

## Characterization of COVID-19 infection in children: A 6 months experience in a tertiary care hospital in Dhaka, Bangladesh.

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### ABSTRACT

**Background:** Corona virus disease is a global health crisis, a surprising feature of the disease reflects that children might be less affected in the initial stage. Previous studies suggest that COVID-19 more likely to infect adults, but paediatric patients are on the rise. In most of the cases children have mild or moderate symptom of COVID-19, but another new serious presentation emerged named Multisystem inflammatory syndrome in children (MIS-C) which includes features like Kawasaki disease or toxic shock syndrome. The past few months we have seen a lot of findings and variation regarding the COVID-19 illness. As childhood presentation are variable analyzing the pattern of disease in children helps the policy makers to make the better strategies and health care givers to serve better.

**Objectives:** This study was conducted to assess the age and sex distribution, clinical presentations, morbidity, mortality pattern in children with COVID-19 infection.

**Methods:** This descriptive study conducted in the Outpatient Department of Pediatrics and dedicated COVID-19 unit of Anwer Khan Modern Medical College Hospital, Dhaka, Bangladesh from May 2020 to November 2020. 24 children with RT-PCR positive for COVID-19 were included in this study. Medical records of these patients were reviewed and data were analyzed using SPSS software version 20.

**Results:** The total number of children with RT-PCR positive for COVID-19 during the study period was 24. The male female ratio was 1.4:1. Most of the patients were aged over 10 years 9(37.5%). Fever (92%), cough (75%) and headache (50%) were the most common clinical features. A total 10 (41.7%) patients presented with mild clinical symptoms, 6 (25%) were severe to critical state and 2(8.3%) patients found with features with MIS-C. No mortality was observed.

**Conclusion:** The paediatric patients with COVID-19 had mild illness and had good prognosis. The child with MIS-C need early intervention for better outcome.

### Introduction

Coronavirus disease 2019 (COVID-19) is a viral disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Corona viruses are a large family of viruses that cause a variety of diseases, such as SARS, MERS and coronavirus disease 2019 (COVID-19)<sup>1</sup>. The most recent corona virus species, SARS-CoV-2, was reported in Wuhan, China in

December 2019<sup>2</sup>. Since then, COVID-19 has become a worldwide health problem threaten the life of people. On 11 March 2020, the World Health Organization (WHO) classified the outbreak as a pandemic<sup>3</sup>. Globally, as of 10 January 2021, there have been 88,383,771 confirmed cases of COVID-19, including 1,919,126 deaths. In Bangladesh between

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8 March and 10 January 2021, according to the DGHS Press Release there were 522,453 COVID-19 confirmed cases including 7,781 related deaths (CFR 1.49%). Bangladesh is the top 27<sup>th</sup> country in the world and accounts for 0.59% of the COVID-19 disease burden in the world<sup>4</sup>.

No age is immune against COVID-19 infection. Though adults represent the population with the highest infection rate; however, paediatric patients are on the rise and unfortunately occurred some casualties already. The clinical characteristics, disease progression and outcome in children so far appeared milder compared to old individuals although the scenario are evolving<sup>5</sup>. About 2% of total cases were detected in children under the age 18 years<sup>6</sup>. Data from China's analysis has shown that children aged less than 10 years account for only 1% of COVID-19 patients<sup>7</sup>. Italy has reported only 1.2%<sup>8</sup>, besides, the United States US has reported 5% of Pediatric patients with COVID-19<sup>9</sup>. In Bangladesh among the confirmed cases 3% belongs to age <10 years and 7% belongs to age 11-20 years and fatality by age 1-10 years 0.8% and 11-20 years 1.5% respectively<sup>10</sup>. Though majority of the cases were mild or moderate in nature but many of them required hospital admission and unfortunately 54 children with COVID-19 died (up to 10.09.2020)<sup>5</sup>.

The mode of transmission of the virus between humans is via respiratory droplets<sup>11</sup>. Direct contact is another source of virus transmission via touching the mouth, nose or conjunctiva with contaminated fingers<sup>12</sup>. Vertical transmission is still a matter of debate and yet to be established. A study has found that 3 out of 33 neonates born to COVID-19 positive mothers had positive nasopharyngeal and rectal swabs for COVID-19<sup>13</sup>. Fecal-oral transmission could be an alternative route of transmission as several studies have reported positive stool samples, even after nasopharyngeal/throat swabs were COVID-19 negative<sup>14,15</sup>.

