

Demographic and Clinical Profile of COVID-19 and Post-COVID Complications in Children at a Specialized COVID Hospital

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Abstract

Background: Clinical manifestations of children with COVID 19 differ widely from adult cases. They usually have milder disease. There are limited data on pediatric COVID patient from Bangladesh. This study was conducted to find out the demographic and clinical characteristics of COVID-19 in children and post-COVID complications in a specialized COVID hospital from south-east part of Bangladesh.

Materials and methods: This retrospective study was conducted in Bangladesh Institute of Tropical and Infectious Diseases (BITID), Fouzderhat, Chattogram from April 2020 to September, 2020. Medical records of PCR-confirmed pediatric COVID-19 cases were collected. Data regarding age, sex, residence, contact history, presenting features, hospitalization, comorbidities and post-COVID complication were noted. Statistical analysis was done by SPSS 20.0 version.

Results: Out of total 2058 pediatric patients, 183 (8.9%) were PCR confirmed COVID-19 cases. Male to female ratio was 1.3:1 and median age was 11 years (Age range 3 months to 17 years). 35% patients belonged to the age group 11 to 15 years. Family clustering was the main transmission route (81.3%) and parents were the most common source (77.8%). Most of the patients lived in the Chattogram metropolitan area (57.1%). Highest peak of infection were during the month of May and June. Many of them (38.9%) were asymptomatic. Among them 11-15 years age group were mostly asymptomatic (38.6%). Most common presentation was fever (85%) followed by cough (37.5%), runny nose (25%) and sore throat (19.3%). For 2-5 years age group, gastrointestinal symptoms were predominant (30%). Only 9 patients (6.3%) required hospitalization. The median time from onset to cure was 3 days (Ranging from 1 to 30 days). Total 8 patients (5.6%) developed post-covid complications. Those were extreme weakness (2.8%), anorexia (2.1%), chronic cough (1.4%), insomnia (0.7%) and headache (0.7%). 16-17 years patients mostly suffered from these complications. There was no mortality in this pool of pediatric patients.

Conclusion: COVID 19 in pediatric patients is distinct from adults. There was slight male preponderance with 11-15 years age group being more susceptible. Most common source of infection were parents. Many patients had asymptomatic infection. Fever was the most common presenting feature followed by respiratory symptoms. Very few patients developed post-COVID complications which were mild and there was no mortality.

Key words: Children and adolescent; Pediatric COVID-19; Post-COVID complications.

INTRODUCTION

In December, 2019 the Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2), a novel coronavirus, emerged in China. Coronavirus disease 2019 (COVID-19), the term used for the clinical disease caused by SARS-CoV-2, was declared a

pandemic by the World Health Organization (WHO) on March 11, with a 5.9% case fatality rate.¹ All ages are susceptible to SARS-CoV-2. However, the proportion of confirmed cases in children has been relatively small. The reason for this remains unknown but may be due to underreporting of pediatric cases, as well as a combination of biologic and epidemiologic factors. The largest epidemiological survey in China showed that 2.2% of children were affected and this number was 1.7% in the USA.^{2,3}

The first confirmed case of COVID-19 in Bangladesh was reported on 8 March, 2020. As of 30th May, 2021 according to the Institute of Epidemiology, Disease and Centre for Research (IEDCR) Bangladesh has reported 7,98,830 confirmed cases (13.47% case detection rate) since 8 March with mortality of 12,583 patients (1.58%).⁴ According to DGHS, in Bangladesh, so far among the confirmed COVID-19 cases 3% belongs to age <10 years and 7% belongs to age 11-20 years. Among the confirmed COVID-19 cases 0.82% deaths belong to age <10 years and 1.49% deaths belong to age 11-20 years.⁵ Though majority of the cases were mild or moderate in nature but many of them required hospital admission and aggressive management for acute lung injury and shock and/or multi organ dysfunction, if present.⁵

Family cluster is one of the common features of COVID-19 in children. Most of them usually have household contacts of adults whose symptoms develop earlier.⁶ Common symptoms of COVID-19 in children are cough and fever. It is important to note that these symptoms may not always be present; thus, a high index of suspicion for SARS-CoV-2 infection is required in children. Most cases in children are mild, and treatment consists of supportive care. During recent times Multisystem Inflammatory Syndrome in Children (MIS-C) appears to be a form of inflammatory disorder associated with COVID-19 and has become a global concern. A possible temporal association with SARS-CoV-2 infection has been hypothesized because some of the children tested for SARS-CoV-2 infection were either positive by Polymerase Chain Reaction (PCR) or serology. Some of these children may share features of Kawasaki disease, Toxic Shock Syndrome (TSS) and Kawasaki Disease Shock Syndrome (KDSS).⁴ Data from China looking at the risk of in utero transmission did not show any evidence of congenital infection with SARS-CoV-2 from mothers with COVID-19 pneumonia.⁷

