

Demographic, Clinicopathological Profile and Outcomes of COVID-19 among Hospital Admitted Children

Sumala Ashraf¹, Tania Taher², Kaisar Haroon³, Md Abu Talha⁴

¹Assistant Professor, Department of Paediatrics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh;

²Associate Professor, Department of Paediatrics, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh;

³Assistant Professor, National Institute of Neurosciences and Hospital, Dhaka, Bangladesh; ⁴Registrar, Paediatric Cardiac Intensive Care Unit, National Heart Foundation Hospital and Research Institute, Dhaka, Bangladesh

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Abstract

Background: Although the corona virus disease 2019 (COVID-19) outbreak is a global public health challenge, clinical patterns of children with COVID-19 still remain unclear as most studies on COVID-19 have focused on adults and only a small number of studies included pediatric patients. **Objective:** This study was done to observe the demographic profile, clinical presentation, laboratory finding and outcome of hospital-admitted children diagnosed as COVID-19. **Method:** This was an observational study done in Department of Paediatrics at Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh from October 2021 to March 2022 for duration of six months. This study included all admitted children from newborn up to 14 years of age diagnosed with COVID-19 either by RT-PCR or by HRCT scan of the chest. **Results:** Among 35 patients mean age was 48.64 ± 63.10 months and 62.8% were male and 37.1% were female. Most common presentations were fever and cough both were (77.1%) followed by diarrhoea and vomiting which were 37.1% and 28.5% respectively. Leucopenia was noted in 22.8% patients. Chest X-Ray abnormalities were found in 60% of patients, bilateral patchy shadows were most common (24.2%) followed by consolidation (17.1%). 1 patient needed PICU, rest of the 34 (97%) patients in this study were discharged after full recovery. **Conclusion:** Clinical features of COVID-19 in children differ from adult cases. Although fever and cough are main clinical symptoms, diarrhoea and vomiting are also common presenting symptoms in this study. Biochemical parameters like serum ferritin, D-dimer were also unremarkable and outcome was generally favourable. [Bangladesh Journal of Infectious Diseases, April 2022;9(suppl_1):S14-S19]

Keywords: COVID-19; fever; cough; diarrhoea; pediatric population

Correspondence: Dr. Sumala Ashraf, Assistant Professor, Department of Paediatrics, Holy Family Red Crescent Medical College and Hospital, Dhaka, Bangladesh; **Cell no:** +8801730300489; **Email:** sumalaashraf@yahoo.com; **ORCID:** <https://orcid.org/0000-0002-9398-3151>

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Introduction

Coronavirus disease (COVID-19) is an extremely infectious and life-threatening viral illness that gave rise to the pandemic; an overwhelming healthcare crisis putting the healthcare system under huge strain. Corona virus disease 19 (COVID 19) is a disease caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2)¹. Corona viruses are a large family of viruses that cause a variety of diseases, such as SARS, MERS, and COVID-19². The most recent corona virus species, SARS-CoV-2, was first identified in Wuhan, Hubei province, China in December 2019³.

On 11th March 2020, WHO recognized this disease as a pandemic⁴. First case of COVID-19 of Bangladesh was detected in Dhaka, on 8th March, 2020⁵. The virus mainly spreads from infected persons through small droplets when coughing or sneezing⁶. Incubation period is in the range of 2-14 days⁷. Since the disease emerged a bunch of studies was done worldwide, but most studies have focused on adults and only a small number of pediatric patients with COVID-19 have been reported. Children and young people comprise only 1-2% of cases of corona virus disease 2019 (covid-19) worldwide⁸. In contrast to other respiratory viruses, children seem to have a lower risk of infection than adults⁹ and the vast majority of reported infections in children are mild or asymptomatic, with few recorded childhood fatalities attributed to COVID-19¹⁰.

This study was done with the objective to observe the demographic profile, clinical presentation, laboratory finding and outcome of hospital admitted children diagnosed with COVID-19.

