A Study On Clinical and Laboratory Profile of Children with COVID-19 Attending A Tertiary Care Hospital in Bangladesh

Kazi Iman¹, Sharmin Mahbuba², Farhana Rahat³, Morsheda Khanam⁴, Azmeri Sultana⁵, Md. Fazlul Haque⁶

Abstract

Background: An outbreak of COVID-19 caused by 2019 novel coronavirus started first in Wuhan, Hubei province of China. Thereafter it spreaded to different countries of the world. Cases among children has been increasing day by day. Despite taking all measures of prevention virus spreading is uncontrolled.

Objectives: To determine the clinical features and laboratory profile of children with COVID-19.

Methods: This was a cross sectional study conducted in Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka. Clinical and laboratory profile were analyzed among the children (aged 0-16 years) admitted between 1st May 2020 to November 2020 with positive RT-PCR for COVID-19. Data were analyzed by using SPSS.

Results: Total 159 cases were included in the study. The most common symptom was fever (97.5%), then the second most common was cough (80.5%), other symptoms were diarrhea (28.3%), vomiting (17%), anorexia (30.8%) and weakness (30.2%). WBC count was within normal limit, leucocytosis was found in 5% cases and leucopenia in 3% cases. Few cases were reported with neutropenia and lymphopenia. Few cases were reported as thrombocytosis. ESR and CRP were high. Chest X-ray showed opacities in 62.9% cases. In most of the cases it was bilateral, few cases showed unilateral. In 37.1% cases it was normal. The disease category of all infected children remained same all through the hospital stay and no mortality was seen.

Conclusion: Children with COVID-19 had distinct clinical features. Fever and cough were the most common symptoms. WBC count was found within normal limit but ESR and CRP were high. Chest radiograph showed opacities in majority cases. The outcome of COVID-19 in children was good.

Keywords: COVID-19, clinical and laboratory profile, children, Bangladesh.

¹. Registrar, Department of Paediatrics, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka.
². Assistant Professor, Department of Paediatrics, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka.
³. Assistant Professor, Department of Paediatrics, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka.
⁴. Assistant Professor, Department of Paediatrics, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka.
⁵. Associate Professor, Department of Paediatric Nephrology, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka.
⁶. Professor, Department of Paediatrics, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka.

Correspondence to: Dr. Kazi Iman, Registrar, Department of Paediatrics, Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka. Cell: 01711317493, E-mail: kaziiman28@gmail.com

