

Clinical profile and outcome of suspect pediatric COVID-19 patients: Experience from a COVID hospital

Chandra S.^{1*}, Kochar G.², Sahai L.³, Jaiswal R.⁴, Bajwa A.⁵

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^{1*} Surabhi Chandra, Associate Professor, SRMS Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

² Gunjan Kochar, Resident, SRMS Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.


³ Lahar Sahai, Resident, SRMS Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

⁴ Rahul Jaiswal, Resident, SRMS Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

⁵ Akansha Bajwa, Resident, SRMS Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

Introduction: The Indian Council of Medical Research (ICMR) has given clinical criteria for suspecting COVID-19 in the Indian population and admissions to hospitals have been based on the above criteria. **Aim** - To study the clinical profile and outcomes of children suspected to have COVID-19 infection (based on ICMR criteria) admitted to a designated COVID hospital of North India. **Methods:** This was an observational study done in a COVID hospital of North India from April to June 2020. All children \leq 18 years of age (including newborns), fulfilling the ICMR criteria and suspected to be COVID infected, from the screening area, were enrolled in the study. Demographic, clinical, laboratory, treatment details, and the final outcome were recorded on a pre-designed data collection proforma. Data was later entered into an MS-EXCEL 2013 spreadsheet and was analyzed using the Epi-info software version 7.2.2. **Results:** Of the 21 admissions (7 newborns and 14 children $>$ 1 month of age) occurring in the COVID suspect ward during the study period, only 1 patient with a positive history of contact, was found to be COVID positive. The mean age of presentation was 10.27 years (Range 0.8-17; SD 7.83). Four children (4/14 = 28.5%) children were admitted on the basis of having symptoms of SARI (Severe Acute Respiratory infection). One patient took leave against medical advice (LAMA) after his RT-PCR report came negative. **Conclusion:** The majority of children admitted as per the testing criteria were found to be COVID negative.

Keywords: Covid-19, Corona Virus, SARS-CoV-2

Corresponding Author	How to Cite this Article	To Browse
<p>Surabhi Chandra, Associate Professor, SRMS Institute of Medical Sciences, Bareilly, Uttar Pradesh, India. Email: surabhi0329@gmail.com</p>	<p>Chandra S, Kochar G, Sahai L, Jaiswal R, Bajwa A. Clinical profile and outcome of suspect pediatric COVID-19 patients: Experience from a COVID hospital. <i>Pediatric Rev Int J Pediatr Res.</i> 2020;7(6):237-241. Available From https://pediatrics.medresearch.in/index.php/ijpr/article/view/606</p>	

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Introduction

COVID-19 pandemic has affected human life globally. Pediatric cases have been found to be 1-5% of the total affected population in various studies [1,2].

The Indian Council of Medical Research (ICMR) has given clinical criteria for suspecting COVID-19 in the Indian population. The criteria are meant for testing and contact tracing and have been revised from time to time [3,4,5].

However, considering the low rate of COVID positivity and varied clinical presentations in children, relying solely on the ICMR criteria for diagnosing pediatric COVID-19 may pose a challenge.

The study was done to know the clinical profile and outcome of children admitted on suspicion of having COVID infection, on the basis of the ICMR criteria from a designated COVID hospital.

Aim

To study the clinical profile and outcomes of children suspected to have COVID-19 infection (based on ICMR criteria) admitted to a designated COVID hospital of North India.

Patients and Methods

This was an observational study done in a COVID hospital of North India over a duration of 3 months viz. April 2020 to June 2020. All children \leq 18 years of age, fulfilling the ICMR criteria and suspected to be COVID infected, from the screening area, were enrolled in the study. The study also included neonates delivered by COVID suspect or confirmed mothers, within the hospital.

Patients were admitted to the COVID ward of the hospital and managed as per their clinical symptoms, signs, and positive laboratory results. Testing of all the children (including suspected neonates) was done by RT-PCR (Reverse Transcriptase Polymerase Chain Reaction) on a sample of the nasopharyngeal swab at a government-designated laboratory. Samples of suspect neonates were sent on the day of delivery while those of the suspect children were sent on the day of admission. Newborns tested as negative on Day 1 were repeat tested after 5 days of postnatal life, as per the National Neonatology Forum (NNF),

Indian Academy of Pediatrics (IAP), and Federation of Obstetrics and Gynaecology of India (FOGSI) guidelines [6].

