

Original Research Paper

CLINICAL PROFILE AND OUTCOME OF PEDIATRIC COVID-19 DURING 3RD WAVE IN PATIENTS IN A GOVERNMENT TERTIARY CARE HOSPITAL IN SOUTH INDIA

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Article Received: 24-08-2022**Revised:**14-09-2022**Accepted:** 04-10-2022**ABSTRACT:**

Introduction: COVID-19 causes respiratory system involvement in adults, leading to pneumonia and severe acute respiratory syndrome in the most severe cases. In contrast, COVID-19 related infections are still poorly understood and are milder in children. The objective of this study was to evaluate the clinical profile and outcome in children infected with SARS-CoV-2 during the 3rd wave of covid 19 pandemic. **Material and methods:** This retrospective observational study was undertaken at a tertiary care paediatric teaching hospital in Southern India. Forty-five children with COVID-19 illness from 3 months to 12 years were assessed for clinical characteristics and presentation. **Results:** 45 children were COVID positive, were The highest number of cases in the 3 years and below age group (Table 1). There were 23 females (51.1%) and 22 males (48.9 %) in the study. Twenty four children had a positive contact history, while none had a positive travel history. In severity, nine (20 %) children were asymptomatic, while the rest, 36 (80 %), were symptomatic. Respiratory (51.1%), fever (13.3 %) and neurological (13.3 %) were the most frequently reported symptoms. **Conclusion:** In concurrence with many other studies in different geographical locations, the present study also showed that children exhibited milder and similar symptoms as previous waves. No adverse health outcomes were noted.

Keywords: COVID -19, children, SARS-CoV-2 infection, third wave, Coronavirus infections

INTRODUCTION:

The sickness caused by the novel coronavirus, severe acute respiratory system coronavirus-2 (SARS-CoV-2), is COVID-19. This virus first appeared towards the end of 2019 in the Chinese city of Wuhan swiftly expanded throughout Europe, the United States, and the rest of the world. The World Health Organization (WHO) declared it a pandemic in March 2020. ^{1,2} COVID-19 causes respiratory system involvement in adults, leading to pneumonia and severe acute respiratory syndrome in the most severe cases. In contrast, COVID-19 related infections are still poorly understood and are milder in children. Further, a child's body reacts to the disease differently than that of an adult. The milder symptoms of COVID-19 may be because of children's undeveloped immune systems, as they are still developing their Band T-cell pool. As a result, they are better prepared to deal with wholly novel antigens, such as SARS-CoV-2, than the elderly because they have less lymphocytes. Thus, a wide range of clinical manifestation, severity, and mortality rates across the age range has been noted in children. ^{1,2,3} India has reported over 33 million infections and

over 450,000 deaths since the first instance of SARS-CoV-2 infection. The first wave of SARS-CoV-2 infection occurred from March to September 2020, followed by the second phase from February to May 2021, where a significant increase in the number of cases was observed. The third wave was witnessed from November 2021 to February 2022. Various studies on the effect of COVID-19 on children during the two waves have researched the clinical manifestations and outcomes. ^{4,5,6} However, studies on the effect of third-wave on children are scanty. Hence, this study aimed to study the clinical profile and outcome in children infected with SARS-CoV-2 during the 3rd wave of the COVID-19 pandemic.

MATERIAL AND METHODS:

This retrospective observational study was undertaken at a tertiary care paediatric teaching hospital in Southern India. The clinical characteristics and presentation data of children with COVID-19 illness from Nov 2021 to Feb 2022 were reviewed and analyzed. Institutional ethical review board clearance was obtained before the commencement of the study.

Forty-five children (3 months – 12 years) who reported to the fever clinic and those who tested positive for SARS-CoV-2 infection were included in the study. **Data were obtained from hospital clinical records, SARS-CoV-2 testing laboratory records and discharge summaries.**

RESULTS:

Totally 45 children who were COVID positive were The highest number of cases noted in the 3 years and below age group (Table 1). There were 23 females (51.1%) and 22 males (48.9 %) in the study. Twenty four children had a positive contact history, while none had a positive travel history. Regarding severity, nine (20 %) children were asymptomatic, while the rest, 36 (80 %), were symptomatic. Respiratory (51.1%), fever

(13.3 %) and neurological (13.3 %) were the most frequently reported symptoms, as demonstrated in Table 2. All the cases were hospitalized. The duration of hospitalization lasted from 1 day to 8 days. Thirty-two (71.1 %) had less than five days of hospitalization, while 13 (28.9 %) had more than 6 days. The mortality rate of patients with SARS-CoV-2 was nil. No statistically significant difference was verified in the duration of hospitalization between < 5 days and >6 days, and the association of symptoms with a duration of hospitalization, as represented in tables 3 and 4. Four children had co-morbidities: seizure disorder/developmental delay, congenital laryngotracheomalacia, wheezing and seizure disorder/HIE sequel.

