

Original Research Article

Clinical profile of children with COVID-19 Admitted at KIMS Hospital, Bangalore- A prospective study

Ramya H S¹, Afroza Asiya¹, Aks Sultan Thariani¹ and Kavya VN^{1,*}

¹ Department of Paediatrics, Kempegowda Institute of Medical Sciences, Bangalore, Karnataka, India.

* Correspondence: kavya.vn04@gmail.com

Received: 27 March 2023; Accepted: 22 May 2023; Published: 28 May 2023.

Abstract: Background: Children account for a small percentage of laboratory confirmed COVID-19 cases, with the clinical course different from the adults. The number of COVID positive cases increased from May 2020. It has been a challenge for clinicians worldwide to manage and treat COVID-19 affected patients, given the meagre information we have regarding the clinical course and the treatment protocols available.

Purpose: The purpose of this study is to analyze the clinical spectrum and outcome in children admitted with COVID-19.

Methods: This is a prospective study of children admitted to KIMS-Bangalore with confirmed COVID-19. In all cases patient demographics including history of exposure, symptoms, age, sex, address were obtained upon admission and laboratory findings were obtained from hospital records.

Results: in our study, 50 children were admitted to KIMS, bangalore. Contact history was found in 80% of the children. 20% were symptomatic without contact history. 54% children were asymptomatic, 46% were symptomatic. Of the symptomatic children, 54% had mild (with fever), 36% had moderate (fever with cough) and 8% had severe symptoms (fever, cough and breathlessness), cases between 6-12 years were –% with a slight female preponderance(54%). None of the children had known comorbid conditions. Oxygen dependency was found in 20% children. COVID was severe in 2 cases (4%), with secondary infection. No deaths were noted in our study.

Conclusion: The course of the disease in children was mild to moderate when compared to adults with no mortality. This is due to underdeveloped immune system, which have not affected the children in large extent. Asymptomatic cases have lead to underdiagnosis of COVID-19 in children, resulting in their becoming silent convalescent carriers and causing disease spread and increase in case load. Hence, it is of utmost importance that children be taught preventive measures such as usage of mask, hand hygiene by using soaps and sanitizers, avoid touching of surfaces and maintaining social distance with elderly persons in the family and surroundings. Upcoming vaccines to children are promising in ending COVID-19 pandemic.

Keywords: Covid 19; SARS-CoV-2 infection; Secondary infection; ACE-2 receptors; Cytokine storm.

1. Introduction

At the end of 2019, a cluster of pneumonia cases was identified in Wuhan (Hubei Province, China), and a novel coronavirus was discovered as a causing factor [1]. The number of cases quickly increased with subsequent epidemic throughout China, followed by an increasing number of cases in other countries throughout the world. The World Health Organization defined the disease COVID-19 (coronavirus disease 2019) in February 2020. The virus causing COVID-19 is called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); initially referred to as 2019nCoV (novel coronavirus) [2,3]. The pandemic was declared on 11 March 2020.

The clinical suspicion of SARS-CoV-2 infection in children has been a challenge for physicians worldwide. Clinicians should recognize that the clinical spectrum of COVID-19 in children is wider than previously described and different from the adult presentation; often with nonspecific signs and symptoms, digestive symptoms. The order of appearance of symptoms (clinical pattern) requires more investigations, as it could predict outcomes [4].

SARS-CoV-2 may spread from person to person by droplets from respiratory secretions. The infection may also occur through contact with an infected surface when the person touches the eyes, the nose or mouth subsequently. Although long-range airborne transmission of SARS-CoV-2 has not been verified, recommendations on airborne protections are generally recommended when aerosol generating procedures are performed [5]. The incubation period of SARS-CoV-2 infection ranges from 1 to 14 days, mostly ranging from 3 to 7 days. Children account for a relatively small proportion of laboratory confirmed SARS-CoV-2 infections. In children, COVID-19 usually has a relatively mild course, which may be responsible for a lower number of diagnostic tests, since they may be performed less frequently. However, in rare cases, severe disorders can be observed, and clinical manifestations may differ from adults [6–9].

It has been seen that fewer children contract COVID-19, and among the infected, children have less severe disease. Less severity of disease in children could be due to

- a) underdeveloped immune system in children, which does not mount a strong response against the virus entering the body. (no cytokine storm)
- b) ACE-2 receptors in children have lesser affinity to corona virus
- c) Pre-existing immunity from corona virus antibodies and T cells.
- d) Stronger innate immunity when compared to adults
- e) Higher levels of melatonin (anti-inflammatory and anti-oxidative)
- f) Off target effects of vaccines

High regeneration capacity of pediatric alveolar epithelium contributes to early recovery from COVID-19. Also, early closure of schools and regular immunization and lack of co-morbidities in majority of the pediatric population has contributed to lesser infection rate among children [10].

2. Aim of the study

To determine the sociodemographic and clinical profile of COVID-19 in children admitted to KIMS, Bangalore from July to December 2020.

3. Methods

This is a prospective study done on children with COVID-19 admitted to KIMS hospital and research center, Bangalore. The children were studied between July and December 2020. Children of age between 2 years and 17 years were studied. Demographics of the patient were obtained from COVID wards and hospital data. When the child was admitted to COVID wards, patient's demographics, including age, sex, weight, symptoms, contact history etc, was noted [11]. Participants were explained about the objectives of the study, written and informed consent obtained and confidentiality maintained. Diagnosis was based on COVID-RTPCR from the swabs obtained from oropharynx and nasopharynx. Various investigations such as complete hemogram, inflammatory markers such as D-dimer, ferritin, CRP, LDH and other investigations were performed [12]. ECG and X ray of the chest were also performed.

