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CLINICAL FEATURES OF COVID-19 IN BANGLADESH DURING ITS INITIAL AND EPIDEMIC PHASES

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Abstract: *In Bangladesh, the outbreak of Coronavirus Disease 2019 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first came into light on March 08, 2020. Since then, the scientific communities of the public health sector expressed concern over the issues of heterogeneous clinical features of the disease in the country. The aim of this study is to analyze the heterogeneity of clinical characteristics of 105 COVID-19 cases in Bangladesh from March 08, 2020, to July 31, 2020. The clinical features of 105 COVID-19 cases including demographic information, symptoms, radiological findings etc. were analyzed and compared for both the initial and epidemic phase of COVID-19 outbreak in Bangladesh. Out of 105 cases, more than 20% of cases were completely asymptomatic. For symptomatic patients, the most common symptoms were respiratory stress (>60%) with low-grade fever, cough, and headache. Major X-ray findings were reported as bilateral and patchy opacities (30%). The most common co-morbidities were diabetes (20%) and heart disease (20%). More than 50% COVID-19 patients recovered from the infection within three weeks. The prevalence of asymptomatic COVID-19 cases may contribute greatly to the rapid community transmission of the coronavirus in Bangladesh. The clinical outcomes of patients are assumed to be directly related to the co-morbidity and age groups along with gender. This study will significantly contribute to preventing further outbreak of COVID-19 in Bangladesh.*

Keywords: *Coronavirus disease 2019, Severe acute respiratory syndrome-coronavirus 2, Epidemiology, Clinical features.*

Introduction

One of the biggest global challenges today is to stay safe from COVID-19 pandemic. [4-7] Due to the quicker outbreak of SARS-CoV-2 across almost all the continents of the world, the current epidemic has already been alarmed as a public health emergency of international concern by the World Health Organization (WHO) on January 30, 2020. [8] It has already been known that the new strain of coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for this potentially fatal disease outbreak and subsequently growing the global concerns. [9-12] Figure 1 represents the known key features of SARS-CoV-2 showing its clinical characteristics, diagnosis and supportive treatment. The main route of transmission of the virus is respiratory droplets of COVID-19 patients and touching objects contaminated by SARS-CoV-2. [13, 14] The virus entries to host cells and causes infection when the S protein of the virus binds to ACE2 receptor [9] of the host cell membrane surface. [15] The incubation period of the virus for susceptible population is generally 1–14 days while exposure to SARSCoV-2 may develop symptoms like fever, dry cough, and fatigue in most COVID-19 cases. [13] The RNA (ribonucleic acid) strain of the virus can be detected by implementing quantitative reverse transcriptase polymerase chain reaction (RT-PCR) technique. [16] For mild COVID-19 cases, symptomatic treatment like relief of basic COVID-19 symptoms can be adopted while severe COVID-19 cases progressing viral pneumonia require supportive therapy like mechanical ventilation to aid in breathing. [17-19] After all of these known features of coronavirus, its epidemiological characteristics may differ from country to country due to its novel pattern. [10, 20-23]

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Bangladesh (officially called the People's Republic of Bangladesh), one of the countries in South -East Asia region (SEAR), has been going through the pandemic flow of coronavirus disease 2019 (COVID-19) since March 08, 2020 (first identified case). After the emergence of COVID-19 in Bangladesh, the epidemiologic picture of Bangladesh is changing on a daily basis. As of June 7, 2023, there are more than 2.1 million confirmed COVID-19 cases in Bangladesh, including 29 thousands deaths and 2 million recoveries. [4] As a result, COVID-19 has become a public health threat for Bangladesh and a comprehensive understanding of atypical features of the ongoing pandemic is essential for effective management and prevention of COVID-19. Only one COVID-19 case during the initial period of coronavirus attack in Bangladesh was reported by Jahan et al. [24] However, no research has yet been performed on clinical characteristics of COVID-19 cases during the initial and epidemic phase of COVID-19 outbreak in Bangladesh. In this study, the clinical characteristics of 105 COVID-19 cases in Bangladesh during its initial and epidemic COVID-19 outbreak were investigated for exploring the natural history, clinical patterns and transmission criteria of the disease in the country. This study will be valuable to researchers in epidemiology, public health and infection control who want to compare the clinical features of COVID-19 cases between initial and epidemic period of the disease outbreak in Bangladesh.

