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Original Research Article

Infection and outcome of COVID-19 affected patients during 1st and 2nd waves in Bangladesh: a hospital based comparative study

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ABSTRACT

Background: COVID-19 emerged as one of the worst pandemics in human history in December 2019. Despite a relatively low infection rate in Bangladesh for seven weeks from mid-January, there were still 287 deaths in February, marking the lowest monthly death toll since May 2020. This study aimed to analyze the infection and outcomes of COVID-19 patients during the first and second waves in Bangladesh.
Methods: This cross-sectional observational comparative study conducted at the Popular medical college hospital, 190 COVID patients were enrolled during the first wave (Mid-June to Mid-August 2020), and 179 COVID patients were enrolled during the second wave (Mid-March to Mid-April 21).
Result: Mean age was 52.85±15.36 years in the first wave and 55.42±14.20 years in the second wave (p=0.097). Male patients predominated in both waves (p=0.082). Common symptoms, such as fever, cough, and respiratory distress, were similar. The second wave had a higher percentage of patients with diabetes. CRP levels increased in the first wave, while D-dimer levels were higher in the second wave. HRCT reports indicated minimal COVID-19 involvement. Most patients were discharged, with a small percentage referred to higher centers, and the mortality rate was not significant (p=0.600).
Conclusions: The study highlights the differences in various factors related to COVID-19 between the first and second waves of COVID-19 in Bangladesh. Although the demographic status was similar in both waves, it provides valuable insights for medical consultations.

Keywords: COVID, Clinical features, Demographic factors, 1st and 2nd wave, HRCT, Respiratory syndrome

INTRODUCTION

In December 2019, an outbreak of pneumonia of unknown origin was reported in Wuhan, Hubei Province, China. Pneumonia cases were epidemiologically linked to the Huanan seafood wholesale market.[1] Countries around the world cautioned the public to take responsive care. The public care strategies have included handwashing, wearing face masks, physical distancing, and avoiding mass gatherings and assemblies. Lockdown and staying-home strategies have been put in place as the needed action to flatten the curve and control the transmission of the disease.[2] The ongoing pandemic severely damaged the world's most developed countries and is becoming a major threat to low- and middle-income countries.[3] COVID-19 is the greatest challenge that these expanded national education systems have ever faced.[4] The COVID-19 pandemic has created considerable uncertainty, anxiety, and a drastic change as regards our way of life.[5] A pandemic is a serial killer that can have devastating consequences on humans and the global economy.[6] One of

the difficulties of COVID-19 is the condition that it has caused in the mental health of the population. The world is experiencing an exceptional situation due to the advance of the pandemic and now with its new variant of the Omicron it has not allowed the full recovery of some countries.[7] During any outbreak of infectious disease, the population's psychological reactions play a critical role in shaping both spread of the disease and the occurrence of emotional distress and social disorder during and after the outbreak. Despite this fact, sufficient resources are typically not provided to manage or attenuate pandemics' effects on mental health and well-being.[8] The WHO has declared this ongoing outbreak of COVID-19 as a public health emergency of international concern on January 30, 2020. According to WHO, countries with vulnerable health systems are at higher risk.[9] In Bangladesh, after detecting the first COVID-19 case on 8 March, in the following 2 weeks, more than 0.63 million overseas workers entered the country without proper screening, facilitating community transmission.[10] Furthermore, a few of the government's delayed decisions were found less effective which worsened the pandemic situation. For example, the government declared a general holiday for 10 days from March 23, 2020, to April 2, 2020, without restricting transportation and public movement. As a result, a crowd of more than 12 million people left Dhaka immediately after the notice that expedited the community transmission.[11] International and domestic tourists have canceled bookings in Bangladesh, and outbound tourism activities have also been banned. Airlines have canceled flights, while hotels are almost completely vacant, and as a result, supporting tourism agencies are facing huge economic losses and employment cuts in Bangladesh. The amplification of COVID-19 is predicted to cause a long-term adverse impact on tourism in Bangladesh. The government of Bangladesh has declared an incentive package for early economic recovery that is needed for businesses to survive the pandemic.[12] The unprecedented COVID-19 pandemic has become a global burden disrupting peoples' quality of life. Students are an important cohort of a country, and their mental health during this pandemic has been recognized as a concerning issue.[13] In Bangladesh, 568,706 people have tested positive for COVID-19 since the first case was confirmed in early March last year, and 8668 people have died, with an infection mortality rate of 1.52%, till March 20, 20201. Since early December 2020, overall case detection in Bangladesh has been declining, with daily case detection falling below 1000 on January 12, 2021. However, beginning March 16, 2021, there has been a significant increase in cases of detection, with daily cases exceeding 2000 as of 20 March. As a result, it was predicted that Bangladesh would experience the second wave of COVID beginning in mid-March 2021.[14] No significant demographic differences in the cases in these two waves indicate the role of other factors such as delta variant and late admissions in higher severity and more deaths. Comorbidity and higher secondary bacterial and fungal infections may have contributed to increased mortality.[15]

