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# BMJ Paediatrics Open

## COVID-19 in children in Odisha state, India - a retrospective review

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Keywords:	COVID-19, Mortality, Microbiology, Virology

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# COVID-19 in children in Odisha state, India - a retrospective review

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<sup>2</sup>Virus Research and Diagnostic Laboratory, ICMR-Regional Medical Research Centre (Dept. of Health Research, Ministry of Health & Family Welfare, Govt. of India), Chandrasekharpur, Bhubaneswar-751023, India.

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**Keywords** : COVID-19, children, 3<sup>rd</sup> wave, immunity,  
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**Abstract**

We retrospectively analysed the swab samples tested for COVID-19 from 7<sup>th</sup> March 2020 to 17<sup>th</sup> August 2021 at ICMR-Regional Medical Research Centre, Bhubaneswar, Odisha. 553,763 Nasopharyngeal swabs were collected from COVID-19 suspected individuals in Odisha state. 75,190 (13.6%) samples were positive by RT-PCR. There were 5,988 (8%) cases in children and young people under 18 years old. Odisha reported 996,153 COVID-19 cases which resulted in 6,985 deaths in adults and 36 in under 18 years olds.

1 COVID-19 affects children of all ages but rarely develop any severe or critical illness.<sup>1</sup> India has been  
2 hit by two major waves of COVID-19 pandemic with peaks in September 2020 and May 2021.<sup>2</sup> More  
3 than 2% of the 44.5 million population of Odisha were diagnosed with COVID-19 infections during  
4 this period. In this study, we retrospectively analysed the swab samples tested from 7<sup>th</sup> March 2020  
5 to 17<sup>th</sup> August 2021 at Indian Council of Medical Research (ICMR)-Regional Medical Research Centre  
6 (RMRC), Bhubaneswar, Odisha. RMRC, Bhubaneswar is the first laboratory to start testing of COVID-  
7 19 samples in the State which has expanded to a network of 64 laboratories during the Covid-19  
8 Pandemic. All Samples which were collected according to the ICMR guidelines were included in the  
9 study except the samples which were invalid or inconclusive after testing.

10 A total of 553,763 RT-PCR tested results were included for the analysis. Among the samples tested,  
11 75,190 (13.6%) samples were found positive by RT-PCR test according to the guidelines issued by  
12 ICMR, Ministry of Health and Family Welfare, Government of India. Among the positive cases,  
13 69,202 (92%) cases were from  $\geq 18$  years and 5,988 (8%) cases belonged to 0-17 years. The positivity  
14 rate among  $\geq 18$  years (13.8%) was relatively higher than 0-17 years (11.6%) and comparable to the  
15 overall positivity (Figure 1). Among the children, the positivity rate was highest in the age group of  
16 6-9 years (12.96%) and lowest among 0-5 years (9.07%). The median age (Q1-Q3) of childhood cases  
17 was 13 years (8-15 Years) and the median age (Q1-Q3) of above 18 years cases was 35 years (26-48  
18 Years) (Figure 2).

19 Our findings demonstrated that the positivity rate among the children was less than adults during  
20 the last two COVID-19 waves. The case fatality rate in Odisha state in the 0-17 years age group were  
21 0.05% and 0.03% respectively in 1<sup>st</sup> and 2<sup>nd</sup> wave, which is much lesser than overall case fatality  
22 (0.75%). In 2021, 4, 11 and 8 children succumbed to COVID-19 in the age groups of 0-6, 7-14, 15-18  
23 years respectively whereas the number of deaths was 3, 6 and 4 in the same age groups in the year  
24 2020. Based on sero-surveillance reports conducted by ICMR in June 2021 COVID 19 infection in  
25 children above 10 years of age occurs in a similar frequency to that of adults. The seroprevalence in  
26 the 10-17 years age group and  $\geq 18$  Years increased from 27.8% to 61.8% and 25.8% to 69.69  
27 respectively from the 3<sup>rd</sup> (December 2020–January 2021) and 4<sup>th</sup> serosurvey (June–July 2021).<sup>3</sup>  
28 None of the children had any comorbidities as per the data collected during their sample collection.  
29 Fear of mutations causing more severe cases in children have no solid scientific evidence to date.  
30 The most successful technique for returning children to schools is to increase vaccine eligibility for  
31 children and adolescents while addressing vaccine hesitancy. Immunization of school teachers and  
32 staff are being prioritised to prevent occupational transmission, and there is a gradual emergence  
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of evidence of vaccine effectiveness in adolescents.<sup>4</sup> Even without vaccination due to the high prevalence of seropositivity, the children might incur natural immunity in preventing future infection or complications due to COVID-19.<sup>5</sup> An expanding vaccine eligibility for children and adolescents while addressing its hesitancy is the most effective strategy for returning children to Schools and colleges.<sup>6</sup> The study highlights that presently there is no such concrete evidence to show that children are or would be affected more than adults in the upcoming waves. To address any future upsurge, a collaborative effort from the private and public sectors is the need of the hour.

### **Ethics statements**

#### **Patient consent for publication**

Not required.