Received: 1 December 2020; Accepted: 29 December 2020
Introduction
The pandemic disease COVID-19 first started in Wuhan, Hubei Province, China in December 2019, caused by corona virus manifested as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).¹ On 30th January 2020 World Health Organization (WHO) declared that COVID-19 a public health emergency of international concern (PHEIC).² COVID-19 infection is a highly contagious to all age group. It spreads mainly through droplets of discharge from nose or saliva when an infected person sneezes or coughs.³ COVID19 transmits from human to human though initially it had been thought that transmission occurs through animal to human.⁴ Transmission to children may occur from asymptomatic cases.⁵ In some cases this RNA virus was detected in faecal mater, so there is every possibility of faucal-oral transmission.⁶ The vulnerability of the spread of this new coronavirus is more and this pandemic has been found to have spread throughout Asia and across the world. The number of deaths is rising quickly.⁷ In Bangladesh first case of COVID19 has been reported on 8th March 2020.⁸,⁹
Despite taking all measures, virus spreading remains uncontrolled. Recent literature indicate that the mean incubation period of this disease is 3 to 5 days but it may range from 0 to 24 days.¹⁰-¹² The incidence of COVID-19 in children is not known due to very few cases in children.¹³ It is uncertain why there are few pediatric cases considering that children have developing immune systems, and thus should be more vulnerable to the virus. In addition, pregnant mothers were also advised to stay indoors, as the long-term and short-term consequences of the virus on the fetus and whether there can be mother-to-child vertical transmission is unknown.¹⁴ Clinical scenario of COVID-19 varies, it may be asymptomatic or critically ill. Some data shows that adult patients with corona virus infections manifest with fever, cough, respiratory distress, easy fatigue ability and lymphopenia. Elderly with co morbidities may develop severe pneumonia which may turn to severe acute respiratory syndrome and even death may occur.¹⁵-¹⁸ According to multiple studies it seems that children usually present milder symptoms than adult.¹⁹,²⁰ However there are limited reports about clinical manifestation and laboratory profile of paediatric patients both nationally and internationally. Due to the dearth of evidence and information on COVID-19, WHO has encouraged more research, particularly those involving children and pregnant women to give a better understanding and outline the clinical characteristics and natural history of the illness.
On the basis of clinical features and epidemiological factors all the suspected cases should be tested. When someone had contact with a patient with COVID-19, PCR testing should be done of asymptomatic to symptomatic contacts. Screening tests should be done according to local situation demands. Rapid collection of sample and testing of specimens from suspected patients should meet the case definition for COVID-19. Suspected cases should be tested for the corona virus with nucleic acid amplification tests (NAAT), such as RT-PCR for COVID-19. Outbreak can be minimized by this way.²¹ Supportive investigations that can be done includes: CBC, decrease WBC count (9-25%), decrease lymphocyte count (83%), increase WBC count (24-30%) and decrease platelet count. Poor prognosis was found in patients with lymphopenia at the beginning of the outbreak. Neutrophil to Lymphocyte ratio more than 3.5 is a poor prognostic factor. C reactive protein (CRP): Most of the patients with COVID-19 have significantly increased levels of CRP. It indicates a possibility of secondary bacterial infection. Procalcitonin: Maximum patients have normal level of procalcitonin. D-dimer: In severe cases D-dimer levels are also found significantly elevated with, bad prognosis. Liver and kidney function test, Serum Ferritin, Arterial blood gas analysis, S. LDH and D-dimer all are suggestive to detect multi organ failure.²² To address this emerging current issue, we aimed to go through both clinical and lab profile of hospitalized children.
Materials and Methods
This was a cross sectional study conducted in Dr. MR Khan Shishu Hospital and Institute of Child Health, Dhaka from 1st May to November 2020. A total of 159 children (aged 0-16 years) admitted with positive RT-PCR for COVID-19 were enrolled in the study. Nasopharyngeal swab was taken for RT-PCR test. Patients who were RT PCR for COVID was positive with any chronic disease like Cerebral palsy, Congenital heart disease, Chronic kidney disease etc. were excluded from the study.
Detailed history and clinical examinations were done. Hematological profiles (Hb%, TC, DC of WBC, ESR, Platelet count) and other tests like CRP were done in all patients. Chest radiograph was also taken in all patients. Clinical and laboratory data were collected and analyzed by SPSS version 21. Informed written consent were taken from the parents. Ethical clearance from the ethical committee of Dr. MR Khan Shishu Hospital and Institute of Child Health was also taken before enrollment in the study.

**Results**

A total of 159 children presented with positive RT-PCR for COVID-19 were included in the study. Among them 61 (38.36%) were male patient and 98 (61.64) were female patient (Fig 1). Male female ratio was 1:1.6. Most of the patients were from Dhaka city, few were from outside Dhaka city (Fig 2).

![Fig 1](image1.png)  
*Fig 1 Distribution of male and female children with COVID-19*

Children of all age groups were affected, among them most commonly affected age group was 1-5 year (42.1%) (Table I).

Symptoms of the infected children were fever, cough, loose motion, vomiting, anorexia and weakness. Fever was the most common reported symptom in 97.5%(155) of cases. The second most common symptom was cough in 80.5%(128) of cases. Most of the patients presented with dry cough. Diarrhoea was seen in 28.3%(45) and vomiting in 17%(27) cases. Other symptoms such as anorexia was noticed in 30.8%(49) and weakness in 30.2%(48) patients (Fig 3).

