were treated with antiviral drugs (favipiravir); most of the patients received oral or parenteral antibiotics (Table-7).

Of the 34 patients re-tested, nearly all (82.4%) became RT-PCR negative for the virus by 10 days (Table-8). The median time of hospital stay was 6 days with a minimum of 1 day and a maximum of 40 days. Forty patients (80%) had recovered and were discharged after a median time of 7 days (Table-9), two patients died, and rest of the 8 patients were transferred to higher centers for respiratory support. The patients who died or were transferred to the higher center had significantly lower hospital stay time (mean 2.82 ± 2.9 days, minimum of 1 day to maximum 9 days with a median of 1 day) than those who discharged (mean 8.87 ± 6.9 days, minimum 3 days to maximum 40 days with a median of 7 days; 95% CI: 2.259, 11.091; $p < 0.05$). Based on median hospitalisation time, 15 (37.5%) patients who recovered had extended hospital stay of more than 7 days.

To ascertain the effects of the risk factors on negative outcomes (death/referral), logistic regression analysis was performed. Smoking and COPD were found to have a significant effect on the outcome by univariate analysis (Table-10). Smokers and patients with COPD had 7 and 19 times higher risk of death/referral respectively. After adjustment of the effect of age, male sex was also significantly associated with negative outcome (Table-11). Male had a 12 times more chance of having a negative

Table-2: *Pattern of co-morbidities of the study population*

Co-morbidities	Female (N = 20) n (%)	Male (N = 30) n (%)	Total (N = 50) n (%)
Diabetes	10 (50)	10 (33.33)	20 (40)
Hypertension	12 (60)	15 (50)	27 (54)
Bronchial asthma	5 (25)	5 (16.67)	10 (20)
Chronic kidney disease	0 (0)	1 (3.33)	1 (2)
IHD	3 (15)	1 (3.33)	4 (8)
Surgery	0 (0)	1 (3.33)	1 (2)
Chronic heart disease	1 (5)	0 (0)	1 (2)
CVD	0 (0)	2 (6.66)	2 (4)
COPD	0 (0)	7 (23.33)	7 (14)
Obesity	1 (5)	0 (0)	1 (2)
Adrenal insufficiency	0 (0)	1 (3.33)	1 (2)
Other co-infections*	2 (10)	2 (6.66)	4 (8)

IHD – ischemic heart disease; COPD – chronic obstructive pulmonary disease; CVD – cerebrovascular disease

*One patient had pulmonary tuberculosis and one had urinary tract infection.

Table-3: *Clinical parameters at the time of admission*

Clinical parameters	Female (N = 20) n (%)	Male (N = 30) n (%)	Total (N = 50) n (%)
Fever	20 (100)	28 (93.33)	48 (96)
Cough	18 (90)	25 (83.33)	43 (86)
SOB	12 (60)	18 (60.00)	30 (60)
Sore throat	6 (30)	7 (23.33)	13 (26)
Anosmia	3 (15)	8 (26.67)	11 (22)
Dysgeusia	3 (15)	4 (13.33)	7 (14)
Diarrhea	5 (25)	4 (13.33)	9 (18)
Vomiting	1 (5)	1 (3.33)	2 (4)
Myalgia	6 (30)	6 (20.00)	12 (24)
Fatigue	4 (20)	10 (33.33)	14 (28)
Headache	1 (5)	4 (13.33)	5 (10)
Confusion	1 (5)	1 (3.33)	2 (4)
Rhinorrhea	2 (10)	2 (6.67)	4 (8)
Chest pain	2 (10)	0 (0)	2 (4)
Altered GCS	1 (5)	1 (3.33)	2 (4)
Cyanosis	1 (5)	1 (3.33)	2 (4)
RR>30/minute	0 (0)	1 (3.33)	1 (2)
Tachypnea	11 (55)	13 (43.29)	24 (48)
Tachycardia	2 (10)	2 (6.67)	4 (8)
SpO_2 90 or less	8 (40)	11 (36.63)	19 (38)

SOB – shortness of breath; GCS – Glasgow coma scale; RR – respiratory rate; SpO_2 – oxygen saturation.

Table-4: *Duration of illness at the time of admission (in days)*

Duration	Min	Max	Median	Mean ± SD	95% confidence interval	
					Lower	Upper
Duration of illness	1	16	5.50	5.9 ± 2.91	5.07	6.73
Duration of fever	1	14	4.00	4.27 ± 2.45	3.56	4.98
Duration of cough	1	11	4.00	4.56 ± 2.6	3.76	5.36
Duration of fatigue	1	14	3.00	4.43 ± 3.79	2.24	6.62
Duration of SOB	1	5	1.00	1.87 ± 1.23	1.42	2.32

SOB – shortness of breath.