As children and adolescents represent a unique patient group, pediatric specific analysis of epidemiological data may enable a better understanding of COVID-19 in these patients and provide situational awareness to the pediatric health community.⁸ Despite having no/less symptoms, infected infants and children may have high viral loads in their nasopharynx, as well as fecal shedding of SARS-CoV-2 for longer periods.⁷

According to WHO COVID-19 situation report, May 2021 (volume 65), 12.8% cases of Bangladesh were reported from Chattogram division.⁹ So far we know, very limited data is available regarding COVID-19 in children from this south-east

part of Bangladesh. So, this study was conducted with an aim to find out the clinical and demographic characteristics of COVID-19 in children as well as to have an insight about the post-COVID complications in this age group.

MATERIALS AND METHODS

This retrospective study was conducted to find out the epidemiological and clinical characteristics of the confirmed pediatric COVID-19 patients diagnosed by RT-PCR in the laboratory of Bangladesh Institute of Tropical and Infectious Diseases (BITID), Fouzderhat, Chattogram. All the patients under 18 years of age were included. Confirmation of COVID-19 was based on a positive result for real-time Reverse Transcription Polymerase Chain Reaction (RT-PCR) testing of SARS-CoV-2 in nasopharynx swabs by hospital laboratory. From April 1 to September 30 of 2020, we retrospectively reviewed medical records of 191 confirmed pediatric COVID-19 cases. The data were collected during sample collection in a prescribed clinical record form and saved in an electronic database. These included age, sex, residence, contact history, information on infected parents, hospitalization, any comorbidities. Later on, they were followed up over telephone regarding outcome, post-COVID complications and other missing information. All the data were collected in a clinical case record form. Statistical analysis was done by using the SPSS 20.0 version.

RESULTS

Total 2058 samples of children and adolescents were tested for suspected COVID infection in BITID lab during the study period. Among them total 183 patients were PCR positive (8.9%). Out of them total 144 patients were available for follow-up and the rest were missing.

Table I Demographic characteristics of the study population

| Characteristics | n (183) | % |
|-------------------|----------------------|------|
| Age | | |
| Range | 3 months to 17 years | |
| Median | 11 years | |
| Sex | | |
| Male | 104 | 56.8 |
| Female | 79 | 43.2 |
| Age distribution | | |
| 1-12 months | 10 | 5.5 |
| 1-5 years | 33 | 18.0 |
| 6-10 years | 43 | 23.5 |
| 11-15 years | 64 | 35.0 |
| 16-17 years | 33 | 18.0 |
| Residence | | |
| Chattogram metro | 106 | 57.9 |
| Outside metro | 77 | 42.1 |
| Family clustering | 148 | 81.3 |
| Parents affected | 142 | 77.8 |

Table I is showing the demographic characteristics of the study population. Male to female ratio was 1.3:1 (104 male and 79 female). Median age of study population was 11 years with an age range of 3 months to 17 years. Most of the patients (35%) belonged to the age group 11 to 15 years. Age break down of cases showed that 5.5% children were <1 years of age, 18.8% were between 2 to 5 years, 23.5% were 6-10 years, 35% belonged to 11-15 years age and 18% were 16-17 years of age. Family clustering was the main transmission route for pediatric population (81.3%) and parents were the most common source for them (77.8%). 57.1% patients were from Chattogram Metropolitan City and rest from outside metropolitan area.

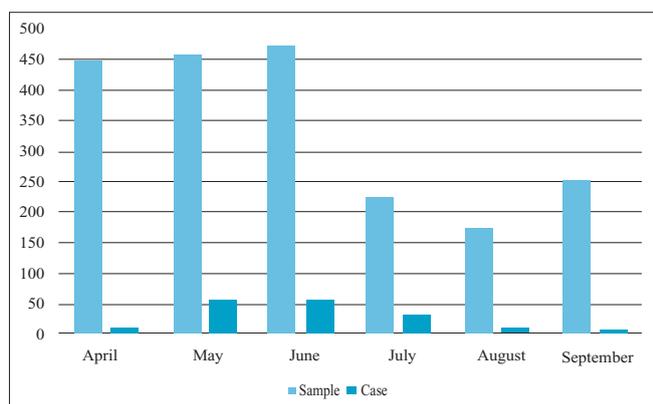


Figure 1 Month wise case detection during the study period

Figure 1 is showing the monthwise case detection rate of the study period. Highest peak for pediatric patients was in the month of May and June (31% each).