Objectives

General objective

General objective was to analyze the infection and outcome of COVID 19 patients during 1st and 2nd waves in Bangladesh.

Specific objective

Specific objective was to discuss the risk factors related to the study, to represent the clinical syndrome of the study subject, to know the rate of infection involvement among the study population and to discuss the outcomes of the study subject.

METHODS

For this cross-sectional observational comparative study conducted at Popular medical college hospital, patients were included during the first wave (Mid-June to Mid-August 2020) and the second wave (Mid-March to Mid-April 2021) of COVID-19. In the first wave, consecutive 190 patients were selected from COVID-dedicated isolation wards/cabins. The inclusion criteria involved patients with fever and respiratory symptoms, as well as those with specific risk factors, who consented to participate in the study. Exclusion criteria included patients below the age of 20 and those who did not provide consent. Patients were diagnosed with COVID-19 based on either real-time polymerase chain reaction (RT-PCR) positivity or clinical features along with typical HRCT chest findings. In the second wave, information was collected from consecutive 179 COVID patients admitted to the same hospital, following the admission criteria mentioned in the national guideline for COVID management. A dedicated team of doctors collected the medical records through direct patient interviews. Purposive sampling was employed, and all data were recorded in a case record form with unique patient ID numbers. The collected data included demographic information, clinical presentation, symptoms on admission, co-morbidities, laboratory investigation reports (including chest imaging and biochemical markers), treatment programs, clinical outcomes, and duration of hospital stay. Patient severity was classified according to the national guideline (version 9.0). Nasopharyngeal swab specimens were obtained at admission and confirmed using real-time RT-PCR. Chest X-rays were performed upon admission, and HRCT chest scans were conducted at the end of the first week of infection. Routine laboratory tests, such as complete blood count, blood biochemistry, CRP, D-dimer, Ferritin, and Procalcitonin, were conducted as per clinical requirements. During the second wave, IL-6 levels were also measured. The study obtained ethical approval and written informed consent from the participants. Data analysis was performed using statistical package for social sciences (SPSS version 20.0) and Microsoft excel 2016.

RESULTS

This research shows the demographic features of 2 waves in parallel columns, which reveals there was no significant difference. Mean age of the patients was 52.85±15.36 years and 55.42±14.20 years respectively during 1st and 2nd waves with a p=0.097. The highest percentage of patients were >60 years of age. Regarding gender distribution, there was male predominance during both waves (Table 1).

Table 1: Demographic characteristics of study subject (N=369)

Characteristics	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
Age (In years)					
≤20	2	1.1	0	00	
21-30	18	9.5	10	5.6	
31-40	25	13.2	23	12.8	
41-50	36	18.9	31	17.3	
51-60	48	25.3	43	24.0	
>60	61	32.1	72	40.2	
Mean ± SD	52.85± 15.36		55.42± 14.20		0.097
Gender					
Male	124	65.3	102	57.0	0.082
Female	66	34.7	77	43.0	

Table 2: Symptoms of study subject, (n=369).

Symptoms	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
Fever	167	87.9	159	88.8	0.780
Cough	153	80.5	146	81.6	0.799
Dyspnea	111	58.4	85	47.5	0.035
Altered sense smell	40	21.1	20	11.2	0.282
Alter sense taste	27	14.2	10	5.1	0.160
Fatigue	94	49.5	21	11.2	0.001
Sore throat	59	31.1	54	30.2	0.854
Diarrhea	23	12.1	25	14.0	0.595
Vomiting	12	6.3	11	6.1	0.946
Anorexia	38	20.0	10	5.6	0.001
Headache	22	11.6	13	7.3	0.157
Confusion	5	2.6	10	5.6	0.151
Nasal congestion	8	4.2	3	1.7	0.152
Conjunctivitis	1	0.5	11	6.1	0.002
Dizziness	4	2.1	0	00	0.051
Chest pain	8	4.2	17	9.5	0.043
Others	24	12.6	12	6.7	0.055

In this study, during both waves, fever (87.9% in 1st wave and 88.8% in 2nd wave; p=0.780) with respiratory symptoms like cough (80.5% in 1st wave and 81.6% in 2nd wave; p=0.799) and respiratory distress (58.4% in 1st wave and 47.5% in 2nd wave; p=0.035) topped the list with almost similar percentages. Anosmia and anorexia were more during 1st wave; whereas chest pain and conjunctivitis were more during 2nd wave (statistically significant) (Table 2).