Methodology

This was a prospective observational study done in Department of Paediatrics of Holy Family Red Crescent Medical College Hospital from October 2021 to March 2022 for a duration of 6 months. This study included all admitted children in this hospital aged from 1 day upto 14 years old, diagnosed with COVID-19 either by RT-PCR or by HRCT scan of chest. Patients of either gender were included in the study. Patients who had symptoms of COVID-19 but did not have supporting laboratory evidence were excluded. After having appropriate consent from parents, data were collected in a structured questionnaire. After admission demographic data, clinical data, related

laboratory findings were collected and analyzed and correlated them with the outcome. Qualitative variables such as fever, cough etc. were expressed as frequency and percentage. Quantitative variables like age was expressed as mean ± standard deviation (SD). All data were analyzed using the SPSS v20 software.

Results

A total number of 35 patients were included in this study. Age ranged varied from 1 day upto 14 years, mean age is 48.64 ± 63.10 month. Children between 2 months to two years were mostly affected (20 patients) (Figure I).

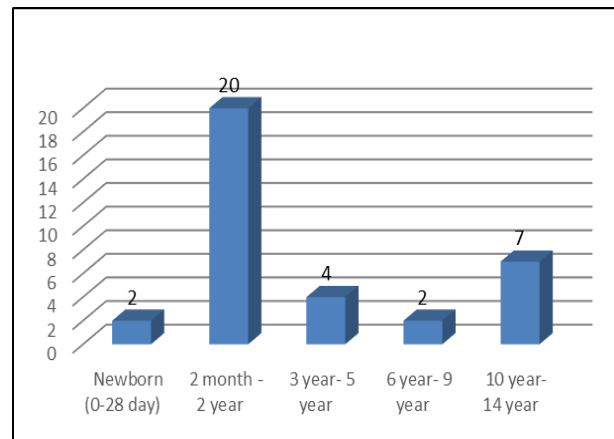


Figure I: Age Group Distribution of Patients (n=35)

Among 35 patients 22(62.5%) cases were boys and 13 (37.5%) cases were girls. 8 patients had comorbidity like congenital heart disease, hereditary haemolytic anaemia, dengue hemorrhagic fever, varicella infection and 14 patients had history of exposure from another family member (Table 1).

Table 1: Baseline Characteristics of Studied Children (n=35)

Baseline Characteristics	Frequency	Percent
Gender		
• Male	22	62.8
• Female	13	37.1
Co morbidity	8	22.8
H/O exposure	14	40.0

Fever and cough was the most prominent symptoms followed by anorexia, 11 patients had respiratory distress and 13 children had diarrhoea (Figure II).

