ORIGINAL ARTICLE

Seroprevalence of SARS-CoV-2 in Children Admitted to a Pediatric Ward of an Urban Hospital

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Abstract

A seroprevalence of SARS-CoV-2 study among pediatric patients in a South Indian urban hospital found 37% of children to be COVID-19 IgG positive in a 7-month period. Data reveals widespread asymptomatic infection among children. We may achieve herd immunity faster than other countries which might also increase vaccine effectiveness. Manifestations like suppurative cervical lymphadenitis and intussusception were seen with greater frequency in our study sample.

Aim: To study the seroprevalence of SARS-CoV-2 among pediatric patients admitted in an urban hospital in South India.

Methods: An analytical study was conducted using medical records of children admitted for various conditions in the pediatric ward of our non-COVID-19 hospital from July 2020 through January 2021, a total of 7 months. All patients were tested for SARS-CoV-2 antibodies using the Cellex q Cassette rapid test. Those with a positive RT-PCR or positive IgM were referred to designated hospitals.

Result: We found 37% of the children to be COVID-19 IgG positive. Manifestations like suppurative cervical lymphadenitis and intussusception were seen with greater frequency in our study sample.

Conclusion: Data reveals widespread asymptomatic infection among children. We may achieve herd immunity faster than other countries which might also increase vaccine effectiveness.

Keywords: Lymphadenitis, Pediatric, SARS-CoV-2 seroprevalence.

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Introduction

The COVID-19 pandemic caused by SARS-CoV-2 has largely spared children.[1] According to the WHO, children account for less than 10% of the total COVID-19 cases. A small percentage of children present with severe symptoms of multisystem inflammatory syndrome temporally related to COVID-19 infection. The WHO states that children have fewer symptoms in comparison with adolescents and adult patients.

A prospective cohort study conducted in UK reported a seroprevalence of 7.66% among children.[2] Another study done among household contacts of COVID-19 patients showed 83% of children had anti-SARS-CoV-2 IgG antibodies.[3] An ICMR-funded study has reported a seroprevalence of 10.4% among children aged 10–17 years in a nationwide community-based survey.[4] An adjusted seroprevalence of 46.7% for the period of June to August 2020 has been reported from Karnataka and published in the Journal of American Medical Association.[5] There is little data on seroprevalence among children under 10 years in India.

Methods

We conducted a retrospective study of children admitted for various conditions in the pediatric ward of our non-COVID-19 hospital from July 2020 to January 2021, a total of 7 months. All patients were tested for SARS-CoV-2 antibodies using the Cellex q Cassette rapid test. Those with a positive RT-PCR or positive IgM were referred to designated hospitals.

Observation and Results

A total of 186 children were admitted during this period. Among them, 103 (55%) were boys and the remaining 83 (45%) were girls. In terms of age groups, 58 (31%) were infants under 1 year, 89 (48%) were between 1 and 5 years and those over 5 years of age totaled 39 (21%).

Not all the children admitted had their COVID-19 IgG records made available. Of the 172 cases where IgG records were available, 63 (36.6%) were found to be seropositive. Among these 172 cases, 94 were boys of whom 34 (36%) were IgG positive and the remaining 78 were girls of whom 29 (37%) were IgG positive. In terms of age groups, 55 were infants under 1 year of whom 19 (35%) were IgG positive, 79 were between 1 and 5 years of whom 30 (38%) were IgG positive and the remaining 38 were over 5 years old of whom 14 (37%) were IgG positive.

All of these findings are summarized in Table 1.

Discussion

None of the seropositive children had any history suggestive of COVID-19 infection in the past. Only one patient gave history of COVID-19 infection in family members.

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The common symptoms among the children were diarrhea, vomiting, abdominal pain, fever, cold, cough, difficulty in breathing, convulsions, and swelling in neck. Of particular interest were three cases of unilateral suppurative cervical lymphadenitis. All three of them required surgical drainage. Two of them had received oral antibiotics before admission in our hospital and were COVID-19 seropositive. The third case of suppurative lymphadenitis, a 1-month-old infant born in our hospital was seronegative for COVID-19. Mother was also seronegative. Blood and pus culture grew Staph aureus in this case.

