ORIGINAL ARTICLE e-ISSN: 2349-0659 p-ISSN; 2350-0964

Prognosis of COVID-19 in Indian Pediatric Population

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Abstract

COVID-19 infection and its various signs and symptoms are still causing significant studies across the world. Although relatively less in prevalence and disease severity, children none the less are also affected by this infection. Most of the research in this regard has been focused on the adults, whereas there is a definite lacuna in the published data in the pediatric COVID-19 cases and its prognosis. India being a large country with significant number of population, which has experienced lot of such cases. The present study aims to explore data from 46 patients <14 years of age with reference to the prognosis of COVID-19 infection done in a semi-urban city in India. The results of this present study concluded that treatment response in children was generally good with oral steroids proving to be beneficial. Children being the most vulnerable section of the community as they are yet to be vaccinated against this new and deadly infection, this study aims to provide valuable insight to the effect of COVID-19 infection in unvaccinated children which also pave the way for further descriptive and elaborate studies to be undertaken on the topic.

Keywords: Indian pediatric COVID-19, Pediatric COVID-19, Steroids

Asian Pac. J. Health Sci., (2022); DOI: 10.21276/apjhs.2022.9.4.4

Introduction

As of December 4, 2021, the SARS-CoV-2, also known as Coronavirus Disease 2019 (COVID-19) has infected 3.17 crore individuals and caused 4.25 lac deaths in India. This pandemic has claimed 42.4 lac lives globally over the period of 18 months. However, most people who test positive for this infectious disease experience mild-to-moderate symptoms without the need for any special treatment, with a 99% recovery rate in India.[1]

Official UNICEF reports claim that the data from across the world, and India, shows that COVID infection in children is generally very mild and more than half the number of children who are infected with COVID-19 are asymptomatic. Of the children that do show symptoms, only around 1–2 per cent need intensive care unit treatment. This number is perceived to be less than the percentage of adults requiring intensive care. This may be due to the fact that the immune systems of children are still developing and due to the fact that they often experience respiratory infections in winters, they may have higher levels of antibody against viruses than adults.[2] They often exhibit a high innate immune response that is likely to control the early infection at the point of entry. The ability of the pediatric alveolar epithelium to regenerate may play a role in the early recovery from COVID-19. In case of severe virus infections, adult patients have reduced adaptive immunity and a malfunctioning over-active innate immune response, which is not found in children. Risk factors such as comorbidities, smoking, and obesity are known to affect children less frequently. Young infants and children with pre-existing illnesses, on the other hand, may be high-risk groups that require close monitoring.[3]

With the second wave of the pandemic that peaked in the month of May 2021, several mutants of the SARS-CoV-2 virus have been documented, that are seen to have a higher positivity rate and affect a younger population.[4] There is limited data on the demographics, clinical characteristics, and outcomes of COVID-19 positive children in India. In a densely populated country like ours, even a small percentage of infection in children translates into few millions of population. In addition, the pediatric population has not been vaccinated and no data exists on the effects of vaccine and long-term effects of the disease on the patients as well, putting the children at risk especially in the backward communities and developing countries. In this study, we aim to understand the prognosis of COVID-19 in the pediatric population and present our findings.

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How to cite this article: Mukherjee S, Das S, Mitra A, Chatterjee K. Prognosis of COVID-19 in Indian Pediatric Population. Asian Pac. J. Health Sci., 2022;9(4):19-21.

Source of support: Nil

Conflicts of interest: None.

Received: 01/01/2022 **Revised:** 01/02/2022 **Accepted:** 13/02/2022

Aim

The aim of this study was to evaluate the effects of COVID in the pediatric population of age <14 years.

Materials and Methods

Analysis of data obtained from Google forms over a period of May 16–December 7, 2021 was carried out on Microsoft Excel. Data were collected anonymously from 46 patients at Durgapur, West Bengal, all of whom were below 14 years of age. This data is free of any fabrication and an independent statistician was employed to perform a bias-free analysis.

Results

Eighteen female and 28 male children between the age groups of less than a year to 14 years who tested positive for COVID-19

Table 1: Antibiotics prescribed to the patients

Antibiotics prescribed to patients; dosage and duration as per physicians choice	
Cefixime	7
Cefuroxime	7
Azithromycin/Azithral	10
Amoxicillin	2
Cefpodoxime	1
Total	27

Table 2: Steroids prescribed to the patients

Steroids prescribed to patients (duration 7–10 days)	
Prednisolone (1 mg/kg)	11
Dexamethasone (0.5 mg/kg)	5
Total	16

Table 3: Hospitalization and home oxygen requirement in patients

Characteristics	*Need for hospitalization*	*Home oxygen requirement*
Percentage of children	6.5%	8.6%
Age group	<1 year and 10–14 years	10–14 years

were included in the study. The age-wise distribution is presented in Figure 1.

Sixteen patients were prescribed systemic steroids, with prednisolone being the most prescribed one, given to 11 of them [Figures 2 and 3].