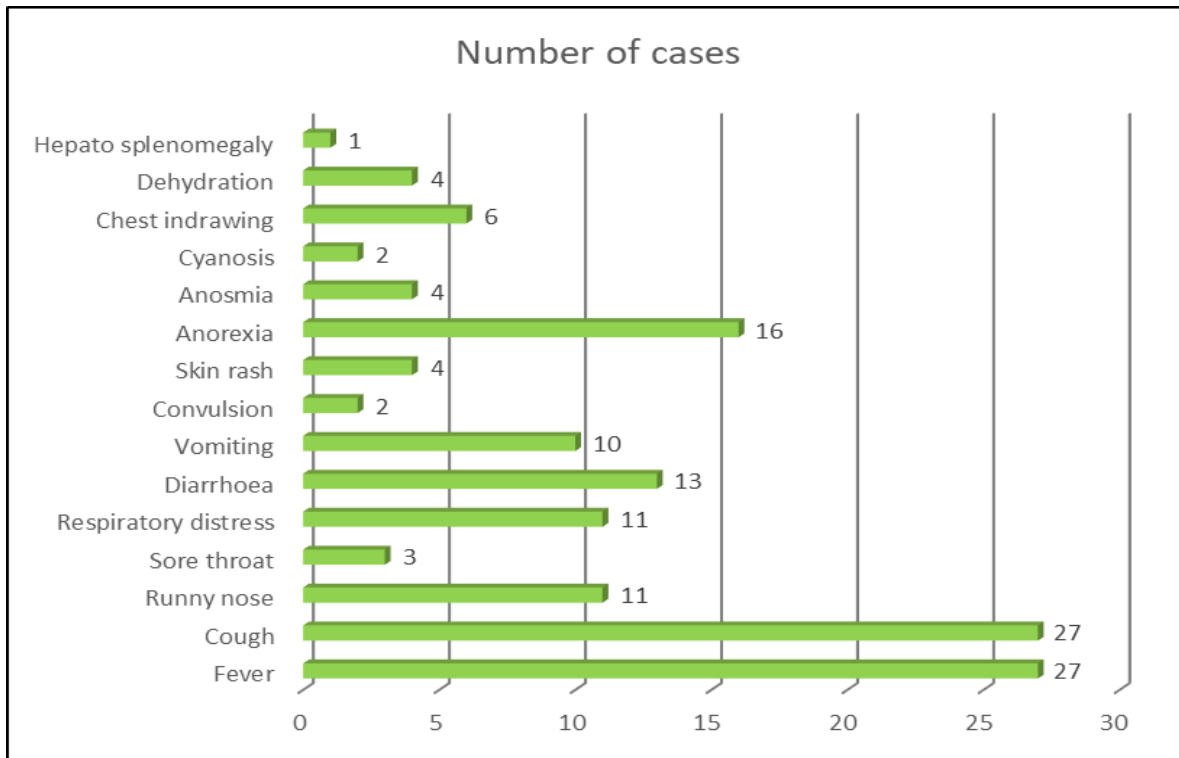


Figure II: Clinical features of study population (n=35)

Of the 35 patients 32 were RT-PCR positive. Three patients were RT-PCR negative. But they were diagnosed based on HRCT scan criteria (Table 2).

Table 2: RT-PCR for COVID 19

RT-PCR	Frequency	Percent
Positive	32	91.4
Negative	3	8.5

Table 3a: Other supportive investigations

Investigation	Frequency	Percent
Leukocyte count		
• Leukocytosis	11	31.4
• Leukopenia	8	22.8
• Normal	16	45.7
CRP		
• Normal	16	45.7
• Raised	19	54.2
Serum Ferritin		
• Normal	29	82.8
• Raised	6	17.1
D-Dimer		
• Normal	34	97.1
• Raised	1	2.8

Most patients had normal leucocyte count, S. ferritin, and D-Dimer. But CRP was raised in most patients (Table 3a).

Table 3b: Radiological Finding (Chest X-Ray)

X-Ray chest	Frequency	Percent
Normal	14	40
Consolidation	6	17.1
Patchy opacity	12	34.2
Ground glass appearance	2	5.7
Pleural effusion	1	2.8

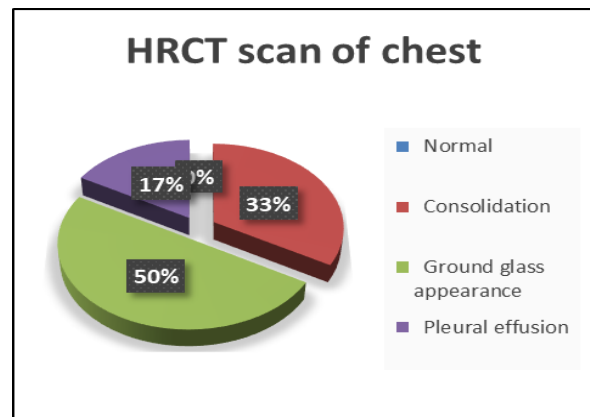


Figure III: Showing HRCT scan of chest

In chest X-ray 14 patients had normal report. 12 patients had patchy opacities and six patients had consolidation (Table 3b).

About 50.0% patients had ground glass appearance of the HRCT of chest. Consolidation in 33.0% and pleural effusion in 17.0% patients (Figure III).

Table 4: Outcome of Study Population (n=35)

Outcome	Frequency	Percent
Discharge with full recovery	34	97.1
PICU admission	1	2.8
Death	0	0

Only one patient needed PICU admission. Other 34 patients were discharged without any complication (Table 4).

Discussion

Outcome and clinical patterns of children with COVID-19 remain unclear¹¹. It was observed that only a small proportion of infected children became severely or critically ill. Since COVID-19 has a favorable clinical course in children, the importance of pediatric cases is also due to epidemiological issues¹². Several reasons have been reported for the low prevalence of COVID-19 among children. One probable reason is low activities and less international traveling as compared to their parents, which results in their low exposure to viral infection¹³. On the other hand, children, especially those younger than 10, possess a more active innate immune response and healthier respiratory tracts^{14,15}.

