



Clinical Characteristics and Early Outcomes of Children with COVID-19 Infection admitted to Children Hospital in Dhaka City

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Abstract

Background: The burden of COVID-19 infection in children is lesser than adult; however, there are only a few data describing COVID-19 in pediatrics. **Objective:** The purpose of the present study was to determine the clinical characteristics and early outcomes of children with COVID-19 infection admitted to children Hospital in Dhaka city. **Methodology:** This is a prospective observational study included children of RT-PCR positive COVID-19 cases admitted to Dr. MR Khan Shishu Hospital & ICH between June 2020 to November 2020. A total 95 children were enrolled. Patients were categorized clinically and visited every day during their hospital stay. This study included mode of presentation, the pattern of comorbidities, presence of co-infection, clinical trajectory & early outcomes. Clinical outcomes included survival, duration of oxygenation, lengths of hospital stay. Data were analyzed after collection of demographic and clinical data of 95 enrolled children. **Results:** Among 95 children with COVID-19 admitted to Dr. M R Khan Shishu Hospital & ICH, 56 (58.95%) were male and 39 (41.05%) were female. Maximum 35 (36.84%) of the patients were between 1-5 years age group. 65 (68.42%) presented with respiratory symptoms and 19 (20%) presented with gastrointestinal symptoms. Twenty-five patients (26.32%) had significant preexisting comorbidities. Most common symptoms were fever 73 (76.84%), cough 65 (68.42%), sore throat 24 (25.26%), diarrhea 21 (22.11%). Oxygenation was required for 5 patients (5.26%). 1 patient (0.95%) had died and 1 required ventilatory support in ICU. The median (range) hospital lengths of stay was 7 (3-14) days. **Conclusion:** Most of the children with COVID-19 presented with mild to moderate symptoms & gastrointestinal symptoms were not uncommon. Most of the patients had good prognosis and only few patients required respiratory support. [*Bangladesh Journal of Infectious Diseases, April 2022;9(suppl_1):S9-S13*]

Keywords: Characteristics; early outcomes; Covid-19; children

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Introduction

The coronavirus disease 2019(COVID-19) is the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is a global health problem and causing economic disaster¹. It is highly contagious disease; the entire population mostly elder people are more susceptible². Respiratory droplets when cough, talk loudly or sneeze and close contact through contaminated hand are the main routes of transmission².

The illness is similar to any acute respiratory viral infection with less pronounced nasal symptoms³. In late November 2019, the first human case was detected in Wuhan province¹. The IEDCR, Bangladesh reported the first human infection in Dhaka on March 8, 2020⁴. Till now, about 120 million people have become infected with COVID-19 worldwide and more than 2 million deaths⁵. Among them, overall regional mortality rates are ranging from less than 1.0% cases to 12.0% cases⁵. From Wuhan province, China, two studies showed that infants and children have less severe disease from COVID-19 than adults⁶.

Chinese Center for Disease Control and Prevention published that only 1.3% of total 72,314 patients were younger than 20 years. Another study in Wuhan province stated that among 171 children, only 3 required intensive care unit (ICU) and 1 of those 3 children died. Therefore, the overall disease mortality in children was reported to be significantly (0.58%) milder than in adults⁷. Centre for Disease Control (CDC) reported that among 150000 cases of COVID-19, only 1.7% were children in USA⁸. Of the 2572 children with COVID-19, 15 required ICU, and 3 children died⁸.

In Bangladesh, till September 20, 2022, total 2,018,829 patients were infected, resulting about 29345 deaths and among them 1,961,260 people recovered⁹. According to Directorate General of Health Services (DGHS) of the Ministry of Health and Family Welfare (MOHFW) in Bangladesh among the confirmed COVID-19 cases 3.0% belongs to less than 10 years and 7.0% belong to age 11 to 20 years³. Among the confirmed cases 0.82% deaths belong to age less than 10 years and 1.49% deaths belong to age 11 to 20 years³. But, children with COVID-19 in Bangladesh is less focused.

Thus, the purpose of this study is to determine the clinical characteristics of COVID-19 in children

including mode of presentation, the presence of comorbidities, presence of co-infection, severity of disease and early outcomes.