Tabl-5: *Haematological and biochemical parameters of the study population*

Parameters	Mean ± SD	95% confidence interval	
		Lower	Upper
Hb(g/dl)	11.60 ± 1.50	10.94	12.270
WBC (cell/µL)	9854.55 ± 2351.24	8812.07	10897.03
Platelet count (cell/µL)	273772.73 ± 76760.56	239739.00	307806.45
Neutrophil (%)	68.77 ± 6.33	65.97	71.58
Lymphocyte (%)	26.64 ± 6.37	23.81	29.46
Absolute lymphocyte count (cell/µL)	2573.41 ± 706.78	2260.04	2886.78
RBC (million cell/µL)	8.37 ± 3.52	6.84	9.89
Serum creatinine(mg/dl)	1.05 ± 0.15	0.97	1.13
ALT(U/L)	43.11 ± 8.76	38.76	47.47
CRP (mg/L)	16.36 ± 4.71	13.19	19.53

Hb – haemoglobin; WBC – white blood cell; RBC – red blood cell; ALT – alanine transaminase; CRP – C-reactive protein

Table-6: *Findings of the X-Ray chest P/A view (n=50)*

Findings	n (%)
Normal	13 (26)
Unilateral consolidation	1(2)
Bilateral consolidations	36 (72)
Total	50 (100)

Table-7: *Modalities of treatment used*

Treatment modalities	Female (N = 20) n (%)	Male (N = 30) n (%)	Total (N= 50) n (%)
Oxygen therapy	9 (45)	12 (40.00)	21 (42)
IV Fluid	0 (0)	2 (6.67)	2 (4)
LMWH[a]	17 (85)	24 (79.72)	41 (82)
Steroid	9 (45)	13 (43.29)	22 (44)
Antiviral (favipiravir[b])	4 (20)	3 (10.00)	7 (14)

Repurpose drugs	16 (80)	25 (83.25)	41 (442)
Ivermectin[c]	14 (70)	23 (76.59)	37 (74)
Nitazoxanide[d]	2 (10)	2 (6.67)	4 (8)
Oral antibiotics	18 (90)	30 (100)	48 (96)
Doxycycline[e]	16 (80)	21 (69.93)	37 (74)
Azithromycin[f]	2 (10)	9 (29.97)	11 (22)
Intravenous antibiotics	15 (75)	23 (76.59)	38 (76)

[a]LMWH – low molecular weight heparin (40 mg subcutaneously daily for 10 days or upto discharge); [b]1600 mg orally 2 times daily on Day 1 then 600 mg 2 times daily for total 10 days; [c]12 mg orally stat. [d]500mg orally 2 times daily for 3 days; [e]100 mg orally 2 times a day for 7 days; [f]500 mg orally 2 times daily for 5 days.

Table-8: *Status of repeat RT-PCR test*

RT-PCR result	n (%)
Positive	4 (11.8)
Negative	28 (82.4)
Inconclusive	2 (5.9)
Total	34

Table-9: *Outcome of the patients at the end of follow-up*

Outcome	Female (N = 20) n (%)	Male (N = 30) n (%)	Total (N = 50) n (%)
Death	0 (0.0)	2 (6.7)	2 (4.0)
Referred to higher center	1 (5.0)	7 (23.3)	8 (16.0)
Due to ARDS	0 (0.0)	2 (28.6)	2 (25.0)
Due to refractory hypoxemia	1 (100)	5 (71.4)	6 (75.0)
Recovered and discharged	19 (95.0)	21 (70.0)	40 (80.0)

ARDS – acute respiratory distress syndrome.

Table-10: *Univariate logistic regression analysis showing impact of risk factors on outcome (death/referral)*

Risk factors	p value	OR	95% CI for OR	
			Lower	Upper
Age	0.133	1.032	0.990	1.076
Sex	0.057	8.143	0.942	70.409
Diabetes	0.474	0.580	0.13	2.59
Hypertension	0.777	0.81	0.20	3.28
Smoking	0.013	7.00	1.52	32.33
COPD	0.002	19.00	2.88	125.31
Bronchial asthma	0.999	0.00	0.00	.
CKD	1.000	0.00	0.00	.
IHD	0.999	0.00	0.00	.
Obesity	1.00	0.00	0.00	.

OR – odds ratio; CI – confidence interval; COPD – chronic obstructive pulmonary disease; CKD – chronic kidney disease; IHD – ischemic heart disease.

Table-11: *Logistic regression analysis showing the influence of age and sex on outcome*

	p value	OR	95% CI for OR	
			Lower	Upper
Age	0.065	1.046	0.997	1.097
Male sex	0.039	12.092	1.128	129.644

OR – odds ratio; CI – confidence interval.