The reason of the lowest percentage of COVID-19 in children despite of the immaturity of their immune system has been explained by numerous arguments<sup>16</sup>. Indeed the SARS-CoV-2 use the ACE2 receptor, the reduced number and the immaturity of ACE2 receptors in children comparing to adults is one of these

hypothesis<sup>17</sup>. Second, the innate immune response, the first line of defense, seems to be more active in children. The thymus is present and the CD8 T cells are more efficient participating in the virus lysis<sup>18</sup>. Finally, children have little co morbidity and are also less exposed to smoking comparing to adults<sup>19</sup>. The incubation period for the SARS-CoV-2 ranges between 2 – 14 Days<sup>20</sup>. Childhood COVID-19 disease usually runs a mild course. The children can be asymptomatic or present with cough, fever and fatigue. Some studies have reported low grade fever or even no fever at all<sup>21,22</sup>. This is usually accompanied by upper respiratory tract symptoms like nasal congestion and headache or with gastrointestinal manifestations (10%) such as diarrhoea, vomiting or abdominal discomfort<sup>5,22</sup>. In more severe cases ARDS, septic shock, refractory metabolic acidosis and coagulation dysfunction may occur. The disease has good prognosis in children with most of the cases are recovered after a mild disease course and it is very uncommon to progress to severe lower respiratory disease<sup>23</sup>. A new serious COVID-19 presentation emerged in late April in the form of Paediatric inflammatory multisystem syndrome temporally associated with COVID-19 (PIMS-TS). Since the first reports from London, UK, in late April, 2020, many countries including the USA, France, Italy reports such cases<sup>24-27</sup>. Parallels have been drawn between the presenting features of this syndrome and other known conditions, like Kawasaki disease, toxic shock syndrome, viral sepsis, and, less commonly, macrophage activation syndrome or haemophagocytic lymphohistiocytosis<sup>28</sup>. PIMS/MISC is a systemic inflammation, involving persistent fever and evidence of clinically severe illness requiring hospitalization with multisystem ( $\geq 2$ ) organs involvement ( Cardiac, renal, respiratory, hematologic, gastrointestinal, dermatological or neurological), which is temporally associated with exposure to COVID-19<sup>5</sup>.

The gold standard test for SARS-CoV-2 is the real-time reverse transcriptase-polymerase chain reaction (RT-PCR) test. It is believed to be highly specific, and its sensitivity was reported to be 91% [95% CI: 83-97%] for initial RT-PCR<sup>30</sup>. Although less sensitive than chest computed tomography (CT), chest radiography is the

first-line imaging modality used to scan patients with suspected COVID-19. Its abnormalities include consolidation or ground-glass opacity (GGO), which in most cases are bilateral and peripheral, and have lower zone predominance<sup>31</sup>.

Available statistic data support the evidence that children are less infected elsewhere in the world but clinical characteristics details and countries' difference of paediatric COVID-19 aspects are rarely reported. Such ambiguity may present a dangerous situation that lead paradoxically to a less protection and a neglect of children from the part of their parents and countries. The aim of this manuscript is to focus on COVID-19 paediatric aspects explaining why parents and doctors should be more vigilant when dealing with children during the period of COVID-19.

**Objectives:** This study was conducted to assess the age and sex distribution, clinical features, morbidity, mortality pattern in children with COVID-19 infection.

**Materials and methods**

**Study design:** This descriptive study was conducted both in the Outpatient Department of Pediatrics and dedicated COVID-19 unit of Anwer Khan Modern Medical College Hospital, Dhaka, Bangladesh from May 2020 to November 2020.

**Study Population:** A total of 24 Children aged less 18 years who had positive RT-PCR test for COVID-19, attend to outpatient department and admitted to dedicated COVID unit at Anwer Khan Modern Medical College Hospital, were included in this study.

