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Clinical Profile, Hospital Course and Outcome of Pediatric patients with COVID 19 during Second Wave Admitted to a Tertiary Care Center in Western Maharashtra, India

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Abstract:
Background: *The COVID-19 pandemic, is an ongoing global caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus was first identified in December 2019 in Wuhan, China. The World Health Organization declared a Public Health Emergency of International Concern regarding COVID-19 on 30 January 2020, and later declared a pandemic on 11 March 2020. The first case of the COVID-19 pandemic in the Indian state of Maharashtra was confirmed on 9 March 2020. Severe COVID-19 disease mainly affects adults and otherwise healthy children and young adults appear to be relatively spared. The aim of this study was to describe spectrum of COVID-19 during second Wave in children.* ***Materials and Methods****: Hospital based retrospective observational study, we included pediatric patients with confirmed COVID-19 who were admitted to the tertiary care center in the western Maharashtra from September 2020 to May 2021.All patients were confirmed by either SARS-CoV-2 RTPCR test or covid Rapid antigen test.* ***Results:*** *Among the 84 patients with COVID-19, the most common symptoms were fever (67.8%), cough (42%), loose stools (16.7%), vomiting (15.5%), decreased oral intake (15.5%). The most common signs were pallor (31%), irritability (29%). tachycardia (26%), tachypnea (22%), chest retractions (19%), pharyngeal erythema (14.3%), conjunctival hyperemia (14.3%). Some children required specific therapy like Steroids 6(7.14%), IVIG 11(13.1%) and Remdesivir 1(1.2%). 79(94.05%) of the children were discharged and 5(5.95%) of the admitted children died. All 5 children who died had comorbidities.*
Conclusion: *Clinicians should recognize that the clinical spectrum of COVID-19 in children is wider than previously described, often with nonspecific signs and symptoms. Gastrointestinal symptoms should raise suspicion. Children with comorbidities are at higher risk of mortality from COVID-19* ***Keywords:*** *COVID-19, Second wave, Children, clinical spectrum, Mortality*

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I. Introduction

The COVID-19 pandemic, also known as the corona virus disease, is an ongoing global pandemic of coronavirus disease-19 (COVID-19), which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus was first identified in December 2019 in Wuhan, China. The World Health Organization declared a Public Health Emergency of International Concern regarding COVID-19 on 30 January 2020, and later declared a pandemic on 11 March 2020. [1] Most people infected with the COVID-19 virus

experience mild to moderate respiratory illness and recover without requiring special treatment. There is little doubt that the consequences of the current severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic on healthcare, infrastructure as well as on our socio-economic life will be severe and long-lasting. The high infectivity of this "new" virus variant, a high frequency of asymptomatic carriers, the lack of herd immunity and a range of rare presentations, including fatal cytokine storms, are posing major challenges. [2]

Maharashtra is a hotspot that accounts for nearly 22.35 % of the total cases in India as well as about 30.55 % of all deaths and Pune is the worst-affected city in Maharashtra.[3] Fortunately ,severe COVID-19 disease mainly affects adults and otherwise healthy children and young adults appear to be relatively spared. Reports on COVID-19 disease showed that less than 1% of the cases were in children younger than 10 years of age. In contrast with infected adults, most infected children appear to have a milder clinical course. From the beginning of the COVID-19 pandemic, it has become evident that the spectrum of manifestations in children is different from those seen in adults. However, most of the clinical descriptions have been made from retrospective studies addressing a narrow number of manifestations. A meta-analysis [4] and a systematic review [5] evaluated fewer than ten signs and symptoms. The aim of this study was to describe spectrum of COVID-19 in children in second wave of pandemic.