Methodology

This is a prospective observational study that included pediatric patients with confirmed RT-PCR for COVID-19 admitted to Dr. M R Khan Shishu Hospital & Institute of Child Health (ICH), Mirpur, Dhaka, Bangladesh from June to November, 2020 for a period of 6 months. Patients’ data included age, sex, presence of comorbidities, mode of presentation and other clinical features were collected by using data collection form. Patients were followed up every day to record vital signs, SpO2, and GCS. If SpO2-less than 92%, then oxygen therapy was given, and if Spo2- less than 92.0% with oxygen, then they were transferred to ICU. Clinical outcomes included survival, duration of oxygenation, and lengths of hospital stay. The severity of the illness was categorized clinically according to BPA guidelines. Mild to moderate cases indicating SARS-CoV-2 pneumonia in chest imaging and no requirement of oxygen. Severe cases including dyspnea, and/or SARS-CoV-2 pneumonia in chest imaging with the requirement of oxygen and/or ventilatory support requirement. Critical cases including underlying conditions with any dyspnea, poor mental response, metabolic acidosis and rapid deterioration of chest imaging. The results of this study were descriptive and presented as frequency and percentage. Analysis was performed by using Excel version 16.16.21 (Microsoft).

Results

Among the 95 enrolled cases, 56(58.95%) were male and 39(41.05%) were female (Table 1).

Table 1: Gender distribution of study sample (n=95)

Gender	Frequency	Percent
Male	56	58.95
Female	39	41.05

Among the 95 cases, neonate 4(4.21%), one month to below one year 25 (26.32%), above one to below 5 years 35(36.84%), above 5 years to below 10 years 22(23.16%), above 10 years to below 15 years 9(9.47%) were found (Table 2).

Table 2: Age Distribution of Study Sample (n=95)

Age Group	Frequency	Percent
Neonates	4	4.21
1 month to < 1 year	25	26.32
≥1 to < 5 years	35	36.84
≥5 to <10 years	22	23.16
≥10 to ≤ 14 years	9	9.47

Most of the patients presented with respiratory symptoms 65(68.42%) cases followed by gastrointestinal symptoms 19(20%) cases and neurological symptoms 5(5.26%) cases during admission in hospital (Table 3).

Table 3: Presentation on Admission of Children with COVID-19 (n=95)

Presentation	Frequency	Percent
Asymptomatic	2	2.11
Respiratory	65	68.42
Gastrointestinal	19	20
Neurological	5	5.26
Circulatory	1	0.95
Others	3	3.16

The most common symptom was fever which was 73(76.84%) cases followed by cough in 65(68.42%) cases. Other symptoms were sore throat in 24(25.26%) cases, runny nose in 21(22.11%) cases, anorexia in 29(30.53%) cases, convulsion in 5(5.26%), breathing difficulty in 11(11.58%) cases, diarrhea in 21(22.11%) cases, weakness in 10(9.5%) cases, abdominal distention in 1(0.95%), rash in 4(4.44%) cases, anosmia in 13(13.68%) cases, jaundice in 1(0.95%) cases, conjunctivitis in 4(4.21%) cases, unconsciousness 1(1.41%) (Table 4).

Table 4: Presenting Clinical Features of COVID-19 Patients (n=95)

Clinical Features	Frequency	Percent
Fever	73	76.84
Cough	65	68.42
Sore throat	24	25.26
Runny nose	21	22.11
Anorexia	29	30.53
Convulsion	5	5.26
Breathing difficulty	11	11.58
Diarrhea	21	22.11
Weakness	10	10.53

Abdominal distension	1	0.95
Rash	4	4.21
Anosmia	13	13.68
Jaundice	1	0.95
Conjunctivitis	4	4.21
Unconsciousness	1	0.95

About 21(22.11%) Covid-19 pediatric patients were associated with co-infection. Among them *Salmonella* Typhi infection 12(12.63%) was the most common (Table 5).

Table 5: Presence of Co-Infection in Children with COVID-19 (n=95)

Co-Infection	Frequency	Percent
Without co-infection	74	77.89
With co-infection	21	22.11
Typhoid Fever	12	12.63
Meningitis	2	2.11
Acute Viral hepatitis	1	0.95
Septic arthritis	1	0.95
UTI	1	0.95
Sinusitis	1	0.95
Cellulitis	1	0.95

Of the 95 cases, 25 patients (26.32%) having comorbidity, among them 9 patients (9.4%) have bronchial asthma. Others including nephrotic syndrome 3(3.16), congenital heart disease 3(3.16%), Epilepsy 3(3.16%), diabetes mellitus 1(0.95%), Lupus nephritis 1(0.95%), ITP1 (0.95%), Acute leukemia 2(2.11) were found (Table 6).

Table 6: Presence of Co-Morbidities among Study Population (n=95)

Co-Morbidities	Frequency	Percent
None	70	73.68
Nephrotic Syndrome	3	3.16
Diabetes Mellitus	1	0.95
Congenital Heart Disease	3	3.16
Obesity	2	2.11
Bronchial Asthma	9	9.47
Epilepsy	3	3.16
Lupus Nephritis	1	0.95
ITP	1	0.95
Acute Leukemia	2	2.11

IPD treatment received in all cases, only 5 patients (5.26%) required oxygenation, 01(0.95%) needed

ICU care for mechanical ventilation. Of the 95 cases, only 1(0.95%) patient died. The patient who died was 5 years; but had no comorbidity and developed multisystem organ failure & require vasoactive support and oxygen supplementation. Mean duration of oxygen support is 4 days and hospital stay 7 days (Table 7).

