ORIGINAL ARTICLE

CLINICAL PROFILE AND OUTCOME OF CHILDREN WITH COVID-19 ADMITTED AT EKKA- KOTEBE TREATMENT CENTER

Muluwork Tefera[1], Rahel Argaw[1] , Aklilu Azazh [2], Sisay Tekelu[3] , Aschalew Worku [4] , Menbeu Sultan[5] Weldesenbet Wagaw[5], Berehane Redea[6] , Miraf Walelegn [6] , Sisay Yiferu[6] , Solomon Setotaw [7], Martha Gebreselassie [7], Yeheyes Getachew [7]

ABSTRACT

Background: *Understanding the clinical profile and outcome of pediatrics Coronavirus disease 2019 will help plan better prevention and treatment strategies taking the local context into consideration. The aim of the study is to assess the clinical characteristics and outcome of pediatrics COVID 19 patients admitted to Ekka Kotebe treatment center from March 20, 2020, to August 20, 2020*

Method*: This retrospective study included all children in Addis Ababa who tested positive for COVID-19 and were admitted at Ekka Kotebe treatment center from March to August 2020. The data was collected from the patient records of the participants who fulfilled the inclusion criteria. The collected data was analyzed using SPSS for windows version 25. The sociodemographic, clinical presentation and their outcome was analyzed using descriptive analysis for each data was done. The finding was presented in tables and graph.*

Result*: A total of 87 children were included in the study, of these 71 (81.6%) were from Addis Ababa. 64.8% (n = 57) of participants were male with a mean age of 10.8years while 11% (n = 10) were infants. About 45.5% (n = 40) had history of household contact. Comorbidities were noted in 10.3% (n = 9) children. More than two third (72.7 %, n = 64) of participants were asymptomatic. Of the 23 symptomatic children, fever (65%, n = 15) was most common followed by cough (6.8%, n = 6), sore throat (2.3%, n = 2). 69.3% (n = 61) stayed for more than 14 days but one of the participants had a fatal outcome.*

Conclusion: *Important number of children with COVID-19 had a household contact and presented asymptomatic or with a mild illness. Severe and critical illness were observed in those with comorbidity.*

Keywords: *Coronavirus disease 2019; severe acute respiratory syndrome coronavirus 2; Ekka-Kotebe, Ethiopia, Childhood/Children, Pediatrics.*

[1] Department of Pediatric and Child Health, Addis Ababa University, College of Health Sciences, Addis Ababa, Ethiopia
[2] Department of Emergency, Addis Ababa University, College of Health Sciences, Addis Ababa, Ethiopia
[3] Department of Gynecology , Addis Ababa University, College of Health Sciences, Addis Ababa, Ethiopia
[4] Department of Internal Medicine, Addis Ababa University, College of Health Sciences, Addis Ababa, Ethiopia
[5] Department of Emergency , Saint Paul Hospital millennium Medical College, Addis Ababa, Ethiopia
[6] Federal Ministry of Health, Addis Ababa, Ethiopia
[7] Ekka Kotebe Hospital, Addis Ababa, Ethiopia
Corresponding author: Muluwork Tefera , email: muluworktef@yahoo.com

INTRODUCTION

Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) causing coronavirus disease (COVID-19) has spread globally, posing immense challenges to every country's healthcare system (1).

The first adult case in Ethiopia was reported on March 1, 2020, at 48 years old Japanese man reported to have traveled from Japan to Burkina Faso and who then arrived in Ethiopia. By September, the number of cases has steadily increased to reach 75,360. As of September 8, children under the age of one represented 1% of the total caseload; children under the age of five made up 2% of the total caseload, and children aged 5-14 made up 4% of all positive COVID-19 cases. The overall positive cases were 28 percent as of the data released by the Ethiopian Public Health Institute (EPHI) in the COVID-19 Daily Situation Report of 2nd of January 2022.