![Fig 3](image3.png)  
*Fig 3 Clinical features in study population*

![Table I](image4.png)  
**Table I**  
*Distribution of age in study population*

| Category            | Frequency | Percent |
|---------------------|-----------|---------|
| Day 1 to <12 month  | 41        | 25.8    |
| 1 year to <5 years  | 67        | 42.1    |
| 5 years to <10 years| 32        | 20.1    |
| 10 years to <16 years| 19      | 12.0    |
| **Total**           | **159**   | **100.0**|

![Table II](image5.png)  
**Table II**  
*Laboratory profile of children with COVID-19*

| Parameter | Mean   | Std. Deviation |
|-----------|--------|----------------|
| Hb        | 11.3579| 1.60164        |
| WBC       | 9030.00| 3154.733       |
| Neutrophil| 52.59  | 13.743         |
| Lymphocyte| 39.43  | 14.981         |
| Platelet  | 315603.77| 111957.950   |
| ESR       | 24.11  | 22.162         |
| CRP       | 83.9616| 201.80763      |

All the patients were well nourished according to weight for age CDC growth chart. Mean weight was 17.24 kg and height was 92.6 cm. Mean temperature was 100°F. Oxygen saturation of the children was measured by pulse oximeter. Average range of oxygen saturation was from 80% to 90% without oxygen inhalation in maximum patients. Chest examination was done in all patients. Auscultation findings were different in different patients. Crepitation was the most common finding 87(54.7%).
Ronchi was present in 21(13.2%) and both crepitation and ronchi was present in 13(8.2%) cases.

Laboratory profile showed normal while blood cell (WBC) count. Differential counts were within normal range. Thrombocytopenia was not reported rather thrombocytosis was seen in some cases. Marked increase level of CRP was found (Table II). Chest X-ray was done in all cases. It showed opacities in 62.9% cases. Most of the cases it was bilateral few cases showed unilateral. In 37.1% cases it was normal (Table III). The disease category of all infected children remained same all through the hospital stay and no mortality was seen.

| Table III | Radiological findings of children with COVID-19 |
|-----------|-----------------------------------------------|
|           | Frequency | Percent |
| Pneumonia | 100       | 62.9    |
| Normal    | 59        | 37.1    |
| Total     | 159       | 100.0   |

Discussion

The number of COVID-19 in children has increased in Bangladesh as well as worldwide. In a study showed 2.2% of 44,672 confirmed cases were corona virus infected children and they were under 19 years old. The great interest of the study is that there was low mortality in children in comparison to other pandemic or outbreak of viral illness. Cao et al reported that children act as silent carriers or spreaders. This was a hospital based study whereby all the information was collected from the parents. Details history was taken from the parents and clinical examination of the patients were done and some related investigations were also done. Our study added the clinical and lab profile of hospitalized children with COVID-19.

In our study we found that the disease may present in any age group but most commonly affected age group was one to five years of age, Sarangi et al showed similar result. In a literature review they found fever and cough were the main symptoms in children with COVID-19. In our study we found similar result fever was present in 97% cases and cough in 80.7% cases. A literature showed malnutrition a risk factor in adult in COVID-19. We noticed all the children were well nourished as per weight for age and it was similar to other studies. Recently some experimental studies added that, like the severe acute respiratory syndrome coronavirus which is also called SARS-CoV and the novel coronavirus 2019 (2019-nCoV) both uses the same receptor; angiotensin converting enzyme II (ACE-II). So there is a possibility that the activity or may be function of ACE-II in children is not like that as in adults.

Nasopharyngeal swab was taken for RT-PCR for COVID-19 in all suspected cases and all positive cases were included in this study. Yang et al reported that sputum and nasal swabs have potential to achieve a positive rate of 88.9% and 73.3% respectively. As a result, there is every possibility of false negative reports and there is a chance of silent spread of infections from one children to others.

The laboratory profile of adults with COVID-19 has demonstrated low WBC count with associated neutrophilia, eosinopenia, lymphopenia, and thrombocytopenia. Also, higher NLR, LMR and PLR have been associated with severe disease and used for prognostication. In this study WBC count was normal in the majority of the cases. Few cases showed leucopenia but no evidence of thrombocytopenia and this was similar to some other literatures. CRP was high in adults with sever COVID-19 in adults. We also found elevated CRP in children with COVID-19.

Chest X-ray was done in children with COVID-19. We found opacities in 62.9% cases. Xia et al found opacity on chest radiograph in 50% (n=20) of the paediatric patients. Literature review provide evidence that children and adult present differently. Future studies are needed to explain these differences.