Table 7: Clinical Course and Outcomes of 95 Children with COVID-19

Characteristics	Frequency	Percent
Severity of illness		
• Asymptomatic	2	2.11
• Acute URTI	19	20
• Mild to Moderate	65	68.42
• Severe	6	6.2
• Critical	3	3.16
Vasoactive support	1	0.95
Respiratory Supports		
• None	89	93.68
• Oxygen only	5	5.26
• Ventilator Support	1	0.95
Duration of Respiratory Support median (IQR), days		
• Respiratory support	4(3-6)	
Length of stay, median(IQR), days		
• Hospital stay	7(4-13)	
Outcome at follow-up		
• Discharged	93	97.9
• Referred to ICU		0.95
• Died		0.95

Discussion

Of the 95 cases, 2.11% asymptomatic and symptomatic in 97.89% cases. Two patients remained asymptomatic over the course of study period were admitted to hospital due to parental anxiety and among the symptomatic cases. In this study, most of the patients presented with only respiratory symptoms, some patients presented with only gastrointestinal symptoms but some other initially presented with respiratory symptoms and then gastrointestinal symptoms developed. A study done by Shekerdeman et al¹⁰ stated that increasing number of COVID-19 children presented with gastrointestinal tract symptoms, including diarrhoea, vomiting and abdominal distention as well as respiratory symptoms which was similar to our study.

In this study, fever was in 76.84% cases and cough in 68.42% cases and these were the most common presenting symptoms which was almost similar to another study done by Bal et al¹¹. Song et al¹² also stated that COVID-19 was presented with fever and/or cough (50.0%). Like other studies, a study in Wuhan showed that fever (35.7%) and dry cough (21.4%) were the most common clinical features¹³. Other symptoms like headache, dizziness, diarrhea were noticed in another study in China done by Choi et al¹⁴ which was consistent with our study.

Among the atypical presentation, patient may present with convulsion. The cerebrospinal fluid study was normal in these patients¹⁵. In this study among 5 convulsive patients, CSF findings consistent with bacterial meningitis in 2 cases and normal CSF findings in 3 cases which was not consistent with the previous study¹¹. A patient presented with high fever, conjunctivitis and rash as Kawasaki disease in our study. A study done by Behera et al¹⁶ observed some unusual presentations like Kawasaki disease which was consistent with this study.

In this study, in 26.32% of the 95 children with COVID-19 had co-morbidities. We found that the most common comorbidity was Bronchial Asthma. According to Yang et al¹⁷, obesity is known as an important risk factor for patients with COVID-19. In this study, the rate of obesity was 2.11% cases and the children were older than 6 years which was not similar to another study done by Shekerdeman et al¹⁰, where the rate of obesity in pediatric patient with Covid-19 was 20.5% cases.

Of the 95 cases, symptomatic was in 93(97.89%) cases. Among these symptomatic cases, acute URTI 19(20%), mild to moderate 65(68.42%), severe 6(6.2%), critical 3(3.16%). As the study was done with hospitalized children in a tertiary care hospital, so most of the children were symptomatic. But, a study done by Song et al¹² in China stated that about half of the patients are asymptomatic (50 %) which finding was not similar to this study.

Another report done by Du et al¹³ showed signs and symptoms were mild (21.4%) and conventional cases (78.6%) cases. About 15.0% cases were asymptomatic, 36.3% cases were mild, 46.0% cases were moderate, 2.1% cases were severe, and 1.2% cases were found critical in another study done by De Souza et al¹⁸ and findings of this study were consistent with this study.

Of the 95 children in this present study, 1 (0.95%) required ICU care and all but 1 survived. This finding was similar to a study done in Wuhan province which stated that among 171 children, only 3 required ICU care, and 1 of those 3 children died⁷. Another study in USA stated that of the 2572 children with COVID-19, 15 required ICU, and 3 children died⁸. So, like other studies, the clinical course of children with COVID-19 was mild to moderate and the hospital outcomes were good in this study.

In this present study, overall mortality rate was 0.95% cases which was similar to the report published by AAP done in USA which stated that mortality rate was 0.00% to 0.04% cases¹⁹. Mortality rate of children admitted to PICU was less than 4% compared with mortality rate 50% to 62% in adults admitted to ICU¹⁷.