In the first reports of coronavirus disease 2019 (COVID-19), the frequency of disease in children was lower than in adults. In a study in China, until January 29, 2020, less than 1% of all patients were younger than 14 years (2). For this reason, most of the guidelines focused on recommendations for adult patients, only a few recommendations were for children. Even though most patients were adults, few children presented with severe COVID 19 illness and needed hospitalization. In addition, children's immune response and the structural characteristics of their respiratory system differ essentially from those in adults (3–5) because of this the diagnostic criteria and management of children may not be similar with adults. There were reports from developed nations that only (1.7%) were children aged < 18 years. The previous findings in children with COVID19 might not have reported fever or cough as often as adults(6–8). However, since then more data has come out showing increased risk in children such as from the CDC whose data as of December 30, 2021, showed 15.8% of the cases in the United States were under the age of 18. (9)

Despite some publications, there is a scarcity of data on pediatric COVID 19 clinical presentation and outcome especially from developing nations, hence this research is aimed to determine the clinical characteristics and outcome of pediatric COVID 19 patients admitted to the dedicated treatment center in Ethiopia.

Materials and methods:

This was a retrospective study conducted at the dedicated COVID treatment center in Addis Ababa, Ethiopia. The study protocol was approved by Institute Ethics Committee. All consecutive children aged less than 18 years who tested positive for SARS-CoV-2 by real time reverse transcription-polymerase chain reaction (RT-PCR) from nasopharyngeal swab between March 2020 and August 2020 were included in the study.

The severity of COVID-19 is categorized as mild, moderate, severe, and critical based on clinical and/or radiological features (10). Mild cases included children with only upper respiratory symptoms. Children with lower respiratory involvement (clinical or radiological signs of pneumonia) but without signs of severe pneumonia or hypoxemia were categorized as moderate disease. Severe disease included children with clinical features of severe pneumonia and/or hypoxemia (SpO2 < 90% on room air) and those with severe diarrhea and dehydration. Presence of acute respiratory distress syndrome (ARDS) and/or multiorgan dysfunction was classified as critical disease. This study included children with all severity including asymptomatic children as per the prevailing admission policy.

The source data were the clinical charts, nursing records, for all patients with laboratory confirmed COVID 19 infection who were admitted to Ekka Kotebe hospital from March to August 2020. Clinical characteristics and treatment outcomes data was obtained by pre-tested data collection tool. The data was collected by two experienced data collectors from patient records after receiving training in data collection. For the purpose of data quality assurance, the data was checked for completeness on daily basis.

The collected data was coded, double-checked, and inputted into EPI-DATA version 3.0 computers and was analyzed using SPSS version 25. Descriptive statistics like mean, median, percent, frequency were applied to generate results.

Inclusion criteria:

All patients below the age of 18 years who were confirmed cases of COVID 19 were admitted to the treatment center during the study period.

Exclusion criteria:

Missed medical records and charts with incomplete data.

Ethical considerations

Ethical approval was secured from Ekka Kotebe Ethics Review Committee. Primarily the data was collected from the patient charts. For confidentiality purposes, the name of the participant was omitted from the data collecting tool and the chart was seen by the principal investigator. The information collected was kept confidential and was used only for the study purpose and maintained the data on the locked cupboard.

Result:

Socio-demographic and clinical characteristics

A total of 87 children admitted to the center were included in this study. The mean age was 10.8 years with a standard deviation of 5.7 years, 11% (10/87) of the participants were infants (<1 year), more than half (59.8%) of the participants were >10 years old. Almost half ($n = 40$, 45%) had a history of household contact. Three out of eighty-seven children (3.45%) had a travel history

abroad. Almost half of the participants (n= 42, 47%) had been vaccinated for their routine childhood vaccinations according to their age. Comorbidities were noted in 10.2% (n = 9) of the children. Almost three fourth (72.7%) were asymptomatic and admitted in the initial phase as a measure of isolation and for monitoring. Of the 23 symptomatic children, fever (62.5%) was the most common symptom followed by cough (25%). The majority (81.6%) of the participants were from Addis Ababa.