II. Material and Methods

This is a hospital based, retrospective, observational study conducted in the dedicated covid hospital of a tertiary care teaching hospital from September 2020 to May 2021 from Western Maharashtra. We included patients less than12years of age, of either sex, fulfilling the following criteria: a) one respiratory symptom, b) one gastrointestinal symptom or c) fever and recent exposure to a confirmed COVID-19 case. All cases were tested with either severe acute respiratory syndrome coronavirus-2 (SARS-Co-V-2) reverse transcriptase - polymerase chain reaction (RT-PCR) nasopharyngeal swabs or covid rapid antigen test. A semi-structured questionnaire was used to obtain information including demographic information (age, sex, and geographic location), medical history, exposure history, clinical features (signs and symptoms at admission, dates of admission and diagnosis) were collected by attending physicians. Gastrointestinal symptoms were defined as the presence of diarrhea, vomiting, nausea or abdominal pain. Laboratory investigations were performed in all positive children. Complete hemogram (CBC), liver (LFT)and renal function tests (RFT), C-reactive protein (CRP), chest radiograph, and RT-PCR for COVID-19 were the commonly ordered tests. Steroids and other drugs were used on a case-to-case basis. Antibiotics were prescribed as per the antibiotic policy of our hospital in children who were assessed to be at high risk of bacterial infection by the treating clinician Data was collected from the case files and electronic records on a pre-designed case record form. Information regarding demographic and clinical details including age, sex, history of contact, type of contact, immunization status, co-morbidities, clinical features and laboratory investigations were recorded. Severity of illness, respiratory involvement, chest imaging findings, type of respiratory support, use of antibiotics, steroids and vasoactive drugs were noted. Outcome included length of hospital stay, recovery and deaths.

We analyzed the data from the COVID-19 confirmed patients; the information was analyzed using case counting and descriptive statistics, and calculating percentages.

III. Results

We evaluated a total of 84 children. Their demographic profile is shown in table 1. Table 2 depicts the distribution of symptoms among these 84 children while table 3 demonstrates the symptoms and clinical signs.

(**Table 1**) Demographic Data

	Age	Total patients(N=84)
Age	Neonates	8(9.5%)
	1month to 1 year	34(40.5%)
	1 to 5years	17(20.23%)
	More than 5years	25(29.61%)
Sex	Male child	46(54.8%)
	Female child	38(45.23%)
Contacts	Household contacts	68(80.95%)
	Health Care Parents	16(19.05%)
Residence	Pune district	78(92.86%)
	Other districts	6(7.14%)
Immunization status	Complete For age	59(77.6%))
	Partial	14(18.4%)
	Not Known	3(3.9%)

(**Table2)** Symptomatology and Distribution of Symptoms

		n (%)
Asymptomatic patients (n=18)		18(21.4%)
Symptomatic patients (n=66)	Mild febrile illness	9(10.7%)
	Only Respiratory symptoms	39(46.43%)
	Only Gastrointestinal	05(5.95%)
	Both respiratory and gastro intestinal	13(15.48%)

(Table 3) Clinical spectrum of COVID positive admitted children

Symptoms	n (%)	**Signs**	n (%)
Fever	57(67.86)	Conjunctival Hyperemia	12(14.29)
Cough	36(42.86)	Pharyngeal erythema	12(14.29)
Running nose	36(42.86)	Hoarseness of voice	3(3.57)
Vomiting	13(15.48)	Irritability	25(29.76)
Loose stool	14(16.67)	Rash	04(4.8)
Decreased intake	13(15.48)	Dehydration	3(3.57)
Throat pain	05(5.95)	Chronic medical illness	15(17.85)
Body ache	04(4.77)	Tachycardia	22(26.19)
Headache	06(7.14)	Tachypnoea	19(22.62)
Eye pain	01(1.19)	Hypotension	05(5.95)
Seizure	04(4.76)	Respiratory support	20(23.81)
Hyposmia	07(8.33)	Pallor	26(30.95)
Dysgeusia	05(5.95)	Rhonchi	04(4.8)
		Crepitations	11(13.1)
		Stridor	1(1.2)
		Grunt	3(3.6)

Among the 84 enrolled children, 60 children (71.5%) were diagnosed with COVID-19 infection by a positive SARS-CoV-2 RT-PCR test and 24 children (28.5%) were diagnosed with COVID-19 by Rapid antigen test. Out of 60 RTPCR positive children,8 were neonates, of which 6 were Nasopharyngeal swab positive while one each was umbilical stump and placental swab positive.