In this study, it was observed the demographic profile, clinical presentation, laboratory findings and outcomes of hospital-admitted children diagnosed with COVID-19. Here among 35 patients, 22(62.8%) cases were male and 13(37.1%) cases were female. In a similar study, Olivia et al¹⁶ showed similar sex distribution. In this study age range varied from newborn up to 14 years, the mean age was 48.64 ± 63.10 months. Among the 35 children, 57.1% were in between 2 months to 2 years, 11.4% cases were between 3 to 5 years of age and 20.0% cases were between 10 years to 14 years of age. In the study of Dong et al¹⁷ 40.0% of children were aged under 5 years. Qiu et al¹² and Shekerdemian et al¹⁸ reported 28.0% and 30.0% of the children to be younger than 5 years, respectively.

Co-morbidity was found in 8(22.8%) patients, Comorbidities include congenital heart disease, tubercular lymphadenitis, hereditary haemolytic anaemia, dengue haemorrhagic fever, chicken pox and so one. The patient with congenital heart disease needed paediatric ICU. In the study done by Mahbuba et al¹⁹ showed 26.0% of their studied children were associated with co-morbid conditions and the conditions were similar to this study.

Like other studies²⁰⁻²², the most common presentations of our patients were fever (77.1%), respiratory complaints including cough (77.1%) and respiratory distress (31.4%) and anorexia (45.7%). In our study diarrhoea and vomiting also commonly occurred in 37.1% and 28.5% children respectively (figure 2). Huang et al²³ and Chen et al²⁴ in their study showed that these symptoms are twice as common in children as in adults. In this report, skin rash presented in 11.4% cases of the children.

There are reports of dermatologic manifestations in COVID-19, and fever and rash were the first presentations of COVID-19^{21,25-26}. None of this study population developed symptoms of MIS-C. Convulsion was noted in 2(5.7%) patients. All of them were afebrile and none had a history of epilepsy or febrile convulsion. Ludvigsson²⁷ in his study stated that convulsions may be a sign of the Omicron variant in children with COVID-19²⁷.

RT-PCR for COVID-19 was positive in 32 (91.4%) patients. The other patients had negative results but their clinical features and investigations including HRCT of the chest were highly suggestive of COVID-19. Leukocytosis was noted in 31.4% patients and leucopenia in 22.8% patients and normal WBC count in 45.7% patients. Tiago et al¹¹ in their study showed 75.8% of their patients had normal leukocyte count. In this study, CRP was normal in 16 (45.7%) patients and raised in 19 (54.2%) patients. Here 6(17.1%) patients had high serum ferritin level. Lin et al²⁸ in their study reported higher serum ferritin levels in severe COVID-19 cases suggested features of systemic inflammatory reaction²⁸. D-dimer was raised in only 1 patient.

Chest X-Ray finding in this study was normal in 14(40%) patients, bilateral patchy shadows, seen in 12(24.2%) patients; consolidation was noted in 6(17.1%) patients and bilateral pleural effusion in 1(2.8%) patient. Liguoro et al²⁹ in their study stated that due to the mild pattern of disease in children findings are usually subtle when compared with adults, and therefore may not be detected on chest X-ray. HRCT scan of chest was done in 4 patients,

among them consolidation was found in 2 (50%) patients, ground glass appearance of lungs were found in 3 (75%) patients and pleural effusion in 1 (25%) patient (figure 3). In the study of Lu et al³⁰ involving 171 cases, ground-glass opacities and patchy shadowing were observed in 32.7% and 31% of cases respectively.

Duration of hospital stay ranged from 1 day to 13 days, the average duration of hospital stay was 6.03 days. 1 patient (2.8%) was transferred to PICU. The exact PICU admission rate in children with COVID-19 remains unknown (Table 4). Göttinger et al³¹ reported an 8% PICU admission rate in their study in Europe. In Spain, 16.0% of confirmed cases were admitted to the PICU³². Rest of the 34(97%) patients in this study were discharged after full recovery. There was no mortality in this present study population. In most of the studies involving paediatric COVID-19 disease, mortality was less, like the study done by Chao et al³³, they reported one mortality out of 67(1.49%) patients .