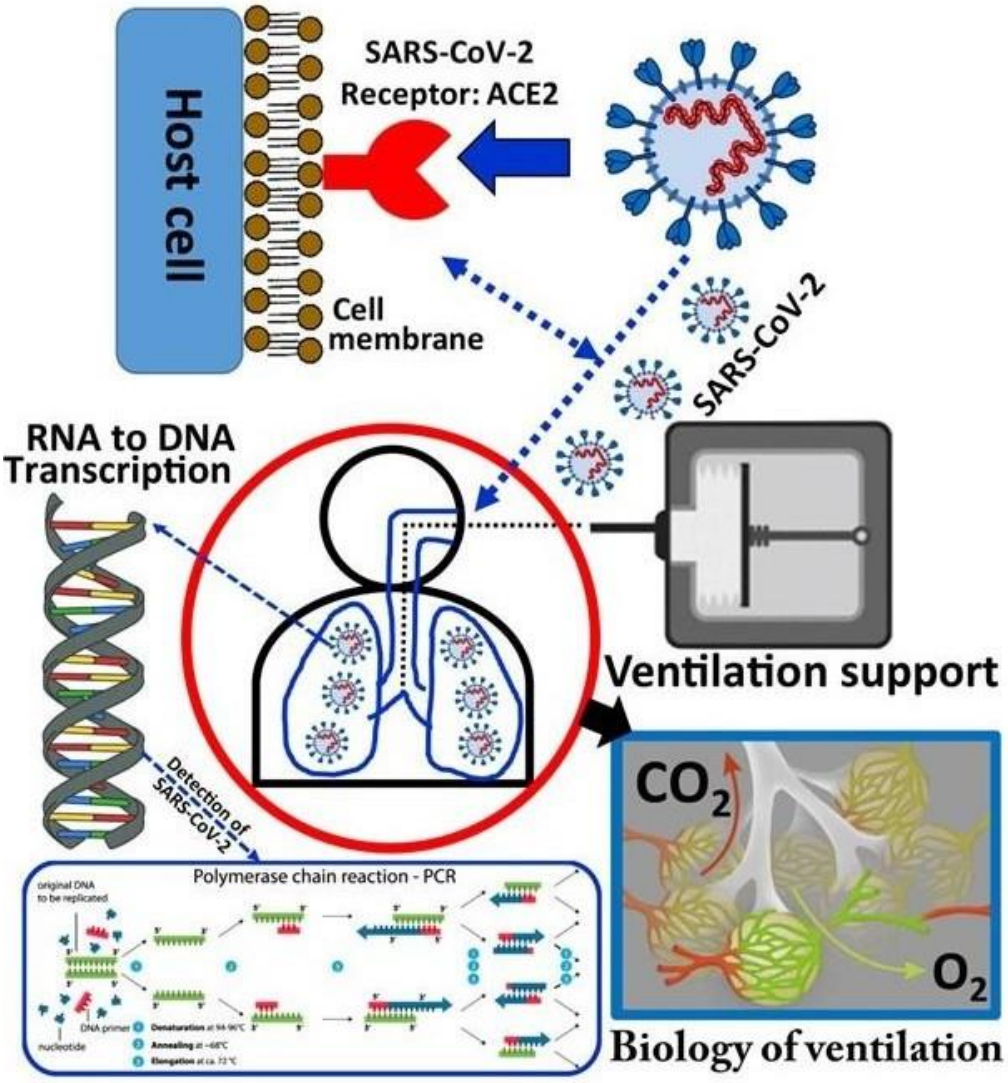

Figure 1. Epidemiology, Diagnosis and supportive treatment of the novel SARS-CoV-2.

Methods

Study design and Collection of data:

A cross-sectional study designed to collect data about the clinical information of COVID-19 cases from two phases of COVID-19 throughout the country: one was initial phase (from March 08, 2020 to April 11, 2020) and the other was epidemic phase (from April 12, 2020 to July 31, 2020). During the initial phase of COVID-19, the study was performed for five Bangladeshi COVID-19 cases confirmed by real-time RT-PCR while a total of one hundred (100) cases of laboratory-confirmed COVID-19 was studied during the epidemic phase of the disease in the country. During the epidemic phase, the sample size for study was calculated using 10% marginal error. The data was collected from medical records of designated district level hospitals in Dhaka and Chittagong division, Bangladesh.

Clinical studies of COVID-19 cases:

All clinical characteristics of the studied Bangladeshi COVID-19 patients were first categorized into basic informative parameters like age, gender etc. The clinical outcomes of the patients were grouped based on the symptoms, COVID-19 test day, CBC reports, chest X-ray and co-morbid conditions. The monitoring parameters during the infection period considered were blood pressure, pulse, oxygen saturation level and other associated blood test reports. All the clinical characteristics of the patients were studied and compared. Furthermore, the possible factors influencing the transmission and infection rate of coronavirus like contact exposure history, obesity, fatty liver etc. were also evaluated.

Patient and public involvement:

The data was collected from medical records of designated district level hospitals in Dhaka and Chittagong division, Bangladesh. Therefore, no patient was involved neither in the development of the research question and outcome measures nor in the design of this study. Patient from the government medical colleges of Dhaka and Chittagong districts were enrolled in the present study.

Results and Discussion

A. Clinical characteristics of five COVID-19 cases during initial COVID-19 outbreak in Bangladesh:

The major clinical characteristics and findings of five COVID-19 cases collected from the initial period of coronavirus infection in Bangladesh are highlighted and presented in Table 1.