The trend chart in Figure 1 is a breakdown of the monthly total admissions and COVID-19 seropositive cases. Table 2 shows a summary of diagnosis for the admitted patients during the 7-month study period. There were three cases of intussusception. Two of them were managed conservatively, one required surgical intervention.

The seroprevalence of SARS-CoV-2 among our pediatric patients was found to be 37%, that is, a little more than one-third of the total admissions. It was similar in both sexes and across different age groups. Infection was asymptomatic in all cases. There was no influence of serologic status on the clinical presentation of the primary condition, response to treatment or duration of hospital stay of the patients. All our patients belonged to lower and lower-middle socioeconomic class.

Conclusion

Respiratory infections are common among children. They probably respond to COVID-19 like any other respiratory infection, with their predominant innate immunological response. Our study shows that children do get infected with COVID-19 but remain asymptomatic. This could be because children have lesser expression of Angiotensin Converting Enzyme 2 in their nasal epithelium and fewer Angiotensin Converting Enzyme receptors.

However, children harboring the virus have the potential to infect other family members. Though our study has a small

Table 1: Demographic summary of pediatric patients July 2020 to January 2021

			COVID-19 IgG	
Demography	*Category*	*Admitted cases (% of total)*	*Available records (% of total)*	*Positive cases (%)*
Sex	Male	103 (55%)	94 (55%)	34 (36%)
	Female	83 (45%)	78 (45%)	29 (37%)
	Total	186 (100%)	172 (100%)	63 (37%)
Age	< 1 yr	58 (31%)	55 (32%)	19 (35%)
	1–5 yr	89 (48%)	79 (46%)	30 (38%)
	> 5 yr	39 (21%)	38 (22%)	14 (37%)
	Total	186 (100%)	172 (100%)	63 (48%)

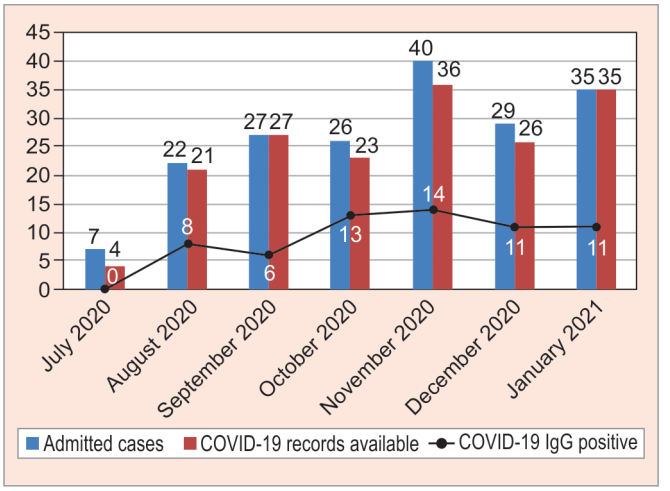

Fig. 1: Monthly total admissions and COVID-19 seropositive cases

Table 2: Diagnosis of the admitted patients, July 2020 to January 2021

Presentation/diagnosis	*# Cases*	*Presentation/diagnosis*	*# Cases*
AGE	58	LRTI	18
Acute appendicitis	4	Dengue	9
Colitis	2	UTI	6
Ileitis	1	Enteric fever	6
Hypertrophic pyloric stenosis	1	Viral URI/AFI	25
Intussusception	3	Seizures	20
Mesenteric lymphadenopathy	4	Infected dermoid cyst	1
Acute abdomen	2	Anemia	5
Persistent diarrhea	1	Undescended testis	1
Suppurative cervical lymphadenopathy	3	Hematuria	1
ALTE	1	Giddiness	1
Poisoning	2	Sepsis	2
Cerebral palsy	2	Excessive cry	1
Inguinal hernia	1	DKA	1
Lipoma	1	Circumcision	1
Urticaria	1	Accessory toe excision	1

sample size and lacks quantitative data, this finding might guide containment strategies as well as school reopening and off-line examination policies. A larger community-based study in young children is needed to confirm our findings.

Contribution Details

Dr Rama Kaja acted as the primary investigator who collected and compiled data, conducted literature search, prepared the draft report with interpretation of results. Dr Surendranath Mallavalli was responsible for conception of this study and was involved in the literature search and interpretation of findings. Both authors approved the final draft prior to submittal.

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