In this study, the average duration of hospital stay was 7 days (4 to 13 days) in comparison to 15.24 days in another study done in China by Bai et al²⁰. Finally, it is important to emphasize that the overall burden of COVID-19 infection in children remains relatively low compared with seasonal influenza.

As of April 28, 2020, the CDC report 8 deaths in children 14 years or younger related to COVID-19 infection, whereas there are 169 influenza-related deaths in children 14 years or younger during the 2019-2020 season, with 81 of these occurring in 2020 in North America²¹⁻²². In Bangladesh, the scenario was similar, 54 children with COVID-19 died till now³.

There are some limitations to this present study. At the time of our study, there was limited testing for COVID-19 due to lack of suspicion, testing capability, or refusal to perform test by guardians and late outcome was not observed. Additionally, our study is descriptive and does not describe any possible benefit regarding management.

Conclusion

Most of the children with SARS-COV-2 infection have mild to moderate symptoms with good prognosis. Gastrointestinal symptoms like diarrhea and convulsion are not uncommon along with respiratory symptoms. Pediatricians need to identify the heterogeneous clinical features for early diagnosis and thus prevent the transmission of COVID-19 infection.

References

1. US Centers for Disease Control and Prevention. Cases in the US. Accessed April 12, 2020. <https://www.cdc.gov/coronavirus/2019ncov/casesupdates/casesinus.html>
2. Munster VJ, Koopmans M, Doremalen N, Riel D, DeWit E. A novel coronavirus emerging in China -key questions for impact assessment. *N Engl J Med* 2020; 382:692-94
3. Management Guidelines for Pediatric COVID-19: BPA. 2nd ed.
4. COVID-19 pandemic in Bangladesh- from Wikipedia, the free encyclopedia2022
5. Johns Hopkins University of Medicine. COVID-19 dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University(JHU). Accessed April 28, 2020.<https://coronavirus.jhu.edu/map.html>
6. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*. 2020;323(13):1239-1242. doi:10.1001/jama.2020
7. Lu X, Zhang L, Du H, et al. Chinese Pediatric Novel Coronavirus Study Team. SARS-CoV-2 infection in children. *N Engl J Med*. 2020;382(17):1663-1665
8. CDC COVID-19 Response Team. Coronavirus disease 2019 in children United States, February 12–April 2, 2020.*MMWRMorbMortaWklyResp*2020;69(14):422-426
9. <https://www.worldometers.info/coronavirus/country/bangladesh/2020>.
10. Shekerdemian LS, Mahmood NR, Wolfe KK, Riggs BJ, Ross CE, McKiernan CA, et al. International COVID-19 PICU Collaborative. Characteristics and Outcomes of Children With Coronavirus Disease 2019 (COVID-19) Infection Admitted to US and Canadian Pediatric Intensive Care Units. *JAMA Pediatr*. 2020;174(9):868-873
11. Bal ZS, Kurugöl Z,Özkinay F. Clinical features of COVID-19 in children. *J Pediatr Res* 2020; 2(7):88-91
12. Song W, Li J, Zou N, Guan W, Pan J, Xua W. Clinical features of pediatric patients with coronavirus disease (COVID-19). *J Clin Virol*. 2020;127: 104377
13. Du W, Yu J, Wang H, Zhang X, Zhang S, Li Q, Zhang Z. Clinical characteristics of COVID-19 in children compared with adults in Shandong Province, China 2020:16: 1-8
14. Choi SH, Kim HW, Kang JM, Kim DH, Cho EY. Epidemiology and clinical features of coronavirus disease 2019 in children. *CEP* 2020; 63 (4):125-132
15. Nathan N, Prevost B, Corvol H. Atypical presentation of COVID-19 in young infants. *The Lancet* 2020; 395:1481
16. Behera B. Presentation of COVID-19 as Atypical Kawasaki Disease in Children. *International Journal of Research and Review* June 2020; 7(6)
17. Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med*. 2020;8(5):475-481
18. De Souza TH, Nadal JA, Nogueira RJN, Pereira RM, Brandão MB. Clinical manifestations of children with COVID-19: A systematic review. 03 June 2020
19. AAP and CHA-children and covid-19state data report.2.25.21
20. Bai K, Liu W, Liu C, Fu Y, Hu J, Qin Y, et al. Clinical Analysis of 25 COVID-19 Infections in Children. *Pediatr Infect Dis J*. 2020;39(7):e100-e103
21. US Centers for Disease Control and Prevention. Weekly US influenza surveillance report. Accessed April 28, 2020
22. National Vital Statistics System. Provisional death counts for coronavirus disease (COVID-19): daily updates of totals by week and state. Accessed April 28, 2020.