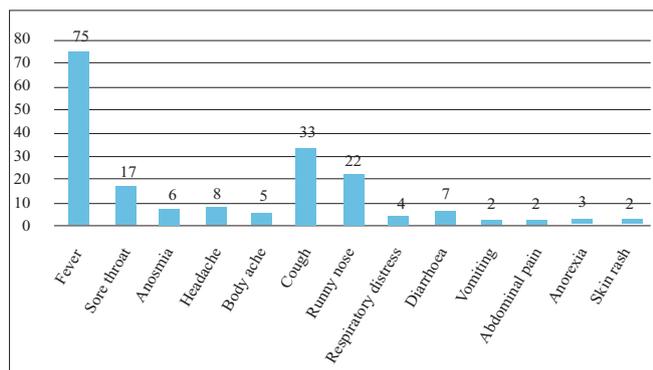


Figure 2 Frequency of symptoms in children and adolescents with COVID-19

Out of 144 patients total 56 patients (38.9%) was asymptomatic and rest 88 (61.1%) patients presented with different symptoms. Most common presentation was fever (85%) followed by cough (37.5%), runny nose (25%) and then sore throat (19.3%). Other symptoms were headache (5.5%), diarrhea (4.9%), anosmia (4.2%), body ache (3.5%), respiratory distress (2.7%), anorexia (2.1%), vomiting (1.4%), abdominal pain (1.4%), and skin rash (1.4%) (Fig 2).

Table II Breakdown of COVID-19 systemic involvement, hospitalization and post COVID complications by age distribution

| Age distribution | 1-12 months | 2-5 years | 6-10 years | 11-15 years | 16-17 years | p value |
|--------------------------|-------------|-----------|------------|-------------|-------------|---------|
| Asymptomatic | 6 (6.8) | 10 (11.4) | 18 (20.5) | 34 (38.6) | 20 (22.7) | 0.07 |
| Constitutional | 5 (6.2) | 9 (11.2) | 16 (20) | 30 (37.5) | 20 (25) | 0.05 |
| Respiratory | 1 (4.3) | 3 (13) | 2 (17.4) | 2 (39) | 2 (26) | 0.58 |
| GIT | 1 (10) | 3 (30) | 2 (20) | 2 (20) | 2 (20) | 0.69 |
| Others | 0 | 0 | 1 (50) | 0 | 1 (50) | 0.54 |
| Hospitalization | 2 (22.2) | 0 | 2 (22.2) | 3 (33.3) | 2 (22.2) | 0.15 |
| Post-covid complications | 1 (12.5) | 1 (12.5) | 1 (12.5) | 1 (12.5) | 4 (50) | 0.11 |

Constitutional symptoms were predominant (55.6%) and respiratory system was the most commonly involved system (31.9%) followed by GIT (6.9%). Table II is showing the breakdown of systemic involvement of Covid-19 by age distribution. Systemic involvement were analysed according to age and it was estimated that 11-15 years children mostly were asymptomatic (38.6%) and constitutional symptoms were their predominant presentation, though it was not statistically significant. But for the age group 2-5 years gastrointestinal presentation were predominant. Among 144 patients only 9 patients (6.3%) required hospitalization and most of them belonged to age group 11-15 years. None of them required ICU support. The median time from onset to cure was 3 days (ranging from 1 to 30 days). 16-17 years patients mostly suffered from post-covid complications.

Table III Frequency of Post-COVID complication

| Name of complication | No | % |
|----------------------|----|-----|
| Weakness | 4 | 2.8 |
| Insomnia | 1 | 0.7 |
| Headache | 1 | 0.7 |
| Anorexia | 3 | 2.1 |
| Chronic cough | 2 | 1.4 |

Total 8 patients (5.6%) developed post-COVID complications. Most common reported complication was extreme tiredness and anorexia. 3 patients had more than 1 complications. Table III is showing the frequency of reported complications. Only 6.3% children had comorbid condition, mostly bronchial asthma. All the patients were cured and there was no mortality in this pool of pediatric patients.

DISCUSSION

Although there is relatively ample information regarding adult COVID-19, knowledge regarding pediatric COVID 19 is limited from Bangladesh, specially from south-east part. In this context, this retrospective analysis of COVID-19 patients, aged less than 18 years was conducted in a specialized COVID hospital of Chattogram to assess clinic-demographic characteristics and post-COVID complications of pediatric COVID-19.

In this retrospective study, among total 2058 suspected pediatric patients 8.9% cases were PCR confirmed whereas in China case detection rate was 34.1% for children.¹⁰ Median age of study population was 11 years with age range of 3 months to 17 years which is consistent with CDC report on children in USA.¹¹ Das AK et al from Chittagong Medical College Hospital, who included patients up to 12 years of age, reported median age of 2.25 years with.¹² Different studies reported different age preponderance. A systematic review on COVID-19 in children revealed that mean age of children were 7.6 years and male represents 52%.¹³ Male to female ratio was 1.3:1 which is nearly similar to another Bangladeshi study by Hussain M et al (1.43:1).¹⁴ But Das AK et al and Ghosh et al reported higher male preponderance which was 1.7:1.^{12,15} Cause of this slight male preponderance in COVID-19 infection is not well understood.