Table 1: Socio-demographic, clinical characteristics of patients admitted to Ekka Kotebe COVID 19 treatment center (n=87)

Characteristics		**Number**	**Percent**
Age	<1year	10	11.5%
	1-<5 years	7	8%
	5-10years	15	17.2%
	>10years	55	63.2%
Sex	Male	57	65.5%
	Female	30	34.5%
Type of contact	Family	40	46%
	Neighbor	5	5,7%
	International Travel history	3	3.4%
	Prison	7	8%
	Hospital admission	5	5.7%
	Workplace	1	1.1%
	Unknown	26	29.9%
Residency	Addis Ababa	71	79%
	Out of Addis Ababa	10	11.5%
	Unknown	6	6.8%
Routine childhood Vaccination status	Vaccinated	42	48.3%
	Partially vaccinated	3	3.4%
	Unvaccinated	26	29.9 %
	Unknown	16	18.4%
Symptomatology	Symptomatic	23	26.4%
	Asymptomatic	64	73.6%
Symptoms n=23	Fever	15	65.2%
	Cough	6	26.1%
	Sore throat	2	8.7%
	Total	87	100%

In the first two months after COVID 19 was first detected in the country, the number of a patients diagnosed to have COVID was small. A high number of participants were seen in the month of May in comparison to the other months.

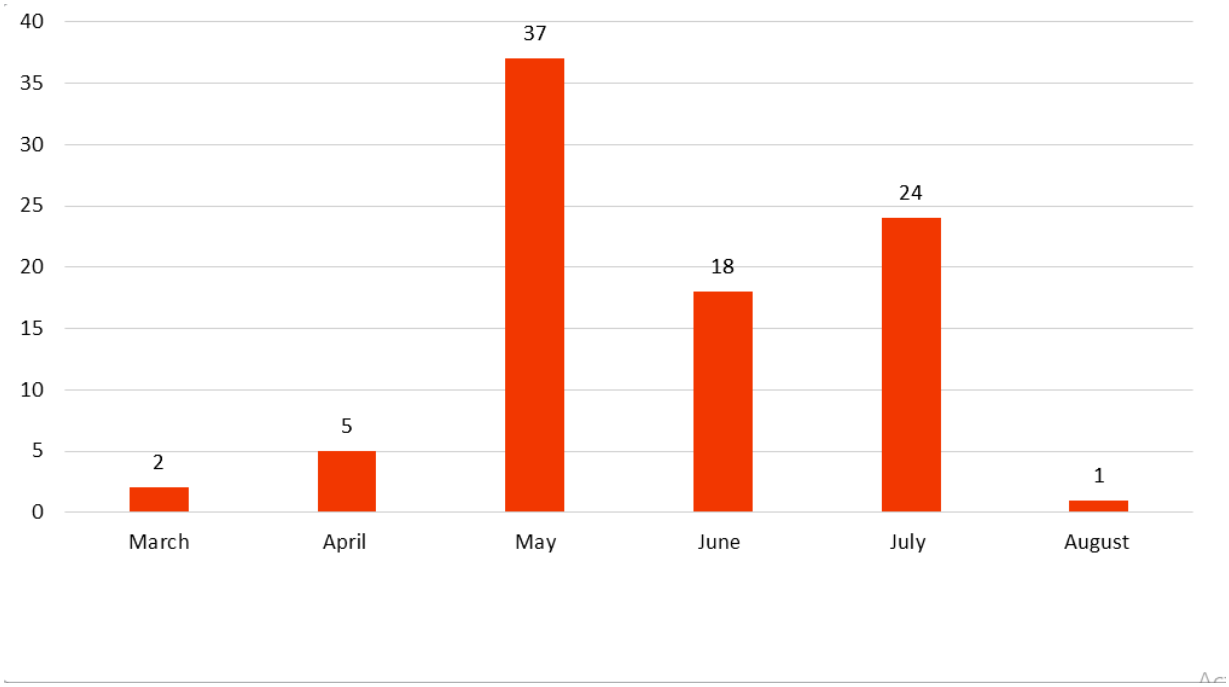

Figure 1: Number of children with COVID-19 admitted to the treatment center in each month at Ekka Kotebe treatment center (n=87)

The severity classification of COVID-19 was as follows; asymptomatic ($n = 61$, 70.1%), mild (n=23, 26.4%), moderate (n = 1, 1.1%), severe ($n = 1$, 1.1%), critical (n = 1, 1.1%). One child had underlying congenital heart disease with pneumonia another child had congenital heart disease and the critical patient who had a fatal outcome was a known non-Hodgkin's lymphoma patient. Almost all patients were admitted to the isolation ward but only one patient was admitted to the high dependency unit. Antibiotics (ceftriaxone and/or azithromycin) were used in 9 children. For one patient steroids were given. With an outcome of 86 children discharged improved, and 1 (1.1%) death. Length of hospital stay was less than14 days for 24 participants and more than14 days for 62 participants.