Table 3: Co-morbidities and risk factor of study subject, (n=369).

Risk factor	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
DM	90	47.4	105	58.7	0.030
HTN	103	54.2	109	60.9	0.194
Asthma	27	14.2	27	15.1	0.813
CHD	11	5.8	16	8.9	0.246
CVD	8	4.2	0	00	0.006
COPD	2	1.1	2	1.1	0.952
CKD	11	5.8	13	7.3	0.566
Smoking	37	19.5	12	6.7	0.001
Obesity	1	0.5	0	00	0.331
Chemotherapy	1	0.5	0	00	0.331
Surgery	1	0.5	0	00	0.331
Dengue	1	0.5	0	00	0.331
Pregnancy	0	00	2	1.1	0.231

This study presents that around half of the patients had been suffering from hypertension (54.2% in 1st wave and 60.9% in 2nd wave; p=0.194) and Diabetes (47.4% in 1st wave and 58.7% in 2nd wave; p=0.030); the percentage of DM was higher in 2nd wave (58.7%). Other less common associated co-morbidities and risk factors are shown in (Table 3).

Table 4: Clinical syndrome of study subject, (n=369).

Clinical syndrome	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
Mild	56	29.5	64	35.8	0.198
Moderate	92	48.4	59	33.0	0.003
Severe	41	21.6	47	26.3	0.305
Critical	2	1.1	10	5.6	0.014

Our study shows most of the patients were affected at a moderate level of the disease during 1st wave (48.4% in 1st wave and 33.0% in 2nd wave; p=0.003). But patients were more frequent at the mild stage during the 2nd wave (35.8%) (Table 4).

Only the ferritin test gave a similar result for both of the waves. The CRP was increased for the patients of 1st wave (69.5%) only whereas; the D-dimer report was also increased for the patients of 2nd wave comparatively (32.5% in 1st wave as well as 75.4% in 2nd wave; p=0.001). The result of the RT-PCR test was more frequently positive among the patients of the 1st wave (71.1%) (Table 5).

Table 5: Investigation of study subject, (n=369).

Investigation	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
CRP					
Yes	132	69.5	19	10.6	0.001
No	58	30.5	160	89.4	
D-dimer					
Yes	62	32.6	135	75.4	0.001
No	128	67.4	44	24.6	
Ferritin					
Yes	63	33.2	25	14.0	0.001
No	127	66.8	154	86.0	
RT- PCR					
Positive	135	71.1	86	48.0	0.001
Negative	55	28.9	93	52.0	

Table 6: HRCT (Suggestive of COVID-19 infection% involvement) of study subject, (n=369).

Suggestive of COVID 19 infection% involvement	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
None	96	50.5	56	31.3	0.001
1-10%	0	00	9	5.0	
11-20%	2	1.1	20	11.2	
21-30%	2	1.1	22	12.3	
31-40%	11	5.8	18	10.1	
41-50%	21	11.1	14	7.8	
51-60%	9	4.7	12	6.7	
61-70%	20	10.5	5	2.8	
71-80%	24	12.6	18	10.1	
81-90%	4	2.1	3	1.7	
91-100%	1	0.5	2	1.1	

Table 7: Outcome of the study subject, (n=369).

Outcome	1st wave, (n=190)		2nd wave, (n=179)		P value
	N	%	N	%	
Discharge					
Yes	151	79.5	149	83.2	0.525
No	39	20.5	30	16.8	
Reference to higher center					
Yes	15	7.9	7	3.9	0.487
No	175	92.1	172	96.1	
Death					
Yes	3	98.4	8	4.5	0.600
No	187	1.6	171	95.5	
DORB					
Yes	34	17.9	14	7.8	0.925
No	156	82.1	165	92.2	

HRCT reports clarified that the maximum number of patients had no COVID-19 infection involvement between the 2 waves. Here, 12.6% of the total study population was involved with a 71-80% rate of infection during 1st wave. But infection involvement rate was comparatively severe at 21-30% level during the 2nd wave (Table 6).