4. Statistical analysis

Patients were categorized according to their sex, presentation of symptoms, contact history etc. other demographic factors were taken into consideration and analyzed using chi square chart.

5. Results

[Table 1] The study included children aged between 2 years and 17 years. With the mean distribution of age being 10.54 years.

Out of the 50 children admitted with COVID-19, there was a slight female preponderance with 23 boys and 27 girls.

None of the children had any co-morbidities such as diabetes, chronic renal disease etc., but 2 out of the 50 children had a secondary infection. One child had dengue fever, while another child had acute on chronic pancreatitis.

Contact history revealed that of the 50 children, 40 of them had contact with a family member who was positive for COVID. Travel history was not present in any of the children.

Table 1. Demographics of the study participants (n=50)

Parameters	male	female
sex	23	27
asymptomatic	14	13
symptomatic	9	14
No contact	4	6
Contact present	19	21
Category A	14	13
Category B	7	11
Category C	2	2
O2 requirement	5	6

Table 2. Symptoms seen in male and female patients

Symptoms	Male	Female
Fever	2	5
Fever with cold	1	1
Fever with cough	2	3
Fever with uri and cough	-	-
Fever and uri and hurried breathing	2	2
Cough	1	-
Fever and loose stools	1	-
Fever with pain abdomen	-	1
Fever and myalgia	-	2

Of the 50 children, most of them belonged to upper middle class (80%) according to modified kuppuswamy classification. The rest belonged to upper class (10%) and lower middle class (10%).

[Table 2] 27 children were asymptomatic, while 23 children were symptomatic. Children presented with symptoms which included fever, fever and URI, fever and cough, fever and hurried breathing or fever and loose stools. MISC was not seen in any of the children. [Table 3] 15 of the children who were admitted had protein energy malnutrition, with 7 of them having grade 1, 5 of them having grade 2 PEM and 1 child having grade 3 PEM. Of the 27 asymptomatic children, 7 children had PEM and 8 of the 23 symptomatic children had PEM.

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When categorized according to their symptoms, 27 belonged to category A, 17 belonged to category B and 6 belonged to category C.

Table 3. Socio-economic status and nutrition in participants

Category	Male	Female
Socioeconomic status		
Upper class	Upper middle	Lower middle
17	2	4
23	3	1
PEM- in symptomatic pts		
Grade 1	Grade 2	Grade 3
1	1	-
2	2	-
PEM in asymptomatic patients		
Grade 1	Grade 2	Grade 3
3	-	1
1	2	-

ICU admissions/ management was required in severe cases. 2 Children required mechanical ventilation in the form of NIV. Oxygen supplementation was required in 11 cases (5 boys and 6 girls). The rest of the children were managed in the wards with oral antibiotics and vitamin supplements.

Raised inflammatory markers were seen in 75% of the children. Of which, 55% children were symptomatic and 45% were asymptomatic.

Radiological changes in the form ground glassing and bronchopulmonary infiltrates were seen in 25% of the patients. Of them, 60% were symptomatic and 40% were asymptomatic. No major ECG changes were noted.

Hospital stays ranged from 5-14 days, with children belonging to categories A and B having an average stay of 7 days. Children belonging to category C required hospital stay for 14 days.

6. Discussion

COVID 19 is the biggest of the world has faced in the recent past after the Spanish flu following world war 1 claiming a lot of lives world wide and resulting in post infectious complications in many [7] Many studies are being conducted worldwide to know the course of the disease, complications, post infectious co-morbidities, effective treatment and create a vaccine and identify areas for improvement of future preparedness plans, as well as prove a critical assessment of the risk factors and actionable items for stopping their spread. Among the patient with SARS-CoV-2 fever was the most common symptoms, followed by cough [13].

In the present study, it was observed that most children admitted with the disease had prior contact history with a family member who had the infection. No significant sexual preponderance was seen. Prevalence of COVID was observed to be less in toddlers and preschool aged children. Adolescents included majority of the patients admitted.

The study included children aged between 2 years and 17 years. With the mean distribution of age being 10.54 years. 15 of the children who were admitted had protein energy malnutrition, with 7 of them having grade 1, 5 of them having grade 2 PEM and 1 child having grade 3 PEM, of the 27 asymptomatic children, 7 children had PEM and 8 of the 23 symptomatic children had PEM.

Children mostly presented with symptoms of fever, respiratory symptoms such as cold, cough, hurried breathing, myalgia and loose stools and other non-specific symptoms. Raised inflammatory markers were seen both in symptomatic and asymptomatic children, though the degree of raise of the markers was more in symptomatic children. This is similar to the findings seen in COVID positive children who were studied in Mexico [14].

Radiological changes observed included ground glass appearance in the lung parenchyma and bronchopulmonary infiltrates, which did not correlate with the symptoms seen, severity of the disease and hospital stay [15]. The public health authorities should keep monitoring the situation closely, as the more we can learn about this novel virus and its associated outbreak, the better we can respond.

7. Conclusion

This study included 50 patients admitted to our hospital. Detailed statistical analysis was performed. Detailed study regarding the symptoms, exposure, inflammatory markers, radiological changes were done. The course of the disease in children was mild to moderate when compared to adults This is attributable to the underdeveloped immune system in children resulting in the absence of cytokine storm, ACE -2 receptors in children have lesser affinity to corona virus, preexisting immunity from corona virus antibodies and T cells, stronger innate immunity when compared to adults, higher levels of melatonin (anti-inflammatory and anti-oxidative), off target effects of vaccines. Asymptomatic children can thus be silent convalescent carriers of infection contributing spread of the disease and thus to the increase in case load.

Author Contributions: All authors contributed equally to the writing of this paper. All authors read and approved the final manuscript.

Conflicts of Interest: "The authors declare no conflict of interests."

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