Table 1: Clinical features of five COVID-19 patients reported in Bangladesh

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5
Age (Yrs.)	55	45	35	22	45
Gender	Male	Male	Male	Male	Female
Symptoms					
Developing Symptoms	Yes	No	Yes	Yes	Yes
Fever	Yes		Yes	Yes	Yes
Cough	Yes		Yes	No	Yes
Sore throat	No		Yes	No	No
Respiratory distress	Yes		Yes	No	Yes
Others	No		(Loose motion)	No	No
Days of illness for sample COVID-19 positive	6th day	4th day	4th day	7th day	5th day
CBC	Lymphopenia	Not done	Normal	Not done	Leukocytosis
Chest X-ray	Bilateral patchy opacities, pleural effusion	Not done	Normal	Not done	Bilateral basal consolidation
Blood pressure (mmHg)	110/70	120/80	130/80	100/80	90/60
Pulse (b/min)	96	76	88	80	100
Oxygen saturation level, SpO2 (%)	88	95	89	97	90
Other associated blood test report	Not done	Not done	Not done	Positive widal test on 5th day	Not done
Contact exposure history	Not mentioned	Suspicious	Direct contact exposure	Suspicious	Suspicious
Co-morbidity	No	No	Hypertension	No	No

Case (A):

Case A was a symptomatic COVID-19 male patient. He was a salesperson at a grocery shop. He complained of fever and cough for 3 days. With no good response from the symptomatic treatment by local physicians, his physical conditions gradually deteriorated with development of breathlessness. On the 6th day of his symptoms, he was diagnosed as COVID-19 positive. While his hematological findings revealed lymphopenia and other biochemical parameters were found normal. The chest radiograph (X-ray) of the patient is presented in Figure 2a, which shows bilateral asymmetrical patchy opacities, multifocal consolidation and left sided mild pleural effusion. CT Scan of chest could not be performed due to less availability. It was reported that the chest radiographs have great diagnostic value in the intermediate to advanced stages, which may show progression of features of acute respiratory distress syndrome (ARDS). [25] The patient was categorized as moderate COVID-19 case group and treated according to national guidelines on clinical management of COVID-19, Disease control Division, Directorate General of Health Services (DGHS), Bangladesh.

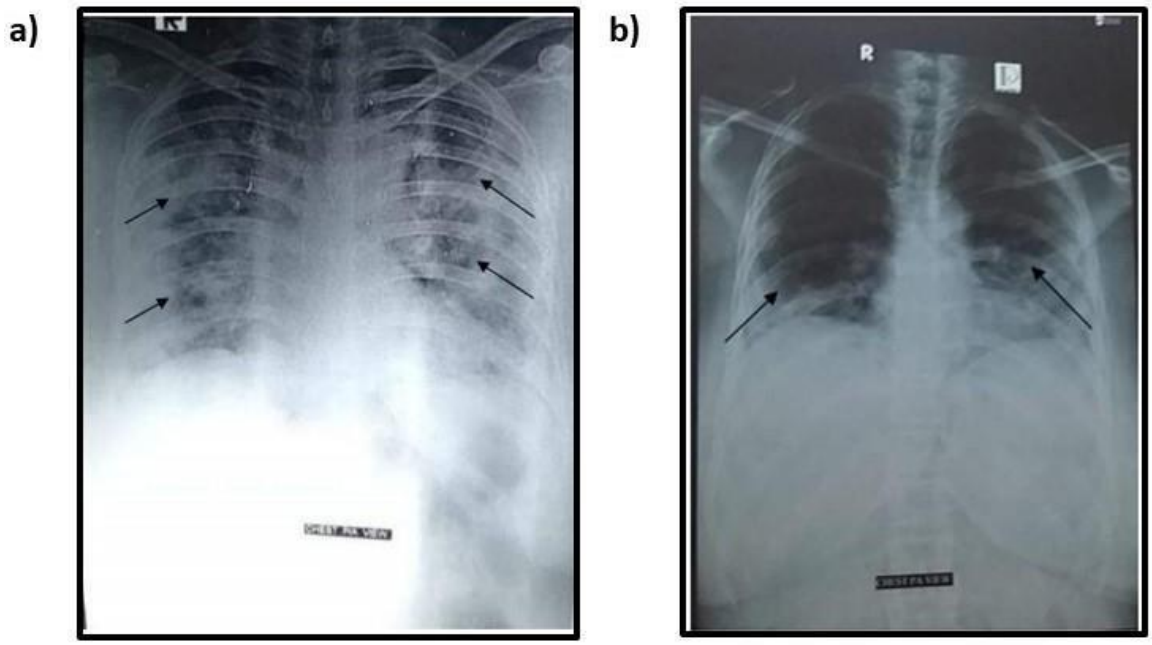

Figure 2. Clinical findings from chest radiographs (X-ray) of two COVID-19 patients of Bangladesh during initial phase of COVID-19: a) Chest X-ray of case A showing bilateral asymmetrical patchy opacities and multifocal consolidations involving mid and lower zone, more marked on left lung (black line arrows) with left sided mild pleural effusion; b) Chest X-ray of case E revealing bilateral patchy opacities in lower zones.