Table 2: Treatment and outcome of patients admitted to Ekka Kotebe COVID 19 treatment center (n=87)

Variables	Characteristics	Percent
Level of care		
Isolation ward	86	98.8%
High dependent unit	1	1.2%
Oxygen saturation		
< 85	6	6.9
85-90	15	17.2
>90	66	75.9
Outcome		
Discharged	86	98.9%
Died	1	1.1%
Length of stay		
< 14 days	25	28.7%
>14 days	62	7.13%
Severity of manifestation		
Asymptomatic	64	73.6
Mild	21	24.1%
Moderate	1	1.2%
Sever	0	0%
Critical	1	1.2%

DISCUSSION

Out of 87 RT-PCR confirmed COVID 19 cases of children admitted at Ekka Kotebe treatment center, between the month of March and August 2020, out of these 36.7% were children aged between 11 and 15 years. This finding is similar to a study conducted in U.S and Canada (11).

In the current study, death among the study population was very low (1.2%). This is similar with a study done by Jun Yasuhara showed no death report (12). But there were discordant in a study conducted in the United Kingdom and North America which had mortality rates of 1% and 4% respectively (13) which could be explained by the large sample size in their studies and admitted symptomatic patients.

More than two-thirds (65.5%, n = 57) of our study participants were males that is similar with another study done in Egypt male admission was predominant (14), while another study in China showed no difference in sex (10). Our study finding showed that the majority (73.6%) of the patients were

asymptomatic and 24.1% of children presented with mild symptoms and one of the participants (1.2%) developed a critical case, which is contrary to another study (11) that revealed a considerable proportion of children were diagnosed with a severe and critical illness with a need for Intensive care unit admission and invasive ventilation the explanation could be 83% participants from the US and Canada study had comorbidities.

Children are a very special group as they are much more dependent on their family as such inevitably having close family contacts, and so may be susceptible to cross-infection. Forty- six percent (40/87) of the participants in this study acquired the infection from their family, with one or more family members were infected which was similar to other studies (15)(16) were (68.6%) and another meta-analysis (16) of 39 studies showed 90% of children demonstrated clear evidence of transmission from a family member. Children with COVID-19 have prominently been reported to be either asymptomatic or with mild clinical symptoms compared to adults. That suggested pediatric patients generally have less severe symptoms than adults as shown in many studies (4,5,7,17). Our study has found similar findings the majority (73.6%) of the participants were asymptomatic at presentation, while discordant with a systemic review of 39 studies (18) which showed only 14.2% were asymptomatic children. The commonest symptom in this study was fever accounting for 65.2%, followed by 26% cough and sore throat 10%. In comparison to our study fever was found in 51.2% and cough was higher seen in 37% in the systemic review (13). While a study done in China showed fever was the presenting symptom in 77.9% and cough was in 32.4% of the study population (19),

Newborns acquire COVID 19 infection horizontally from their mother (13,19). In our study, there were 6 newborns admitted to the treatment center with most of them being asymptomatic. All of them were discharged with improvement. The finding was similar to the study done in China (20) where no fatal cases were reported in infants <28 days.

The major limitations of this study were that it was based on retrospective data with missing or incomplete data from the health facilities being a major problem.

Conclusion

A significant number (46%) of children with COVID-19 had a household contact and presented asymptomatic or with a mild illness. Severe and critical illnesses were observed in those who had comorbidities. Almost all had a good outcome with recovery leading to a hospital discharge however there was one death.

Reference

1. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. Acta paediatrica. 2020 Jun;109(6):1088-95.