Ancillary investigations included complete blood counts (CBC), C-reactive protein (CRP), chest x-ray, and others as required. Similarly, newborns were investigated by sepsis screen, a chest x-ray, and other investigations as and when required.

Demographic, clinical, laboratory, treatment details, and the final outcome were recorded on a pre-designed data collection proforma. Data was later entered into an MS-EXCEL 2013 spreadsheet and was analyzed using the Epi-info software version 7.2.2

Results

During the study period, 14 children have met the admission criteria were admitted from the screening area. Five newborns were delivered by COVID positive mothers and 2 newborns were delivered by COVID suspect mothers who later turned out to be negative.

Thus, in our hospital, a total of 21 admissions (7 newborns and 14 children >1 month of age) occurred in the COVID suspect ward, over a 3 months (April-June) period following the ICMR guidelines and on the basis of clinical suspicion by the COVID consultant on call. Of these only 1 patient with a positive history of contact, was found to be COVID positive.

Table-1: Demographic profile, ICMR criteria for suspicion, and history of contact with a COVID positive person in the children admitted.

Age/Sex	Residence	ICMR criterion	Contact history
7 years/M	Hotspot area	SARI	Absent
6 years/M	Hotspot area	SARI	Absent
10 months/M	Hotspot area	SARI	Absent
4 years/M	Not applicable	Ward of migrant laborer	Present
9 years/F	Not applicable	Ward of migrant laborer	Present
11 years/F	Not applicable	Ward of migrant laborer	Present
14 years/M	Not applicable	Ward of migrant laborer	Present
15 years/M	Not applicable	Ward of migrant laborer	Present
17 years/M	Not applicable	Ward of migrant laborer	Present
17 years/M	Non-hotspot area	Ward of positive HCW	Present
14 years/F	Non-hotspot area	Ward of positive HCW	Present
10 years/M	Non-hotspot area	Ward of positive HCW	Present
14 years/F	Hotspot area	SARI	Absent
6 years/M	Hotspot area	Grandson of positive man	Present

The mean age of presentation was 10.27 years

(Range 0.8-17; SD 7.83). Five children (5/14 = 35.7%) resided in a hotspot area, three (3/14 = 21.4%) resided in non-hotspot areas and six (6/14 = 42.8%) children had migrated from elsewhere. Four children (4/14 = 28.5%) children were admitted on the basis of having symptoms of SARI (Severe Acute Respiratory infection) and the remaining 10 (10/14 = 71.4%) had a history of contact with a COVID positive person [2,3,4].

*HCW = Healthcare worker

All children admitted on the clinical suspicion of SARI had neutrophilic leucocytosis in CBC and positive chest x-ray findings. RT-PCT results for COVID-19 were negative in (13/14 = 92.8%) all except one (1/14 = 7.1%). One patient took leave against medical advice (LAMA) after his report came out to be negative. Two (2/14 = 14.2%) patients expired in the suspect ward. Eleven (11/14 = 78.5%) patients got discharged. This included the single COVID positive patient who was first shifted to the 'COVID positive' ward first and later discharged from there.

Table-2: All children admitted on the clinical suspicion of SARI had neutrophilic leucocytosis in CBC and positive chest x-ray findings.

CBC	Chest X ray	RT-PCR result	Final outcome
Neutrophilic leucocytosis	B/I heterogenous opacities	Negative	Discharged
Lymphocytic leucocytosis	B/I heterogenous opacities	Negative	LAMA
Neutrophilic leucocytosis	Right upper and middle lobe opacities	Negative	Expired
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Normal	Normal	Negative	Discharged
Neutrophilic leucocytosis	B/I heterogenous opacities	Negative	Expired
Normal	Normal	Positive	Discharged

*B/I = Bilateral

All the 7 newborns were delivered by LSCS (lower segment cesarean section). All had negative RT-PCR results for COVID-19. Of these 5 (5/7 = 71.4%)

Were delivered at term and two (2/7 = 28.5%) were delivered preterm. Newborns delivered to 6 (6/7 = 85.7%) mothers, including all COVID positive mothers were discharged. One preterm neonate delivered by COVID negative, antenatal steroids not covered mother having an antepartum hemorrhage, succumbed to its illness due to early-onset sepsis with respiratory distress syndrome.

Table-3: Demographic and clinical details of the delivered newborns.