COVID-19 claimed many lives in adults than in children. Impaired immunity in adult patients may be possible cause of death. The co-morbidities such as diabetes, cancer and cardiovascular diseases increased prevalence of COVID-19 in adult and elderly. As a result, these patients are more prone to develop organ damage following coronavirus infection. Children suffered less as they do not have comorbidities but co infection was common in one third of the patients. Typhoid fever, meningitis, urinary tract infection and acute viral hepatitis were seen in our study cases. There are many literatures which showed co infection in children with COVID-19.
The scientific communities most urgent priorities are to pick and support the best therapies and to prevent and tackle the COVID-19 pandemic. As there was no specific treatment, study population got supportive and symptomatic treatment. This study also added that the prognosis of the children were good.

Results of this study confirmed that children with COVID-19 is not a severe disease, however severe presentation in selected population of paediatric patients may also occur. Evidence need to be generated to further establish the incidence of severe presentation of COVID-19 in infants and children with pre-existing disease.

Conclusion
Children are disproportionately affected by COVID-19 and severe symptoms are less common in children. Symptoms include fever, cough, diarrhea, vomiting, anorexia and weakness. Lab profile showed normal WBC count, high ESR and CRP. Chest X-Ray revealed opacities. Most of the patients were from Dhaka city few were from outside Dhaka city. Further experimental trials would be beneficial to provide robust evidence for development of treatment protocol to reduce morbidity in children with COVID-19.

References
1. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus infected pneumonia. N Engl J Med 2020;382:1199e207.
2. Chang TH, Wu JL, Chang LY. Clinical characteristics and diagnostic challenges of pediatric COVID19: A systematic review and meta-analysis. Journal of the Formosan Medical Association 2020;119:982-89.
3. World Health Organization 2020. Coronavirus. Accessed on 27 March, 2020. Available from https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19.
4. World Health Organization. Situation report - 4 Novel Coronavirus (2019-nCoV) 24 January 2020. Available from https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200124.
5. Niet A, Waanders BL, Walraven I. The role of children in the transmission of mild SARS-CoV-2 infection. Acta Paediatr 2020;109:1687.
6. Matthai J, Shanmugam N, Sobhan P. Coronavirus disease (COVID-19) and the gastrointestinal system in children. Indian Pediatr 2020;57:533-35.
7. World Health Organization. Coronavirus Disease 2019 (COVID-19): Situation Report; World Health Organization: Geneva, Switzerland. 2020. Available from https://www.who.int/o.../novel-coronavirus-2019/situation-reports.
8. Bangladesh confirms first three coronavirus cases. Somoy English Desk. 2020 March 16:20.Available from https://en.somoynews.tv/5897/news/Bangladesh-confirms-first-three-coronaviruscases.
9. Hossain I, Khan MH, Rahman MS, Mullick AR, Aktaruzzaman MM. The epidemiological characteristics of an outbreak of 2019 novel coronavirus Diseases (COVID-19) in Bangladesh: A descriptive study. Journal of Medical Science and Medical Research 2020;8:544-551.
10. Public Health England. Stay at home: guidance for households with possible coronavirus (COVID-19) infection. Available from: https://www.gov.uk/government/publications/covid-19-stay-at-home-guidance/stay-at-home-guidance-for-households-with-possible-coronavirus-covid-19-infection.
11. Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q, Meredith HR, et al. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. Ann Intern Med 2020. doi: 10.7326/M20-0504.
12. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med 2020;382:1708-20.
13. Moreton E. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected. World Health Organisation 2020.
14. Ho CLT, Oligbu P, Ojubolamo O, Pervaiz M, Oligbu G. Clinical characteristics of children with COVID-19. AIMS Public Health 2020;7:258-73.
15. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patientswith 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA 2020;323:1061-69.
16. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.
17. Guan WJ, Ni ZY, Hu Y, Liang WH. Clinical characteristics of corona virus disease 2019 in China. N Engl J Med 2020;382:1708-20.
18. Zhang JJ, Dong X, Cao YY, Yuan YD, Yang YB, Yan YQ, et al. Clinical characteristics of 140 patients infected by SARS-CoV-2 in Wuhan, China. Wiley Online Library 2020;75:1730-41.