Table 1: Age groups

Age group	Frequency	Percent
<3	23	51.1
3.1-6	8	17.8
6.1-9	5	11.1
>9.1	9	20.0
Total	45	100.0

Table 2: Clinical presentation

Presentation	Frequency	Percent
Fever	6	13.3
Gastrointestinal	1	2.2
Neurological	6	13.3
Respiratory	23	51.1
NIL	9	20.0
Total	45	100.0

Table 3:

Symptoms		Duration of stay		Total	P-value
		<5	>6		
Asymptomatic	Count	7	2	9	0.622
	% within Symptoms	77.8%	22.2%	100.0%	
Symptomatic	Count	25	11	36	
	% within Symptoms	69.4%	30.6%	100.0%	
Total	Count	32	13	45	
	% within Symptoms	71.1%	28.9%	100.0%	

Table 4:

Presentation		Duration of stay		Total	P-value
		<5	>6		
Fever	Count	4	2	6	0.079
	% within Presentation	66.7%	33.3%	100.0%	
Gastrointestinal	Count	0	1	1	
	% within Presentation	0.0%	100.0%	100.0%	
Neurological	Count	2	4	6	
	% within Presentation	33.3%	66.7%	100.0%	
Respiratory	Count	19	4	23	
	% within Presentation	82.6%	17.4%	100.0%	
NIL	Count	7	2	9	
	% within Presentation	77.8%	22.2%	100.0%	
Total	Count	32	13	45	
	% within Presentation	71.1%	28.9%	100.0%	

DISCUSSION:

The World Health Organization (WHO) designated COVID-19 a pandemic on March 11, 2020. Since then, any patient presenting with fever, respiratory symptoms, gastrointestinal symptoms, and fatigue should be considered a potential case of SARS-CoV-2 infection. Diagnosis of COVID-19 is based on real-time polymerase chain reaction (RT-PCR) from the samples obtained from nasopharyngeal, oropharyngeal and lower respiratory tract swabs. COVID-19 provides more diagnostic problems in children than in adults because of the long incubation period, which includes a protracted period (5–6 days) of viral shedding before symptoms. COVID-19 clinical symptoms in neonates and children have been generally mild and consistent across nations. Fever, respiratory symptoms such as cough, sore throat, pharyngeal erythema, nasal congestion, tachypnoea/dyspnoea, and tachycardia were the most common reasons for seeking hospitalization in children. Also noted as one of the primary presentation symptoms was the gastrointestinal (GI) symptoms of nausea, vomiting, abdominal pain, and diarrhoea.⁷ This study analyzed 45 clinical records of COVID-19 positive children aged from 3 months to 12 years. We found that the results of this study corroborate with previous findings stating that children affected by COVID-19 present with milder clinical conditions and lower mortality than adults.^{7,8,9,10} We used the expert consensus statement by Shen et al. to classify the patients:¹¹

1. Asymptomatic infection: Children who tested positive for SARS-CoV-2 did not have any clinical

manifestations and without any abnormal chest imaging findings.

2. Mild cases: Children who presented only with fever, cough, pain in the pharynx, nasal congestion, headache, fatigue, muscle pain or discomfort, sans any signs of pneumonia on chest radiography or sepsis.

3. Common cases: Children with or without fever have respiratory system symptoms such as cough and chest radiography indicative of pneumonia, but not severe pneumonia.

4. Severe cases: The cases had to meet the following criteria: 1. Respiratory rate: ≥ 70 times/min (<1 year), ≥ 50 times/min (≥ 1 year) (when the effects of fever and crying have been ruled out); 2. Oxygen saturation less than 92%; 3. Hypoxia: assisted breathing (moans, nasal, flaring and 3 concave signs), cyanosis, intermittent apnoea; 4. Disturbance of consciousness: somnolence, coma, or convulsion; 5. Food refusal or feeding difficulty, with signs of dehydration.

5. Critical cases: Those who meet one or more of the following requirements and need ICU care: Respiratory failure requiring mechanical ventilation; Shock; Combined with other organs failure.