Case (B):

Case B was an asymptomatic COVID-19 male patient. He was a police constable working in a regional Thana health complex of Kishoreganj district, where more than 100 COVID-19 cases have been found till April 11, 2020. He has been through a screening test because of his history of exposure in the highly risky COVID-19 area and eventually diagnosed as COVID-19 positive. He was immediately taken to the isolation ward of the local hospital for supportive management. All other hematological parameters were found to be normal and no chest X-ray was done. After 7 days of isolation, the second laboratory test result was negative. He was clinically stable and had no other comorbidity.

Case (C):

Case C was a symptomatic COVID-19 male patient, who was the first doctor affected by the disease in Bangladesh. He had a history of direct contact with a critical patient of COVID-19 taking treatment in an intensive care unit (ICU) on 18 March 2020. On the 3rd day of contact exposure to COVID-19 patient, he developed fever, cough and sore throat. On the 4th day of symptoms, he was tested as COVID-19 positive and treated at home in isolation. On the 6th day of illness, he was admitted in the hospital due to frequent loose motion and breathing difficulties. It was good that his physical condition improved gradually and moreover, two consecutive tests with samples collected 48 hours apart were negative at 22nd day of exposure.

Case (D):

Case D was a less symptomatic COVID-19 patient, who was a medical technologist (dental department) and had been suffering from low grade fever for 5 days. His Widal test was positive (both TO and TH titer- 1:160) for enteric fever. On the 7th day of illness, he was diagnosed as COVID-19 positive and admitted to the isolation ward of a hospital. After 7 days of providing symptomatic treatment, the second laboratory test result appeared negative.

Case (E):

Case E was a female COVID-19 patient, who was admitted in hospital with the complaints of fever, cough and breathing difficulties for 3 days. Her nasopharyngeal swab was taken on the 5th day of illness and found positive for COVID-19. The chest radiograph (X-ray) of the patient was presented in Figure 2b, which reveals bilateral patchy opacities in lower zones. The white blood cell count raised and oxygen saturation (SpO_2) level was 90% on pulse oximetry during hospital admission. The recovery report of the patient is unknown.

Comparison among five studied cases:

Our analyses of the clinical outcomes for five representative COVID-19 cases from March 08, 2020 to April 11, 2020 in Bangladesh have revealed remarkable variation in age and gender where the infected ratio of male and female is 4:1 and age is flanked between 22 and 55 years. The RT-PCR test has been found positive mostly within the 4th to 7th day of exposure to SARS-CoV-2 (Table 1). While only one patient had a direct exposure history of COVID-19 patients and others had suspicious/no contact history. It is important to note that out of five patients reported in the mentioned date range, one was completely asymptomatic. Although there have been few reports about asymptomatic transmission in other countries like Germany, [26] asymptomatic patients can spread the virus in the incubation period like symptomatic patients.[27] According to the report of IEDCR to date, 23 percent (%) of all the COVID-19 cases in Bangladesh are asymptomatic, which may cause rapid transmission of the coronavirus in the country. [4] Therefore, it is expected that more asymptomatic COVID-19 patients would be found in Bangladesh if more clinical tests are conducted. Other four patients reported in Table 1, required treatment in an isolation ward after getting admitted into the hospital. Out of four symptomatic COVID-19 patients, two were assessed with abnormal chest radiograph findings. Moreover, the represented cases in this study indicates that the clinical features of COVID-19 patients in Bangladesh may be directly related to co-morbidity and age group along with gender.

B. **Comparison of clinical characteristics for 100 COVID-19 cases during epidemic period of COVID-19 outbreak in Bangladesh:**

In order to determine the prognosis and severity of COVID-19 in Bangladesh, the major clinical characteristics and features of one hundred COVID-19 cases studied during the epidemic phase of COVID-19 attack in the country are discussed here (Figure 5and 6).

a. Demographic distributions:

The demographic distributions of Figure 3a and 3b illustrate that males constitute more than 60% in infection. The proportion of male to female COVID-19 patients is 2:1. More than 60% of infected are aged between 41 to 60 years of age. In addition, the percentage of age group from 21 to 40 years old was 25% revealing that young people can also be susceptible to COVID-19 like middle and old-aged.

However, least infection was found for age less than 20 years. Figure 3c shows that more than 77% of cases survived by fighting with coronavirus. More than 50% COVID-19 patients recovered from the infection within three weeks while minimum recovery time from the day of infection was found two weeks (Figure 3d). It is important to note that out of the 100 studied COVID-19 cases, 22.4 % was reported to death within ten days from the infection (Figure 3c). A possible explanation is that the studied patients were mostly admitted in the ICU with multiple comorbidities.