Graph 1 demonstrates the number of children with comorbidities who were COVID positive.

(**Graph 1**) Preexisting Co-morbidities Among COVID-19 Enrolled patients

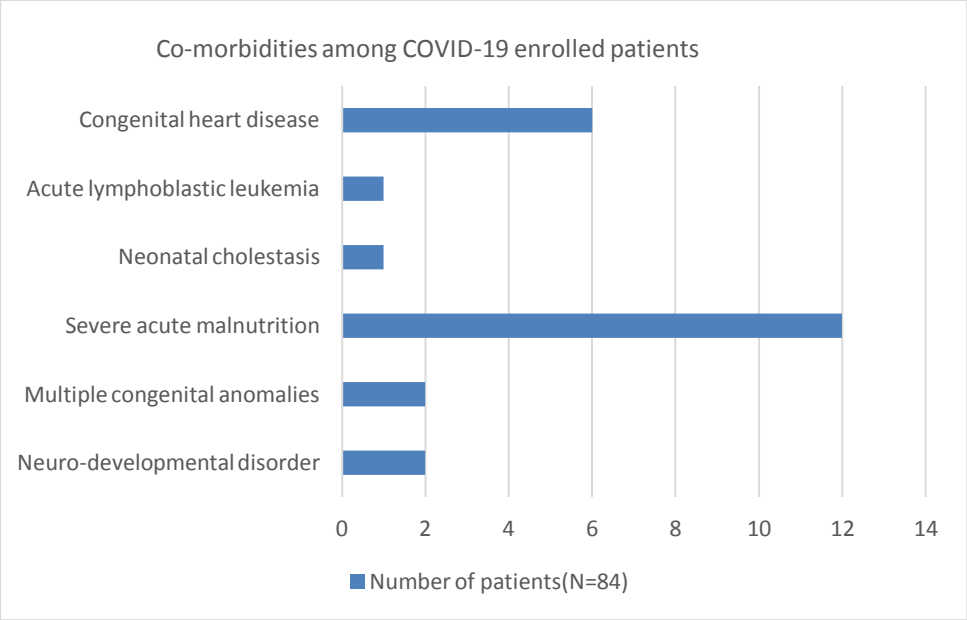

Table 4 and table 5 show the blood investigations profile and outcomes respectively.

(Table 4) Hematological and Biochemical Profile

Variables	Mean +/- Sd
Hemoglobin(gm/dl)	11.08+/-2.79
Total Leucocyte Count (X 10^9 /L)	12.5+/- 8.3
Platelet Count(X10^9/L)	292 +/-110
LDH (Iu/L)	635 +/- 391
Ferritin (Ng/ml)	228+/- 478
CKMB(Iu/L)	39+/- 24
D Dimer (Mg/L)	2+ /-3.7
Amylase (Iu/L)	32+/- 25
Urea (Mg/Dl)	23.1+/- 15
Creatinine (Mg/Dl)	0.71+/- 0.2
Sodium (Mmol/L)	135+/- 5.2
Potassium (Mmol/L)	4.2+/- 0.5
SGOT(U/L)	43.1+/- 49
SGPT(U/L)	35.1+/- 30
Bilirubin Total (Mg/Dl)	0.44+/- 0.34
Bilirubin Direct (Mg/Dl)	0.23+/- 0.19
Albumin (Gm/Dl)	4.01+/-0.96
Prothrombin Time (Sec)	16.01+/-8.9
INR	1.225+/-0.67