The limitation of this study is small sample size. If it could be done in multiple institutions, then the study would have been better.

Conclusion

Clinical feature of COVID-19 in children differs from adult cases. Although fever and cough are main clinical symptoms, diarrhoea and vomiting are also common presenting symptoms in our study. So gastrointestinal symptoms should be kept in mind while suspecting COVID-19 in children. The outcome is generally favorable although PICU admission is not rare. May be, vaccination against COVID-19 can bring down the incidence in children.

Abbreviations:

COVID-19: Coronavirus disease 2019
HRCT: High resolution computed tomography
RT-PCR: Reverse transcription polymerase chain reaction
PICU: Paediatric Intensive Care Unit
MIS-C: Multisystem inflammatory syndrome in children

References

- Zare-Zardini H, Soltaninejad H, Ferdosian F, Hamidieh AA, & Memarpoor-Yazdi M, Coronavirus Disease 2019 (COVID-19) in Children: Prevalence, Diagnosis, Clinical Symptoms, and Treatment. *International journal of general medicine.*2020; 13, 477–482.
- Jiehao C, Jin X, Daojiang L, Zhi Y, Lei X, Zhenghai Q, et al. A Case Series of Children with 2019 Novel Coronavirus Infection: Clinical and Epidemiological Features. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America.*2020; 71(6), 1547–1551.
- Singhal T. A Review of Coronavirus Disease-2019 (COVID-19). *The Indian Journal of Pediatrics.*2020; 87, 281–286.
- Ding Y, Yan H and Guo W. Clinical Characteristics of Children with COVID-19: A Meta-Analysis. *Front. Pediatr.*2020; 8:431
- Mowla SGM, Azad KAK, Kabir A, Biswas S, Islam MR, Banik GC et al. Clinical Profile of 100 Confirmed COVID-19 Patients Admitted in Dhaka Medical College Hospital, Dhaka, Bangladesh. *J Bangladesh Coll Phys* 2020; 38:29-36
- Chua MSQ, Lee JCS, Sulaiman S, Tan HK. From the frontline of COVID-19 – how prepared are we as obstetricians? A commentary. *BJOG.* 2020; 127: 786– 788
- Lee PI, Hu YL, Chen PY, Huang YC, Hsueh PR. Are children less susceptible to COVID-19? *J Microbiol Immunol Infect.* 2020;53(3):371-372
- Wu Z, McGoogan JM. Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020;323:1239-42
- Viner RM, Mytton OT, Bonell C, Melendez-Torres GJ, Ward J, Hudson L, et al. Susceptibility to SARS-CoV-2 infection among children and adolescents compared with adults: a systematic review and meta-analysis. *JAMA pediatrics.* 2021;175(2):143-56
- Liu W, Zhang Q, Chen J, Xiang R, Song H, Shu S. et al. Detection of Covid-19 in Children in Early January 2020 in Wuhan, China. *The New England journal of medicine.*2020;382(14), 1370–1371
- de Souza TH, Nadal JA, Nogueira RJN, Pereira RM, Brandão MB. Clinical manifestations of children with COVID-19: A systematic review. *Pediatric Pulmonology* 2020;55:1892– 1899
- 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 paediatrics.*2020; 174(9), 868–873
- Tan X, Huang J, Zhao F, Zhou Y, Li JQ, Wang XY. Clinical features of children with SARS-CoV-2 infection: an analysis of 13 cases from Changsha, China. *Zhongguo Dang Dai Er Ke Za Zhi.* 2020;22(4):294-298
- Lu Q, & Shi Y. Coronavirus disease (COVID-19) and neonate: What neonatologist need to know. *Journal of medical virology.*2020; 92(6):564–567
- Mosaddeghi P, Shahabinezhad F, Dehghani Z, Farahmandnejad M, Taghipour MJ, Moghadami M, et al. Therapeutic Approaches for COVID-19 Based on the Interferon-mediated Immune Responses. *Current Signal Transduction Therapy* 2021;16: 1
- Swann OV, Holden KA, Turtle L, Pollock L, Fairfield CJ, Drake TM, et al. Clinical characteristics of children and young people admitted to hospital with covid-19 in United Kingdom: prospective multicentre observational cohort study. *BMJ (Clinical research ed.).*2020; 370: m3249
- Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jiang Z, & Tong S. Epidemiology of COVID-19 Among Children in China. *Pediatrics.*2020; 145(6), e20200702
- Qiu H, Wu J, Hong L, Luo Y, Song Q, Chen D. Clinical and epidemiological features of 36 children with coronavirus disease 2019 (COVID-19) in Zhejiang, China: an observational cohort study. *The Lancet Infectious Diseases* 2020;20(6):689-96
- Sultana M, Chowdhury S, Amin AA. Clinical Profile and Outcome of COVID-19 in Children at a Tertiary Hospital,