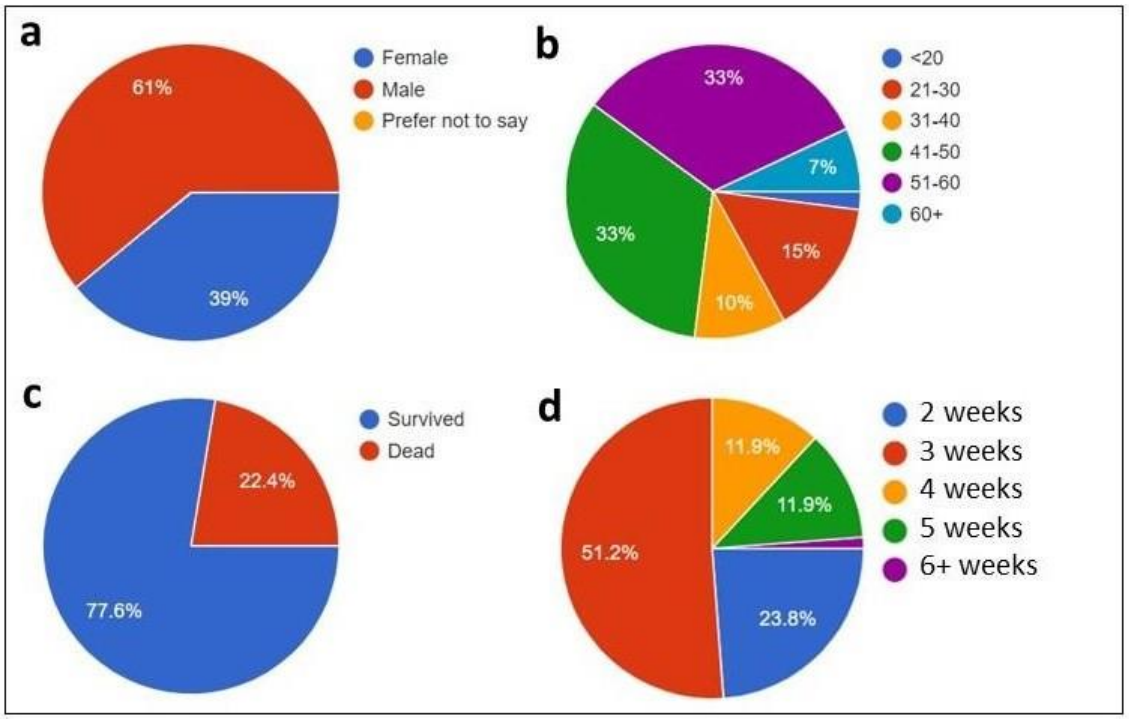

Figure 3. Basic information of 100 COVID-19 cases in Bangladesh during epidemic phase of COVID-19: a) Gender distribution; b) Age-group distribution (in years); c) Percentage of death; and d) Time required to recover from coronavirus infection.

b. Major clinical outcomes:

Figure 4 summarizes all the clinical outcomes of the 100 COVID-19 cases. Among all the cases, 66 % of the studied cases developed symptoms like fever, cough, sore throat, respiratory distress, loose motion, stuffy nose, headaches, body ache and pains, nausea etc. (Figure 4a). The most common COVID-19 sign for cases developing symptoms were respiratory distress along with cough, fever and headache. About 33% of the studied cases did not have any signs of COVID-19 which means these cases are asymptomatic. As it has already noticed from the previous section (initial period of COVID-19 in Bangladesh) that around 20% (one case out of five) of initial cases were asymptomatic, this factor is assumed to contribute to the rapid transmission of the coronavirus throughout the country during the epidemic period, which is consistent with the report released by IEDCR.[4] Most of the diagnosis reports of COVID-19 cases (35%) were found to be positive on the 5th day of illness while 26% of cases were diagnosed as COVID-19 positive on the 4th day of illness (Figure 4b). The hematological findings in Figure 4c show that 20% and 19% of COVID-19 cases had leukocytosis and lymphopenia respectively while 33% of cases had normal CBC report. The chest radiograph (X-ray) findings reveals that 30% of the cases had bilateral and patchy opacities while only 10% and 8% of cases had pleural effusion and basal consolidation respectively (Figure 4d). The common co-morbid conditions illustrated in Figure 4e were diabetes (20%), asthma (20%), heart disease (15%) and hypertension (15%). It is

important to note that these co-morbid conditions of the studied cases may contribute to worsening the physical conditions of patients during fighting with coronavirus. It was reported that the prevalence of comorbidities in SARS-CoV-2 infected patients is considered as one of the risk factors for severe patients compared with non-severe patients, which may contribute to worsening the physical conditions of patients during fighting with coronavirus. [28] Therefore, it is difficult to mention the actual cause of death of COVID-19 cases who suffered from co-morbidities.