In our study, most of the patients (36.6%) belonged to the age group 11 to 15 years, whereas CDC reported mostly affected age group as 15-17 years.³ Age break down of cases showed that 5.5% children were <1 years of age, 18.8% were between 2 to 5 years, 23.5% were 6-10 years, 35% belonged to 11-15 years age and 18% were 16-17 years of age. But study done by Hussain M et al. which was done among hospitalized children showed 30.74% were <1 year of age, 25.68% were 1-5 year belong to age group, 21.34% belongs to 6-10 years and 22.24% belongs to 11-15 years' age group.¹⁴ Dong y et al. reported 11.7% patients to be age group under 1 year.¹⁰ This disparity is due to less sampling at this age group in Bangladesh. While USA and China data were compiled UNICEF reported most of the patients were between age group 15-17 years (29%) and < 1 year old children comprised 15% of total.¹³ In this study, 82.6% patients had definite contact history, similar to the report of Li et al.¹⁶ Family clustering was the main source of infection in this study (81.3%) compared to 90% reported by Li et al and 89% by Qui H et al.^{16,17} 91% by CDC, indicating that pediatric population is as vulnerable to COVID-19 as adult.³ Pediatric patients acquired COVID-19 mostly through close contact with family members, specially parents. In our study 81.3% patients had confirmed case in family and 77.8% patients had affected parents.

Prevalence of pediatric asymptomatic infection was 38.9% which is much higher than 19.72% estimated by Ghosh et al and 5.9% estimated by Guo et al.^{15,18} Li et al reported 23% and Qui H et al reported 28% asymptomatic infection.^{16,17} Fever and cough were the main symptoms (similar to the finding of Hussain M et al. Guo et al and Li et al).^{14,16,18} which was followed by runny nose, sore throat and some gastrointestinal manifestation. Study done by Hussain M et al among hospitalized patients reported the most common presenting symptoms were fever (94.92%), cough (79.69%), dyspnea (59.77%) and desaturation (62.11%) and mortality was 4.52%.¹⁴ Ghosh et al in a Bangladeshi study found that all patients presented with a combination of symptoms including fever, abdominal pain, diarrhea, and vomiting.¹⁵ Asymptomatic

infection was more common in the age group 11-15 years, but GIT manifestation were common in 2-5 years group. The time from onset to cure was 1 to 30 days with a median duration of 3 days, which is quite different from the Chinese study done by Guo et al. (6 to 39 days, median 16 days).¹⁸

This study found that, very few pediatric patients required hospitalization (6.3%) consistent with finding that covid-19 often has a milder course in younger age group. (CDC reported 5.7% to 20%).³ None of the study patients required ICU support, contrary with the finding of other reports. (CDC reported 0.58 to 2,0%; 1.8% reported by Guo et al).^{3,18} As more patients belonged to the age group 11-15 years, so hospitalization was more in this age group, whereas CDC reported hospitalization more in <1 year age group.³ Regarding hospitalization status, range of duration of hospitalization was 2 days to 30 days.

Very few patients developed post-covid complications (6.3%) and they were not severe. Most post covid complications were reported from the age group 16-17 years and most common complications were extreme tiredness, anorexia and chronic cough. Children rarely had associated other medical condition (8.3%), similar to the finding by Ghosh et al compared to 20.8% reported by Das AK et al and 27% by Li et al.^{15,12,16} Most common comorbid condition was bronchial asthma (7 patients), which is similar to different reports worldwide (CDC, Li et al and Dong y et al).^{3,10,16}

LIMITATIONS

This study has several limitations. This is a retrospective and single centered study and covered only a brief period. However, as very limited data is available on pediatric COVID from this part of Bangladesh, this study would be able to add to the pre-existing knowledge.

CONCLUSION

Covid 19 in pediatric population presents distinct features than adults and also it is very different from China and other countries. There was slight male preponderance and 11-15 years age group were more susceptible. Most common source of infection were parents. Significant proportion of children had asymptomatic infection. Fever was the most common presenting feature followed by respiratory symptoms. There was no mortality in this pool of pediatric patients. Very few patients developed post-COVID complications and they were mild.

RECOMMENDATIONS

Large scale multi-center studies should be done to have a complete insight about the distinct feature of pediatric COVID-19 regarding demographic and clinical features and long term follow up to observe more about pediatric post-COVID complications.

DISCLOSURE

All the authors declared no competing interest.

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