Table -12: *Multivariate logistic regression analysis showing the impact of the individual risk factor*

Risk factors	p value	OR	95% CI for OR	
			Lower	Upper
Diabetes	0.389	0.386	0.044	3.367
Hypertension	0.111	0.113	0.008	1.647
Smoking	0.135	6.941	0.547	88.088
COPD	0.028	20.352	1.390	298.054

OR – odds ratio; CI – confidence interval; COPD – chronic obstructive pulmonary disorder.

Table - 13: *Univariate logistic regression showing impact of clinical parameters at admission on outcome (death/referral)*

Risk factors	p value	OR	95% CI for OR	
			Lower	Upper
Respiratory rate	0.002	1.445	1.144	1.824
Pulse rate	0.196	1.048	0.976	1.125
Systolic BP	0.210	0.967	0.917	1.019
Diastolic BP	0.039	0.889	0.795	0.994
Temperature	0.134	1.512	0.881	2.594
GCS	0.316	0.480	0.115	2.012
Cyanosis	0.316	4.333	0.247	76.046
SpO_2	0.006	0.606	0.425	0.865

OR – odds ratio; CI – confidence interval; BP – blood pressure; GCS – Glasgow coma scale; SpO_2 – Oxygen saturation.

outcome. In multivariate analysis, after adjusting for the influence of other important risk factors, only COPD was unanimously associated with poor outcomes (Table-12). The patients with COPD had a 20 times more chance of death or referral to higher center than the patients without COPD. Increased respiratory rate, decreased SpO_2 and low diastolic blood pressure at admission had a significant impact on death/referral to a higher center (Table-13). None of the treatment modalities had an impact on the outcome.

Discussion

This study was conducted at a resource constraint rural healthcare center. However, all the COVID-19 patients who were included in the study were prospectively followed up to the endpoint, and relevant data were recorded systematically. The patients were closely monitored and treated following the national guideline. We documented the range of presentations and try to ascertain the probable risk factor(s) for unfavourable outcomes.

Most of the COVID-19 cases in this study were male. Although the gender distribution for COVID-19 infection is conflicting [16], other Bangladeshi studies and studies from neighbouring countries show strong male predilection [17-27]. In a recent meta-analysis of 1994 COVID-19 patients, 60% (95% CI: 0.54, 0.65) were male [23], but in another meta-analysis, this deference was only minimal; the ratio of men to women was 1:0.9 [28]. The higher infection rate in male was explained by a higher expression of the angiotensin-converting enzyme 2 (ACE2) receptor in men [29]. Nevertheless, this issue is still controversial [30]. Other factors namely, less outdoor activity and less chance of contact of women with an infected person in this part of the world might contribute in lower rates of infection among women [23]. Women show more robust innate and humoral immune responses, and this may be another contributing factor to the lower infection rate in women [31]. Also, hygiene practices and compliance with the rules of personal protection and social distancing are more common among women [30,32]. Male patients in our study had a significantly worse outcome than women, which is a recognised finding of the COVID-19 outcome globally [23,28,30,33]. It is unclear why men are more prone to developing serious diseases, but immunological status can contribute to poorer outcomes in male patients. Men and women show a clear difference in the reactions of the immune system, with women producing more robust immune responses to pathogens [31,34]. This difference in immune response can make a significant contribution to viral load, disease severity and mortality [33]. Differences in the sex hormones could also be a determinant of viral infections since oestrogen has immune-stimulatory effects while testosterone has immunosuppressive effects [35]. Another critical factor is the higher prevalence of smoking in men which could adversely affect the respiratory system and influence the outcome with SARS-CoV-2 infections [36].

Most of our participants were middle-aged, which correlates with other Bangladeshi studies as well as studies from other Asian countries [18,21,22,37,38]. However, in Western countries, due to the large number of elderly people, the average age of COVID-19 cases is relatively higher [39,40]. Age is a major contributor to poor outcomes in patients with COVID-19 [41-44]. In our study, however, we found no significant influence of age on disease severity or mortality. In a meta-analysis of 12 studies focused on quantifying the isolated influence of age on severe COVID-19 outcomes, Starke et al. found a 2.7% increase in the risk of disease severity per year and almost no risk of age-related death. It seems that age-related co-morbidities carry more weight than age itself [45].