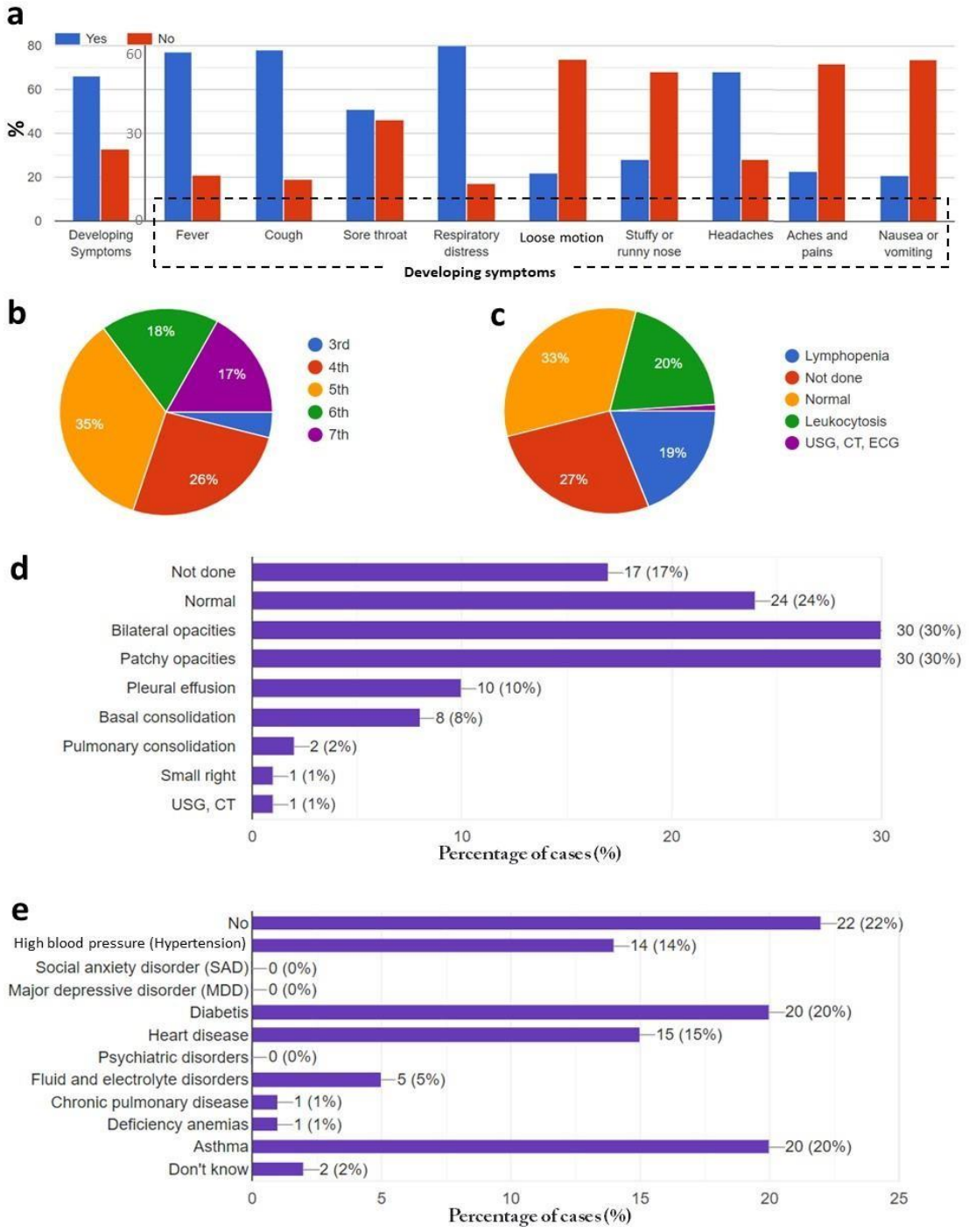

Figure 4. The clinical outcomes of the 100 COVID-19 cases of Bangladesh during epidemic phase of COVID-19: a) Signs and symptoms developed for patients; b) Days of illness for sample COVID-19 positive; c) CBC report findings; d) Chest X-ray findings; and e) Co-morbid conditions.

c. Monitoring of physical parameters during hospitalization:

It was reported that a stable and comfortable environment should be sustained for COVID-19 patients during therapy while continuous monitoring of physical parameters can reduce the rate of death of COVID-19 patients. [29] Figure 5 shows the physical parameters monitored for the studied cases during their hospitalization. As shown in Figure 5a, blood pressure readings for around 36% of COVID-19 cases was ideal, which was between 90/60mmHg (systolic) and 120/80mmHg (diastolic). While the blood pressure readings between 120/80mmHg and 140/90mmHg was found for only 15% COVID-19 cases. Most of the studied cases had normal heart rate, 60-100 beats/min, while only 1% cases had pulse rate above 100 beats/min (Figure 5b). Out of 100 cases, 66 COVID-19 patients had normal blood oxygen saturation levels (SpO_2), which was between 94% to 99% (Figure 5c). While 11% of cases were provided with supplemental oxygen due to their SpO_2 levels falling below 90% and 3% of cases required oxygen therapy and oxygen equipment as their SpO_2 readings were below 88%. Figure 5d presents the other blood test reports of all the studied COVID-19 cases, among which 39% cases were positive in Widal blood test.