**Data collection:** Data were collected from the outpatient register book for outdoor patients and admission, discharge and death registers for the admitted patients, using a pretested structured questionnaire. Data extracted included: The age and sex of the patient, clinical presentation, investigation, final diagnosis, treatment given and outcomes (discharge, death or left against medical advice) and cause of death.

**Data analysis:** The data were subjected to statistical analysis according to standard procedure. SPSS version 20 for Windows (SPSS Inc, Chicago, IL, USA) software was used for data recording and

analysis. Since it was a descriptive study, percentage and frequencies were determined.

**Ethical issues:** Approval for the study was obtained from the ethical committee of the college. Informed written consent was taken from the parents of the patients.

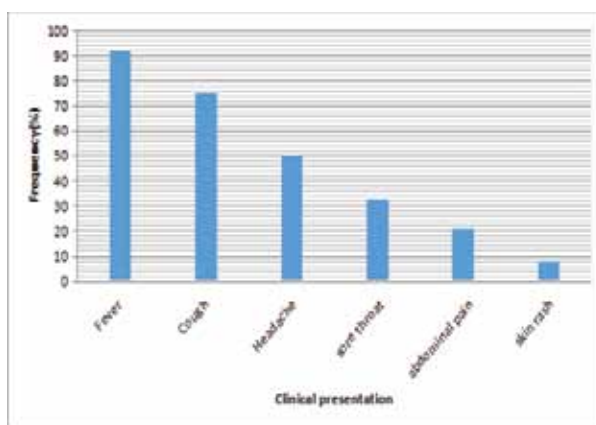
**Results:**

Total twenty four patients who were RT-PCR positive for COVID-19 were included in the study over a period of six months.

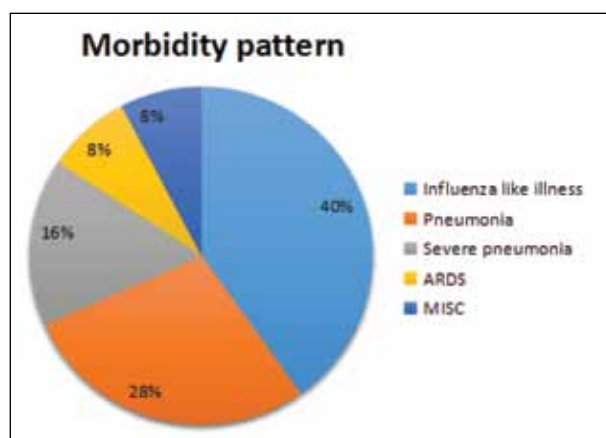
**Table I:** Demographic characteristics of the children with COVID-19 disease (n=24)

Demography	Male	Female
Age (years)		
0-5	2(8.33%)	1(4%)
5-10	4(16.7%)	3(12.5%)
10-15	6(25%)	3(12.5%)
15+	2(8.33%)	3(12.5%)
Total	14(58.4%)	10(41.6%)

Among them male was 14 (58%) and female was 10(42%) and the male female ratio was 1.4:1. Majority of the patients were with in 10-15 years age group that were 9 (37.5%) then with in 5-10 years age group that were 7(29%) (Table I).



**Figure 1:** Clinical presentation of the patients (n=24). Twenty two( 92%) patients presented with fever, the next common symptoms were cough 18(75%), headache 12(50%), sore throat 8(33%), abdominal pain 5(21%), and skin rash 2(8%).



**Figure 2:** Morbidity Pattern of the patients (n=24).

Total ten (41.7%) patients were clinically classified as Influenza like illness- ILI, 6(25%) were pneumonia, 4(16.7%) were severe pneumonia, ARDS 2(8.3%), and 2(8.3%) patients presented with features like Multisystem inflammatory syndrome in children (MIS-C). Overall success rate was 100%, no mortality occurred in the present study.

**Table II:** Laboratory findings of the patients (n=24).

Investigations	Frequency	Percentage(%)
Leukocytosis	3	12.5
Lymphopenia	6	25
High ESR	10	41.7
High CRP	12	50
High S. Ferritin	4	16.6

Twelve (50%) patients had no abnormal laboratory findings, 6(25%) patients had lymphopenia, 10(41.7%) had high ESR, 12(50%) had high CRP and 4(16.6%) showed high ferritin level (Table II).