Most of the patients were discharged in both waves. Some (7.9% during 1st and 3.9% during the 2nd wave) of them were referred to higher centers and the rate of death was not much significant (Table 7).

DISCUSSION

A comparison of the socio-demographic and clinical profiles of COVID patients between the 1st and 2nd waves along with their short-term outcomes was done in this study. This research showed the demographic features of two waves in parallel columns, which reveals there was no significant difference. The highest percentage of patients were >60 years of age. Regarding gender distribution, there was male predominance during both waves. A different study was conducted at Sheikh Russel National Gastroliver Institute on 486 admitted cases, which found most of the patients were in the age group of 41 to 60 (50.2%) with a mean age of 53.47±13.86 and male predominance (62.9%) was seen among COVID patients.[16] Another study in Spain found that the average age was the same as this one.[17] Both of the studies were similar to our study. In this study, during both waves, fever with respiratory symptoms like cough and respiratory distress topped the list with almost similar percentages. Anosmia and anorexia were more during 1st wave; whereas chest pain and conjunctivitis were more during 2nd wave (statistically significant). Another study described that fever (78.9%) and coughs (76.6%) were the most predominant symptoms, with 18% of patients suffering from diarrhea. Fever and cough are the most common symptoms in COVID patients which is relatable to our study.[17] A study done by Mowla et al also found that diarrhea may be present in 17% of COVID patients.[18] These symptomologies should be compared with our study among the Bangladeshi population. Our study presents that around half of the patients had been suffering from hypertension and diabetes; the percentage of DM was higher in 2nd wave. In a different study, among co-morbidities, HTN (413.4%) was the most common co-morbidity found in this study, followed by DM (39.4%), bronchial asthma (9.4%), and CKD was present in 4.1% of the patients.[17] Similarly, in other studies conducted in Bangladesh and other countries, DM and HTN were found to be the 2 most common co-morbidities among patients like our study.[18-20] This study showed most of the patients were affected at a moderate level of the disease during 1st wave. But patients were more frequent at the mild stage during the 2nd wave. This similar diagnosis was found in Sheikh Russel National Gastroliver Institute on 486 admitted cases from March 24-April 24, 2021.[18] Our study explained that only the ferritin test gave a similar result for both of the waves. The CRP report was increased for the patients of 1st wave only whereas; the D-dimer report was increased for the patients of 2nd wave comparatively. The result of the RT-PCR test was more frequently positive among the patients of 1st wave. These study subjects are

rarely diagnosed previously. HRCT reports clarified that maximum number of patients had no COVID-19 infection involvement between the 2 waves. Here, 12.6% of the total study population was involved with a 71-80% rate of infection during 1st wave. But the infection involvement rate was comparatively severe at 21-30% level during the 2nd wave. In another study, mean percentage of total lung involvement in HRCT of the chest, 50% of patients had lung involvement of 25% to 50%.[18] A previous study in our country reported that, mean percentage found in most patients (29.69%) with <25% of lung involvement which is close to our study.[21] In this research, most of the patients were discharged in both waves. Some (7.9% during 1st and 3.9% during the 2nd wave) of them were referred to higher centers and the rate of death was not much significant. Oliveira et al in their study found that the mortality rate was very low which is similar to our study result.[22]

Limitations

The study was conducted in a single hospital with a small sample size. The participants were from one center, so the results cannot be generalized to reference the population.

CONCLUSION

The study demonstrates clinical and demographic features and outcomes of the COVID-19 pandemic during the 1st and 2nd waves in Bangladesh. It concludes that the demographic features of two waves had no significant difference. During both waves, fever with respiratory symptoms like cough and respiratory distress made prevalence list with almost similar percentages. Percentage of DM was higher in 2nd wave than the 1st wave. There was a difference in level of clinical syndrome. Only the ferritin test gave a similar result for both of the waves where CRP, D-dimer and RT-PCR were different in result. HRCT reports clarified that max no. of patients had no COVID-19 infection involvement between 2 waves. Mortality rate was minimal during both of the waves.

Recommendations

People and healthcare professionals should concern with the aged people who are at the risk of COVID attack and also respiratory clinical issues need proper diagnosis. A long-term multi-center study with a larger sample size may be undertaken to make the representation of the whole country's population.

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