(Table 5) Hospital Course and Outcome Among Enrolled Covid-19 Positive Children

	Level of care	N(%)
Level of Care	Isolation ward	56(66.6)
	ICU	20(23.81)
	SNCU ward	8(9.5)
Organ support therapy	Respiratory Support	20(23.81)
	1) Supplemental Oxygen	5(5.9)
	2) Indigenous Bubble CPAP	9(10.7)
	3) Mechanical Ventilation	6(7.1)
	Inotropes	7(8.33)
Specific therapy	Steroids	6(7.14)
	IVIG	11(13.1)
	Remdesivir	1(1.2)
Outcome	Discharged	79(94.05)
	Death	5(5.95)
	Average hospital stay	8.27+/- 2.84 days

All the five children who died of COVID-19 had underlying medical conditions as below:

1. Acute lymphoblastic leukemia with acute respiratory distress syndrome
2. Global developmental delay with epilepsy with operated congenital heart disease with cleft lip and cleft palate.
3. Neonatal cholestasis (decompensated liver failure) with gross ascites
4. Severe acute malnutrition with anemia
5. Suspected Aicardi syndrome (congenital heart disease with corneal opacity with failure to thrive with bronchopneumonia with seizures) (Graph 1).

IV. Discussion

Our study confirms the previous studies which show fever, respiratory and gastrointestinal symptoms as the presenting symptoms in most children with COVID. We found a few children with unusual symptoms like seizures, hyposmia and dysgeusia in our study. The clinical suspicion of SARS-CoV-2 infection in children has been a challenge for physicians worldwide. Many case series have been published; however, most of them are retrospective and collect few clinical features. A broader description of the disease is of paramount importance for the clinical suspicion of SARS-CoV-2 infection in children.

In another study from Pune [6], out of 158 confirmed COVID-positive pediatric cases, there were 104 (65.83%) symptomatic cases and 54 (34.17%) were asymptomatic positive. Fever was seen in 49 cases, cough in 21 cases, shortness of breath in 6 cases, rhinorrhea in 7 cases, nausea/vomiting in 7 cases, abdominal pain in 4 cases, diarrhea in 6 cases, sore throat in 3 cases, and headache in 1 case. In this study, fever was seen as a major presentation followed by respiratory complaints followed by gastrointestinal symptoms which is similar to our study. However, the proportion of children with severe disease was much less and they did not report unusual symptoms.

A systematic review of 27 studies found fever (41%–58%) followed by cough (39%–51%) and rapid breathing (6%–17%) as the chief presenting symptoms. Gastrointestinal symptoms, particularly diarrhea was noted in 6%–13% children [7] ,similar findings are found in the present study. In addition to the common symptoms of fever and cough; rash ,convulsions, unconsciousness and reduced Oxygen saturation were found in a study from Bangladesh [8] . Though similar findings were observed in the present study, the proportion of children who had these symptoms and signs were much lesser.

None of the children in our study received hydroxychloroquine or other repurposed antiviral drugs. Use of other therapies are reported more widely in adults and in varying proportions as per severity of illness, hospital policy and local availability. Effectiveness of these agents may depend on timing of administration with respect to the course of illness and host characteristics and this finding was similar to that of Nallasamy et al [9]. There is insufficient data to include them as standard care.

V. Conclusion

At the start of the pandemic, most children with COVID-19 had a household contact and presented with asymptomatic or mild illness and there were negligible deaths observed among the pediatric population as per literature. However, no adequate data is available about second wave of pandemic, which is focused in present study. In our study, death was observed in children with preexisting co-morbidities. Severe and critical illness required organ support care, majority had good outcome in the form of recovery and were discharged without any symptoms. Clinicians should recognize that the clinical spectrum of COVID-19 in children is wider than previously described, often with nonspecific signs and symptoms and gastrointestinal symptoms should raise suspicion. Vaccination could prevent severe disease and death in children with comorbidities and should be considered on priority in these children. High index of suspicion and early aggressive management could prevent morbidity and mortality in these children.

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