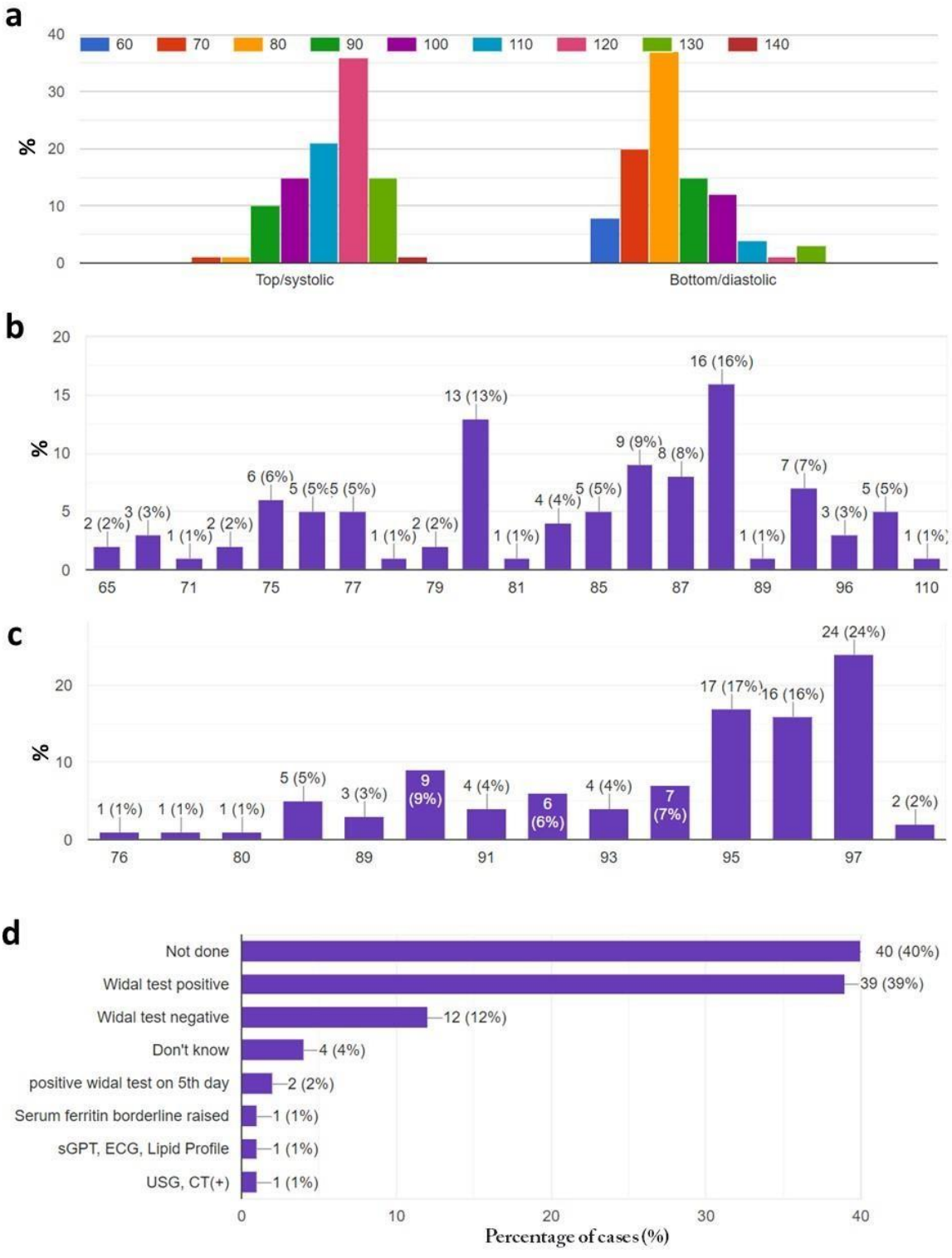

Figure 5. The physical parameters monitored for the hospitalization of 100 COVID-19 cases of Bangladesh during the epidemic phase of COVID-19: a) blood pressure readings (mmHg); b) pulse (b/min); c) Oxygen saturation level, SpO_2 (%); and d) Other associated blood test reports.

d. Pre-existing risk factors for getting infected by SARS-CoV-2 virus:

The relevance of pre-existing risk factors for acquiring the coronavirus infection are shown in Figure 6. The contact exposure history of all the cases presented in Figure 6a presents that 26% of cases were claimed to direct contact with COVID-19 patients while the contact history was questionable for 34% of cases. Figure 6b shows the information whether or not the studied COVID-19 patients had taken BCG vaccination against tuberculosis. Interestingly, most of the COVID-19 cases did not know about their vaccination. However, according to WHO,[30] there is no evidence that the Bacille Calmette-Guérin vaccine (BCG) provides any kind of protection against coronavirus infection with COVID-19 virus. Incidentally, about 13% of COVID-19 cases had obesity (Figure 6c). As compared to the H1N1 influenza experience, there is a relationship between severe obesity and COVID-19 infections.[31] Therefore, the patients with severe obesity should be taken with special care and priority on detection and testing of COVID-19 and allied screenings. The percentage of cases having fatty liver was only 14% as shown in Figure 6d. It was reported that the effect of having fatty liver on coronavirus infection is modest while the mortality rate of COVID-19 due to liver related disease is unusual.[32] Figure 6e shows that 63% cases took preventive measures before getting infected while 16% of cases did not maintain prophylaxis to avoid the disease.