2. Alhazzani W, Møller MH, Arabi YM, Loeb M, Gong MN, Fan E. & Du, B.(2020). Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). Intensive care medicine.:1-34.
3. Cao Q, Chen YC, Chen CL, Chiu CH. SARS-CoV-2 infection in children: Transmission dynamics and clinical characteristics. Journal of the Formosan Medical Association. 2020 Mar;119(3):670.
4. Zhang YH. Zhonghua er ke za zhi= Chinese Journal of Pediatrics 58. E006. 2019.
5. Wu J, Wu X, Zeng W, Guo D, Fang Z, Chen L, Huang H, Li C. Chest CT findings in patients with coronavirus disease 2019 and its relationship with clinical features. Investigative radiology. 2020 May;55(5):257.
6. Shen KL, Yang YH. Diagnosis and treatment of 2019 novel coronavirus infection in children: a pressing issue. World Journal of Pediatrics. 2020 Jun;16(3):219-21.
7. Chen ZM, Fu JF, Shu Q. New coronavirus: new challenges for pediatricians. World Journal of Pediatrics. 2020 Jun;16 (3):222-.
8. Lowe J, Rumbold B, Aoun SM. Memorialisation during COVID-19: implications for the bereaved, service providers and policy makers. Palliative Care and Social Practice.2020 Dec; 14: 2632352420980456.
9. Woodruff RC, Campbell AP, Taylor CA, Chai SJ, Kawasaki B, Meek J, Anderson EJ, Weigel A, Monroe ML, Reeg L, Bye E. Risk factors for severe COVID-19 in children. Pediatrics. 2022 Jan 1;149(1).
10. Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jiang Z, Ton S. Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China. Pediatrics. Advance online publication.
11. Shekerdemian LS, Mahmood NR, Wolfe KK, Riggs BJ, Ross CE, McKiernan CA, Heidemann SM, Kleinman LC, Sen AI, Hall MW, Priestley MA. Characteristics and outcomes of children with coronavirus disease 2019 (COVID-19) infection admitted to US and Canadian pediatric intensive care units. JAMA pediatrics. 2020 Sep 1;174(9):868-73.
12. Swann O, Holden K, Turtle L, Pollock L, Fairfield C, Drake T, Seth S, Egan C, Hardwick H, Halpin S, Girvan M. Clinical characteristics of children and young people hospitalised with covid-19 in the United Kingdom: prospective multicentre observational cohort study.
13. Guo CX, He L, Yin JY, Meng XG, Tan W, Yang GP, Bo T, Liu JP, Lin XJ, Chen X. Epidemiological and clinical features of pediatric COVID-19. BMC medicine. 2020 Dec;18(1):1-7.

14. Saleh NY, Aboelghar HM, Salem SS, Ibrahem RA, Khalil FO, Abdelgawad AS, Mahmoud AA. The severity and atypical presentations of COVID-19 infection in pediatrics. BMC pediatrics. 2021 Dec;21(1):1-1.

15. Adam KM, Elamin BK, Alfaifi JA, Abbas M. Clinical Determinants and Predictors for Prognosis of SARS-CoV-2 Infected Pediatric Patients in Saudi Arabia. medRxiv. 2021 Jan 1.

16. Ewing C. 'Color Him Black': Erotic Representations and the Politics of Race in West German Homosexual Magazines, 1949-1974. Sexuality & Culture. 2017 Jun 1;21(2).

17. de Souza TH, Nadal JA, Nogueira RJ, Pereira RM, Brandão MB. Clinical manifestations of children with COVID-19: a systematic review. Pediatric pulmonology. 2020 Aug;55(8):1892-9.

18. Leulseged TW, Hassen IS, Maru EH, Zewde WC, Chamiso NW, Edo MG, Abebe DS, Aliy MA. COVID-19 in Hospitalized Ethiopian Children: Characteristics and Outcome Profile. medRxiv. 2021 Jan 1:2020-10.

19. Chamseddine RS, Wahbeh F, Chervenak F, Salomon LJ, Ahmed B, Rafii A. Pregnancy and neonatal outcomes in SARS-CoV-2 Infection: a systematic review. Journal of pregnancy. 2020 Oct 7;2020.

20. Liu Y, Chen H, Tang K, Guo Y. Withdrawn: clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy. The Journal of infection. 2020 Mar 5.