**Table III:** Treatment given (n=24)

Name of drugs	Frequency	Percentage
Antibiotics	11	45.8
Remdesivir	6	25
Steroid	6	25
Thrombolytic agent	4	16.66

Only 11 patients need to be hospitalized. Among them 11(45.8%) patients treated with antibiotics, 6 (25%) patients got Remdesivir and steroid and 4(16.7%) patients need thrombolytic agent (Table III).

## Discussion

COVID-19 infection has been reported in all age groups including infants, children and young adults. In this study two-third of the total children were male and children aged over 10 years were more affected. The age distribution and male predominance were similar to other studies<sup>30,31,32,33</sup>. But a study in china found that the median age was 7 year among the Chinese paediatric patients<sup>34</sup>. The teen age boys play outside and use mobile more frequently, so their chance of exposure is higher than others.

The clinical characteristics, disease progression and outcome in children and young adults so far appear milder compared to older individuals<sup>23</sup>. We found that more than three-fourth patients with positive RT-PCR for COVID 19 had fever, next common symptoms are dry cough, headache, abdominal symptoms and sore throat (Figure 1). A study in China and other countries reported that half of the patients had cough (48.5%) and fever (41.5%)<sup>35,36,37,38</sup>. A systemic review with 131 studies showed that the most frequent symptoms were fever (59.1%), cough (55.9%) and rhinorrhea (20.0%)<sup>39</sup>. A meta-analysis reported that 30% paediatric patients were asymptomatic<sup>40</sup>. A study done in Bangladesh showed that 19.7% patients were asymptomatic<sup>41</sup>. Asymptomatic children play an important role in human-to-human transmission and accelerate the pandemicity.

Most of the paediatric patients had mild illness and had good prognosis.<sup>21,23,38,41</sup> In the present study we also found that half of the patients had mild illness that is influenza like illness (ILI), and one-third had moderate illness (pneumonia). Only seven patients presented with severe to critical state (Figure 2). Among the critical patients two children had fever, rash, hypotension and diarrhea which was similar to the characteristic features of MIS-C according to WHO case definition<sup>42</sup>. We found that pediatric patients had fewer underlying co-morbid disease and complication. Some other studies also reported that symptomatic cases of COVID-19 is less and they experience milder disease.<sup>21,35,38,41</sup> The disease severity was categorized according to National Guidelines on Clinical Management of Coronavirus Disease 2019<sup>5,15</sup>.

Children with mild disease had few laboratory changes (Table-2). Some patients showed leukocytosis. In severe to critical state lymphopenia was common findings. Some study in China also found the similar abnormality<sup>43,44</sup>. The inflammatory markers like ESR, CRP, D-dimer, also increase in hospitalized patients and which is associated with greater illness similar to adults.<sup>43,44</sup> Regarding chest x-ray two patients with ARDS presents bilateral ground glass appearance and there were no abnormal x-ray findings in mild cases.

Most of the children were treated at home and nine patients required hospitalization. All the patients were treated according to Bangladesh Paediatric Association Management Guideline For Paediatric COVID-19.<sup>5</sup> Among the hospitalized patients only 2(8.5%) patients need PICU support. Patients with severe to critical stage were treated with antibiotics, remdesivir (25%), oral steroid (25%) and only four (16.7%) patients need thrombolytic agent. The patients with MIS-C like features were treated with IVIG at 2 gm/kg in infusion on Day1, 50 mg/kg aspirin initially for 5 days then 3 mg/kg/day for next 8 weeks and IV dexamethasone for 5 days then orally tapered over 2 weeks. No antiviral was given to this patients. Worldwide mortality rate is less in children in compare to adults<sup>19,23,45</sup>. Which is similar to present study. No mortality was observed in this study.

#### Conclusion:

COVID-19 infection had milder symptoms in majority cases and more than two-third of the patients had fever and respiratory problems. The outcome is good in children. But the new serious presentation of COVID-19 that is MIS-C is not uncommon and which require early identification and intensive treatment to get better prognosis.

**Conflict of interest:** None.

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