Diabetes and hypertension were the two most common co-morbidities in our study population, which correlates with the results of other studies [46,47]. In a meta-analysis of 10 Chinese studies, Singh et al. found that almost 21% of the study population had HTN and 11% had diabetes. In this study, they found increased mortality with these co-morbidities in patients with COVID-19 [47]. In another meta-analysis by de Almeida-Pititto et al. found that diabetes mellitus and hypertension were moderately associated with severity and mortality in COVID-19 (diabetes: OR 2.35; 95% CI: 1.80, 3.06 and OR 2.50; 95% CI: 1.74, 3.59; hypertension: OR 2.98; 95% CI: 2.37, 3.75 and OR 2.88; 95% CI: 2.22, 3.74) [48]. Parveen et al. in a systematic literature review and exploratory meta-analysis also concluded the same [49]. However, in our study, we found no association between the adverse outcomes and diabetes or hypertension, which so far was unexplained. Within the critical co-morbidities, COPD had a significantly negative impact on the outcome in our cohort, which correlates with other national and international studies [50-52]. In a systematic review and meta-analysis, Zhao et al. have shown that the presence of COPD is associated with a nearly fourfold higher risk of developing severe COVID-19 (OR 4.38; 95% CI: 2.34, 8.2) and OR of COPD for death was 1.93 (95%CI: 0.59, 7.43) [53].

In our study, significantly higher proportion of smokers had to be transferred to the higher center or succumbed to the disease. Smoking has been reported as one of the most important causes of adverse COVID-19 outcome [54,55]. It was found in a meta-analysis by Zhao et al. that smoking doubled the risk of severe COVID-19 (OR 1.98; 95% CI: 1.29, 3.05) [53]. In another meta-analysis of 19 peer-reviewed articles covering 11,590 COVID-19 patients, Patanavanich et al. found a significant

association between smoking and the progression of COVID-19 (OR 1.91; 95% CI: 1.42, 2.59; p = 0.001) [54]. Smoking upregulates the ACE2 receptor; a potential adhesion site for the SARS-CoV-2 and might be responsible for severe disease in smokers and patients with COPD [56]. Contrary to general agreements, few studies have not found a detrimental effect of current smoking on the outcome of COVID-19 [38,57-59], this may be due to misclassification of smoking, or due to the under-reporting of smoking in these cohorts [60]. In our study, after adjusting the impact of COPD and other risk factors, the significance of smoking on the outcome disappeared. COPD is a well-known consequence of long-term smoking. All of the COPD patients in this study were smokers. Therefore, it was not clear whether the negative outcome of COVID-19 patients was due to the effects of current smoking or due to the sequelae of long-term smoking. In any case, smoking, at present or in the past, is a risk factor and should be considered in evaluating COVID-19 pateints. Finally, Mahabee-Gittens et al. raised concern about the transmission of SARS-CoV-2 through vapour and smoke and urged to quit both indoor smoking and vaping [61]. We did not found any association between other co-morbidities and COVID-19 outcome.

In this cohort, fever was the most common symptom as in the other cohorts [22,46]. Most patients have had severe disease, but this does not reflect the true picture of the severity of the disease in the community as patients with milder disease usually do not require hospitalisation [15]. Patients sought hospitalisation at the end of the first week of symptom onset in our study, which correlated with the timing of symptom worsening if they had not already recovered. However, from the onset of symptoms to hospitalisation time was shorter in the early stages of the pandemic, in a study in Shanghai, between January 2020 and February 2020, the time between the onset of symptoms and hospitalisation in symptomatic patients was 4 days (2-7 days) [62]. In our cohort, two patients had an altered level of consciousness; a recent study found that altered mental state may be the first manifestation of COVID-19 in elderly patients [63]. However, in our cases, an altered level of consciousness could be due to hypoxia [64,65].

Respiratory rate and SpO_2 at admission had a significant impact on the outcome; higher respiratory rate and lower SpO_2 were associated with increased death and referral to a higher center in our cohort. In a retrospective study of 6,493 hospitalised COVID-19 patients, Mikami et al. found a respiratory rate greater than 24 per minute and peripheral oxygen saturation less than 92% were associated with about two times increased in mortality (HR 1.43; 95% CI: 1.13, 1.83; HR 2.12, 95% CI: 1.56, 2.88) [66]. In an American cohort of 1,461 hospitalised COVID-19 patients, Bahl et al. found a similar picture, in multivariable analysis. Low oxygen saturation and elevated respiratory rate on admission were associated with increased in-hospital mortality [67]. We did not found any association between other clinical and laboratory parameters and COVID-19 outcome. The study had some limitations. The study was conducted at a resource-poor setup on small number of patients and not all necessary investigations were conducted. Post transfer data of the referred patients' could not be collected and also no detailed smoking history of every case was available.

In this study, COPD was associated with a negative outcome. However, we did not find any association between many established risk factors (age, DM, HTN) and adverse COVID-19 outcome in our study. Extensive prospective studies should be carried out to identify the risk factors influencing the outcome of COVID-19 in our population at different health care settings.

Author's contribution:

WMMH – study planning, data analysis, manuscript writing; CSP – study planning, patient recruitment and management, data collection; NC – data collection and entry, patient management; MMIS – patient management, data entry; SKMSK – patient management, data collection; AK – overall supervision of isolation unit; RH, MARM, AA, AS, LS, SR – patient management.

Conflict of interest: none

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