- Dhaka. Journal of Bangladesh College of Physicians and Surgeons. 2021; 39(3), 154–159
20. Zimmermann P, Curtis N. COVID-19 in Children, Pregnancy and Neonates: A Review of Epidemiologic and Clinical Features. The Pediatric infectious disease journal 2020; 39(6), 469–477
21. Hoang A, Chorath K, Moreira A, Evans M, Burmeister-Morton F, Burmeister F, et al. COVID-19 in 7780 pediatric patients: A systematic review. E Clinical Medicine. 2020; 24:100433
22. Rahimzadeh G, Ekrami Noghabi M, Kadkhodaei Elyaderani F, Navaeifar MR, Enayati AA, Manafi Anari A, Hujati M, Rezai S, Rezai MS. COVID-19 infection in Iranian children: a case series of 9 patients. Journal of Pediatrics Review. 2020 Apr 10;8(2):139-44.
23. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The lancet. 2020 ;395(10223):497-506
24. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020 ;395(10223):507-513
25. Navaeifar MR, Ghazaghi MP, Shahbaznejad L, Rouhanizadeh H, Abutalebi M, Varandi MR, Rezai MS. Fever with rash is one of the first presentations of COVID-19 in children: a case report. International Medical Case Reports Journal. 2020;13:335.
26. Greene AG, Saleh M, Roseman E, Sinert R. Toxic shock-like syndrome and COVID-19: multisystem inflammatory syndrome in children (MIS-C). The American journal of emergency medicine. 2020 Nov 1;38(11):2492-e5
27. Ludvigsson, JF. Convulsions in children with COVID-19 during the Omicron wave. Acta Paediatr. 2022; 111: 1023–1026
28. Lin Z, Long F, Yang Y, Chen X, Xu L & Yang M. Serum ferritin as an independent risk factor for severity in COVID-19 patients. The Journal of infection. 2020; 81(4), 647–679
29. Liguoro I, Pilotto C, Bonanni M, Ferrari ME, Pusiol A, Nocerino A, Vidal E, Cogo P. SARS-COV-2 infection in children and newborns: a systematic review. European journal of pediatrics. 2020;179(7):1029-46.
30. Lu X, Zhang L, Du H, Zhang J, Li YY, Qu J. et al. SARS-CoV-2 Infection in Children. The New England journal of medicine 2020; 382(17):1663–1665
31. Götzinger F, Santiago-García B, Noguera-Julián A, Lanasa M, Lancelli L, Carducci FI, Gabrovská N, Velizarova S, Prunk P, Osterman V, Krivec U. COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. The Lancet Child & Adolescent Health. 2020;4(9):653-61.
32. Tagarro A., Epalza C., Santos M., Sanz-Santaefemia F. J., Otheo E., Moraleda C., & Calvo C. Screening and Severity of Coronavirus Disease 2019 (COVID-19) in Children in Madrid, Spain. JAMA paediatrics 2020; e201346
33. Chao JY, Derespina KR, Herold BC, Goldman DL, Aldrich M, Weingarten J, Ushay HM, Cabana MD, Medar SS. Clinical characteristics and outcomes of hospitalized and critically ill children and adolescents with coronavirus disease 2019 at a tertiary care medical center in New York City. The Journal of pediatrics. 2020;223:14-9