Outcomes

CRP levels-C-reactive protein (CRP) is produced by the liver in response to inflammation. A CRP test is used to measure the amount of CRP present in the blood to detect the inflammation in acute conditions and a level of CRP below 8 mg/L is seen as normal.[5] When the inflammation is reduced, the level of CRP falls, and this makes it a good marker for monitoring the severity of disease.[6]

CRP levels were reported in most of the patients in our data but were missing in about 20% of them. Average CRP level of 37 patients was found to be around 12 mg/L. CRP levels were observed to be slightly higher in the age group of 10–14 years, whereas in the lower age groups, it is not seen as significant [Figure 4].

Oxygen Requirement and Hospitalization

Hypoxemia is a condition when the oxygen level in blood decreases and requires additional oxygen. 8.6% children required oxygen in this study. About 6.5% children were hospitalized with a mean length of stay being 6.3 days. A higher prevalence of comorbidities is seen among those who need hospitalization.[7] Mostly hospitalization and home oxygen requirement were not needed. Only one patient was referred to higher center, while all others clinically improved after treatment [Table 3].

Discussion

In our study, no gender bias was observed within the pediatric group in terms of COVID exposure. Although steroids are generally not advisable, our study reported that a small number of patients

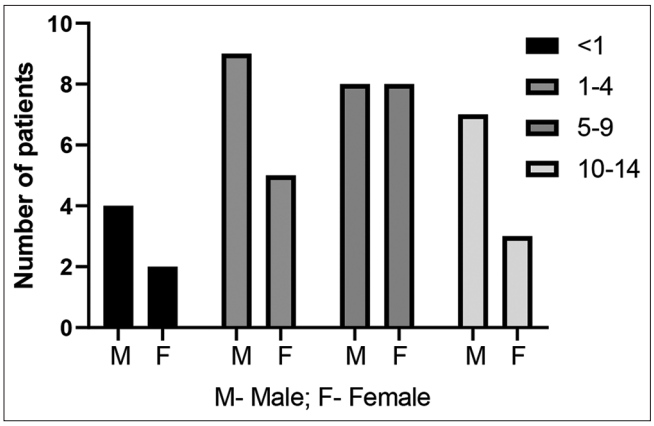

Figure 1: Number of COVID-19 positive patients and their age

Figure 2: Prednisolone prescribed to COVID 19 pediatric patients

Figure 3: Dexamethasone prescribed to COVID 19 paediatric patients

were prescribed steroids in minimal dosages. The average requirement for hospitalization was very less which is indicative of effective treatment and optimal prescription of steroid and antibiotic dosages. In addition, no adverse effects were reported. The hospitalized children had an average CR*P* value of 17.5 mg/l, which can be seen as moderately high and may be an indicator of

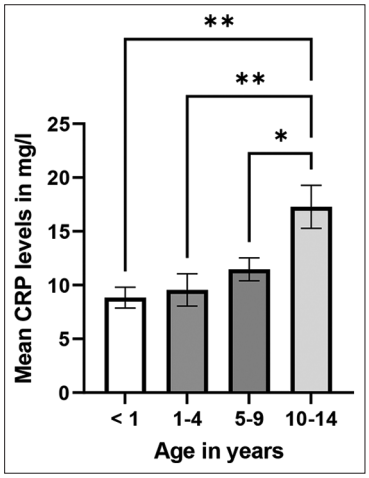

Figure 4: C-reactive *protein* levels in COVID 19 pediatric patients

extreme inflammation. An outlier observed here was one patient (patient X) belonging to age group of 10–14 years, was reported to have a relatively higher CR*P* value of 30.6 mg/L, was hospitalized for 7 days, and later was referred to higher center for further treatment.

The patient X was male who was prescribed the steroid dexamethasone and antibiotic cefuroxime whereas among the two other hospitalized patients, one was female belonging to the 10–14 years age group and was prescribed the same medicines as patient X, but recovered after 7 days and another was a male patient who was less than a year and was given Cefixime antibiotic and no steroids, who recovered after 5 days of hospitalization. Since no conclusive interpretation can be made from this data, additional information on the comorbidities of patient X may be needed to establish a concrete inference.

As most of the patients in our data clinically improved after their prescribed treatments [Table 1 and 2], we can safely conclude that the treatment given was optimal.

Future Prospects

This study was done on a small cohort of <50 individuals. For better statistical analysis and in depth understanding of COVID-19 in pediatric population, studies need to be conducted on a larger group. Other factors of disease such as comorbidities and symptoms of disease in the patients along with manifestations of anosmia and dysgeusia in children,[8] on which no studies have been conducted so far, can be considered in further analyses. Various blood components other than CRP levels can be tested for their increase or decrease and explored as potential markers for different aspects of disease.

Conclusion

COVID 19 especially in paediatric patients is still an evolving infection with ongoing research in many parts of the world. In India also a substantial number of paediatric population were affected by this infection but the fatality was relatively low. The present study highlights promising outcomes of such patients, particularly with the use of steroids and other drugs. Although the study was conducted in a small subset, yet the results indicate good prognosis in Indian paediatric covid19 patients.

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