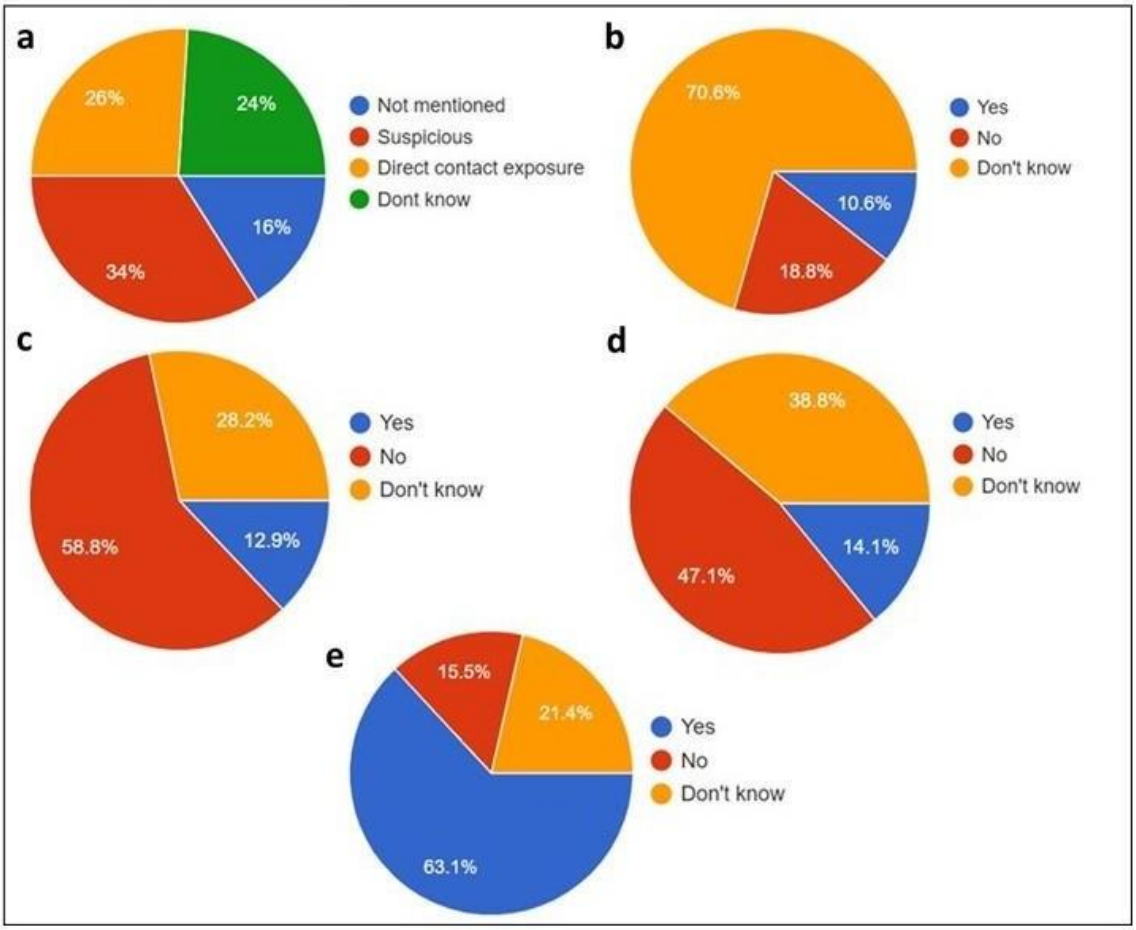

Figure 6. The possible pre-existing risk factors for acquiring the coronavirus infection in this study: a) history of contact exposure; b) Vaccination of BCG for prevention of tuberculosis; c) having obesity; d) having fatty liver; and e) Preventive healthcare, or prophylaxis taken for coronavirus disease prevention.

In summary, the narrative analyses of the clinical outcomes for 100 representative COVID-19 cases in Bangladesh have revealed that the epidemiological and clinical characteristics of COVID-19 during the epidemic period are similar to that of the initial period of COVID-19 in the country. The limitation of

the present study is that the number of analyzed cases were relatively small, which needs further analysis including more COVID-19 cases for practical implication of the current findings and to develop different strategies to address this kind of epidemic in future.

Conclusion

We have systematically analyzed the clinical characteristics for a number of laboratory-confirmed COVID-19 cases infected with SARS-CoV-2 during the initial and epidemic period of COVID-19 in Bangladesh. We have observed that the clinical outcomes of these patients in Bangladesh during the initial as well as epidemic period of COVID-19 are directly related to the co-morbidity and age group along with gender. Men are more likely to be infected than women and young people are also susceptible to infections like old people. Due to the prevalence of asymptomatic cases reported in the previous section, droplet precautions should be taken by using surgical or procedure mask, gown, and gloves during treatment of all COVID-19 patients. In order to avoid super spreading events of SARS-CoV-2 among healthcare workers and other patients in hospitals, the best practice of stringent infection control measures and using personal protective equipment in the hospitals should be followed. The current study would be helpful in preventing the spread of COVID-19 and promoting interventions in their country.

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Conflict of interest statement

The authors declare that there are no conflicts of interest. Informed written consent was taken from each patient. All participants provided their written and informed consent.

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