Sex	Clinical diagnosis	RT-PCR result	Final outcome
M	Normal newborn	Negative	Discharged
F	Normal newborn	Negative	Discharged
F	Normal newborn	Negative	Discharged
M	Normal newborn	egative	Discharged
F	Term newborn with hypoxic-ischemic encephalopathy - II	Negative	Discharged
M	31 weeks preterm with early-onset sepsis with neonatal hyperbilirubinemia (Rh-negative mother)	Negative	Discharged
F	30 weeks preterm small for gestational age with respiratory distress syndrome	Negative	Expired

Discussion

As was the aim of the present study, our main focus was to study pediatric (including neonatal) admissions in the COVID suspect ward rather than studying COVID positive pediatric patients per se.

In the present study of 21 pediatric patients admitted on suspicion of COVID-19 (over the 3 months duration) only one child was found to be COVID-19 positive. The 3 months period included in the study covered 2 months of 'nationwide lockdown' and 1 month of 'unlock' by the Government of India. This might explain the relatively lesser number of even suspect pediatric patients requiring admission. The only child who was positive was admitted during the 'unlock' phase on the basis of contact tracing, like his grandfather who was COVID positive had been admitted to our hospital only. Other studies have also reported an incidence of 2-5% in the pediatric population. The mean age of presentation was 10.27 years (excluding the neonates). Children were admitted on the basis of ICMR criteria for testing clinically suspects (which had been revised from time to time during the study period).

The majority of cases in children have been found to be asymptomatic or have mild illnesses [7,8,9].

Besides the most commonly reported symptoms of fever, cough, and breathlessness [9,10] studies have also reported various other symptoms in children including gastrointestinal symptoms [11] multisystem inflammatory syndrome (including Kawasaki's like presentation) [12,13] and atypical dermatological features [14]. The only COVID positive child in the present study was asymptomatic.

Though SARI has been one of the criteria, being constant in all the ICMR testing guidelines, none of the patients admitted with the same turned out to be COVID positive.

A positive history of contact with a COVID positive adult has been reported in various studies and positive children have been found to have familial clustering. [8,9,15]. However, in the present study 9(9/10 = 90%) children having contact with a known positive adult patient were tested to be negative and remained asymptomatic throughout. Numerous explanations have been put forth to explain the relatively low incidence of COVID infection in children. Some of these are timely closure of schools and colleges, less expression of the ACE-2 receptors (primary target receptors of SARS CoV-2), strong innate immune response due to trained immunity (different vaccinations), less ability to mount the dysfunctional hyper-inflammatory response and relative lack of comorbid conditions, smoking and obesity [16]. Recently a protective role of MMR (Measles, Mumps, Rubella) vaccine is also being investigated for possible protection [17].

In the present study, 11 asymptomatic patients were discharged finally, 2 suspect patients expired and 1 went LAMA due to personal reasons. The globe is facing a crisis of healthcare workers all over and doctors from all specialties are being posted in different shifts of the day to look after these patients which could be a possible reason for mortality percentage seen even in the non-COVID patients admitted in these wards. As regards the neonates delivered to COVID positive mothers, antenatal and postnatal course was uneventful in all of them except for 31 weeks preterm with early-onset sepsis and neonatal hyperbilirubinemia (Rh-negative mother) who also improved with antibiotics, phototherapy, and supportive care. A recent review published in June 2020 [10] has found that 4 COVID positive newborns had been reported till then, of whom 3 had pneumonia.

Limitations

The current did not include pediatric patients with Influenza-like Illness (ILI) symptoms as general OPD was closed and none of such patients presented to the Emergency unit of the hospital. This might lead to an underestimation of the true burden.

Conclusion

The majority of children admitted as per the testing criteria were found to be COVID negative. However, the threshold for suspicion should be low and adequate IPC (Infection Prevention and Control) measures are a must even when working in 'suspect' or 'non-COVID' areas of the hospital.

What does this study add to the existing knowledge?

Screening COVID infection in children on the basis of ICMR criteria alone was found to have low positivity rates.

Author contribution

Dr. Surabhi Chandra conceptualized the study and prepared the manuscript. **Dr. Gunjan Kochar, Dr. Lahar Sahai, Dr. Rahul Jaiswal,** and **Dr. Akansha Bajwa** helped in data collection and manuscript preparation.

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Healthcare workers all over the globe fighting the pandemic menace on the frontline.

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