Nine (20 %) of the present cases were asymptomatic, while the rest had mild symptoms. None of the cases was marked as severe or critical. The results of this study agree that a cross-sectional, retrospective, and observational study conducted in Brazil between March 1 and June 30, 2020, studied 115 RT-q PCR confirmed COVID-19 children between the age group of 0–18 years. While three children were

asymptomatic, respiratory symptoms were noted in 58% and gastrointestinal symptoms in 34%. The majority of children were less than 3 years of age. There were no different clinical manifestations between the genders, nor in the incidence of hospitalization. The study concluded that most of the children had mild clinical manifestations.¹ Researchers compared 242158 children and adolescents diagnosed with COVID-19 and 9769 hospitalized due to it and compared them with 2084180 children diagnosed with influenza. The demographic characteristics, co-morbidities, symptoms, treatments, and outcomes were analyzed. They noted that dyspnoea, bronchiolitis, loss of smell, gastrointestinal symptoms, and 30-day outcomes like pneumonia and hypoxemia were more commonly noted in COVID-19 than in influenza.¹² Twenty-seven full-text articles published between 1 December 2019 and 9 April 2020 on COVID-19 were reviewed by Jahangir et al. They noted that children of all ages: neonates, infants, and young children can get infected. The study noted male preponderance, which was not observed in our study. In line with the present study, fever and cough were the most often noted manifestation, with gastrointestinal symptoms predominantly noted. COVID-19 has a milder manifestation in children than in adults, and the prognosis is better was the conclusion arrived at by the researchers.² A review performed a literature search of 28 articles to identify extrapulmonary manifestations in paediatric cases from January 1 to June 21 2020. Some of the chief non-pulmonary manifestations noted were GI, renal, cardiovascular, neurological and haematological systems.³ In our study, GI involvement was n 2.2 % and neurological in 13.3% of cases. The present study concurs with a review of 114 pediatric cases with COVID-19. The symptoms were categorized as mild, and fever (64%), cough (35%), rhinorrhea (16%), or asymptomatic (15%) were the main symptoms noted.¹³ A study in India compared the clinical presentation and outcome in RT-PCR positive SARS-CoV-2 children (0–17 y) between the first (July 2020 to January 2021) and second (February 2021 to July 2021) wave. Of the 8,626 patients assessed, 14.7% were positive during the first wave due to ancestral strain and 21.2% during the second wave due to the Delta variant. The results are congruent with our study.⁴ This study's results agree with the Coronavirus Infection in Pediatric Emergency Departments (CONFIDENCE) study. They assessed Covid-19 and confirmed 100 Italian children < 18 years between March 3 and March 27 in 17 paediatric emergency departments. Fever, cough, or shortness of breath was dominant symptoms. There was no reported mortality.¹⁴ There are a variety of potential theories for why the disease's signs are milder in children than in adults. The first reason of significance is that it is uncommon for children to have co-morbidities like diabetes, cardiovascular disease, smoking and obesity.

Additionally, adults have a greater incidence of C-reactive protein and a longer duration of fever than children, implying a stronger immune response. Also noteworthy is that children tend to be indoors, and thus the chances of exposure to the pathogen are less. SARS-CoV-2 affects the angiotensin-converting enzyme II receptor, which declines with age. ACE-2 exhibits lung-protective action by restraining angiotensin-2 mediated pulmonary capillary leak and inflammation. Children are less vulnerable because of their lower maturity and lower capacity to bind to the diverse distribution of angiotensin-converting enzyme II receptors. Besides, children are more likely than adults to contract respiratory infections during the winter, resulting in increased levels of antibodies and cross-protection against respiratory viruses infections. This is also combined with the other innate immunity they develop due to living vaccines. Also, children are most commonly infected by viruses of the second or third generation; as a result, the viruses with which they are infected are less virulent than those with which adults are infected. Moreover, since their immune response is developing, their response may be different from that of adults. The ability of the paediatric alveolar epithelium to regenerate may play a role in the early recovery from COVID-19.^{2,15} This study of 45 COVID -19 positive children noted that they exhibited milder symptoms and faster recovery without any major adverse outcome. In addition, the 4 children with pre-existing co-morbidities also had a favourable outcome. Limitations: This study has some limitations. Since the data were collected retrospectively from medical forms and records, there could have been some unforeseen inaccuracies and omissions. Further follow-up of the cohorts would have provided more information on the long term effects of COVID-19.

CONCLUSION:

In our series of pediatric cases studied, 9 were asymptomatic, and the rest exhibited mild symptoms. No adverse outcomes were noted, even in those with pre-existing co-morbidities. COVID – 19 is a globally and constantly evolving phenomenon. Although to date, by and large, the prevalence of the adverse outcome in children affected by the virus has been low, vigilance must be stepped up in young infants and those with pre-existing illnesses. Longitudinal studies will be able to provide data on the long term effects of the virus in children.

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