19. The International Committee on Taxonomy of Viruses (ICTV) Coronaviridae Study Group. Naming the 2019 Coronavirus. Available from https://talk.ictvonline.org/.

20. WHO-China Joint Mission, Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19), (2020) Geneva Accessed March 1, 2020 https://www.who.int/docs/default-source/coronaviruse/who-china-jointmission-on-covid-19-final-report.pdf.

21. Laboratory testing for coronavirus disease 2019 (COVID-19) in suspected human cases. WHO interim guidance 2020, p 1.

22. National Guidelines on Clinical Management of Coronavirus Disease 2019 (Covid-19) 2020, p 13.

23. 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;323:1239-42.

24. Cao Q, Chen YC, Chen CL, Chiu CH. SARS-CoV-2 infection in children: Transmission dynamics and clinical characteristics. J Formos Med Assoc 2020;119:670e3.

25. Sarangi B, Reddy VS, Oswal J, Malshe N, Patil A, Chakraborty M, et al. Epidemiological and clinical characteristics of COVID-19 in Indian children in the initial phase of the pandemic. Indian pediatrics 2020;57:914-17.

26. Chang TH, Wu JL, Chang LY. Clinical characteristics and diagnostic challenges of pediatric COVID-19: A systematic review and meta-analysis. Journal of the Formosan Medical Association 2020;119:982-89.

27. Li T, Zhang Y, Gong C, Wang J, Liu B, Shi L, et al. Prevalence of malnutrition and analysis of related factors in elderly patients with COVID-19 in Wuhan, China. Eur J Clin Nutr 2020;74:871-79.

28. Zhou P, Yang X, Wang X, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature 2020;579:270-73.

29. Wrapp D, Wang N, Corbett KS, Goldsmith JA, Hsieh C, Abiona O, et al. Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. Science 2020 367:1260-63.

30. Yang Y, Yang M, Shen C, Wang F, Yuan J, Li J, et al. Evaluating the accuracy of different respiratory specimens in the laboratory diagnosis and monitoring the viral shedding of 2019-nCoV infections. MedRxiv 2020.

31. Lagunas-Rangel FA. Neutrophil-to-lymphocyte ratio and lymphocyte-to-C-reactive protein ratio in patients with severe coronavirus disease 2019 (COVID-19): A meta-analysis. J Med Virol 2020;92:1733-34.

32. Wang L. C-reactive protein levels in the early stage of COVID-19. Med Mal Infect 2020;50:332-34.

33. Xia W, Shao J, Guo Y, Peng X, Li Z, Hu D, et al. Clinical and CT features in pediatric patients with COVID-19 infection: Different points from adults. Pediatric Pulmonol 2020;55:1169-74.

34. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.

35. Wu Q, Xing Y, Shi L, Li W, Gao Y, Pan S, et al. Co-infection and other clinical characteristics of COVID-19 in children. Pediatrics 2020;146: e20200961.

36. Haqqi A, Khurram M, Din MSU, Din M, Aftab MN, Ali M, et al. COVID-19, and Salmonella typhi co-epidemics in Pakistan: A real problem. J Med Virol 2020. Doi: 10.1002/jmv.26293.

37. Verduyn M, Allou N, Gazaille V, Andre M, Desroche T, Jaffar M-C, et al. Co-infection of dengue and COVID-19: A case report. PLoS Negl Trop Dis 2020;14:e0008476.

38. Akram A, Jewel MSH, Chowdhury R, Chowdhury MRU. A case report of nosocomial infection with SARS CoV-2 in a one-year-old Meningoencephalitis patient in a tertiary hospital of Bangladesh. Microbes and Infectious Diseases 2020;1:36-38.

39. Wander P, Epstein M, Bernstein D. COVID-19 presenting as acute hepatitis. The American Journal of Gastroenterology 2020. Doi: 10.14309/ajg.0000000000000660.

40. Mandelia Y, Procop GW, Richter SS, Worley S, Liu W, Esper F, et al. Dynamics and predisposition of respiratory viral co-infections in children and adults. Clin Microbial Infect 2020;S1198-743X:30342-46.