#### **Ethics approval**

Ethics permission was deemed unnecessary, as this was a retrospective study of seasonally collected, anonymised clinical data. No direct patient data were used.

#### **Contributorship statement**

DB & SP designed the study. GCD, SS, JT, DP, SR, JS, UKR and RRN were involved in testing and analysis of data. GCD, SS, HRC, and DB, were responsible for data analysis and valuable inputs. SP, DB, GCD, and SS wrote the manuscript. All authors have read and approved the final manuscript.

#### **Patient and Public Involvement**

The section is not applicable as this was a retrospective study of seasonally collected, anonymised clinical data. No direct patient data were collected by us.

#### **Acknowledgement**

The authors gratefully acknowledge all the healthcare workers for their tireless dedication at each level to fight COVID-19 and for voluntarily participating in this cohort study. The authors are thankful to the Indian Council of Medical Research, New Delhi and Dept. of Health & Family Welfare, Govt. of Odisha for providing financial support for the study.

#### **Conflict of Interest**

None to declare

#### **Data availability**

All data and statistical code to reproduce the tables and figures in the manuscript are available on request to the corresponding author.

## References

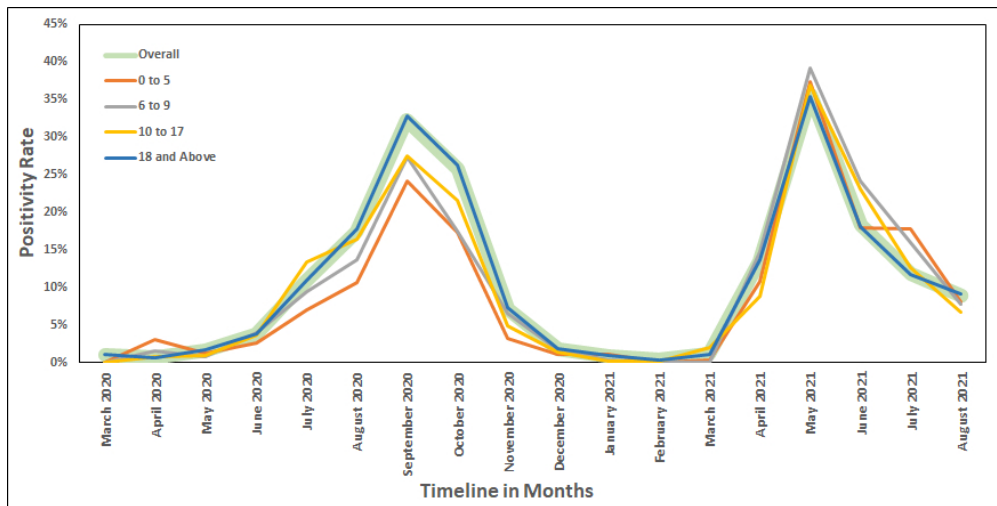
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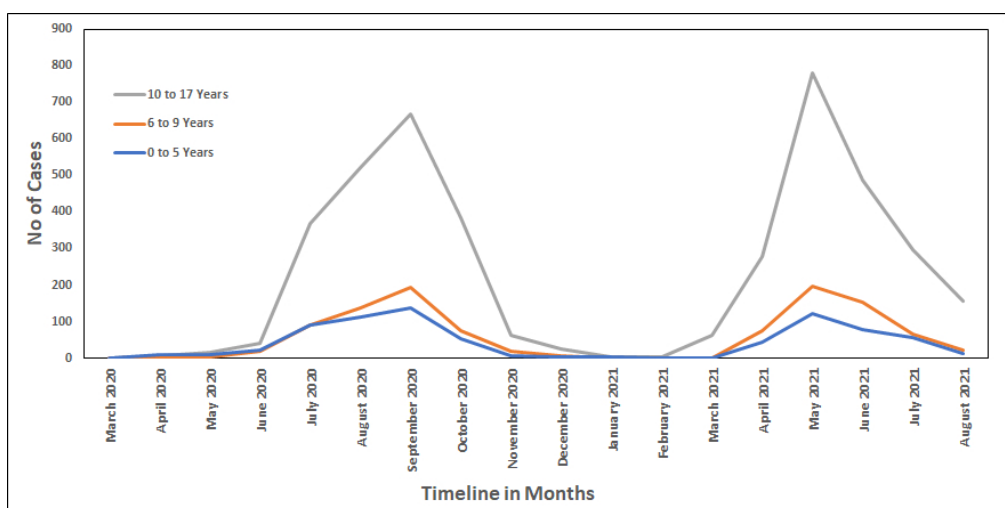
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**Keywords** :

COVID-19, children, 3<sup>rd</sup> wave, immunity,

mortality

**Abstract**

1 Covid-19 has created challenges in every age group. With widespread vaccination in adults the focus  
2 is shifting towards children with a probable third wave in India. India has bit hit by two waves of the  
3 pandemic in 2020 and 2021 and as of 17th August, 2021, Odisha reported 996,153 COVID-19 cases  
4 which resulted in 6,985 deaths in adults and 36 in children below 18 years. There was no difference  
5 in the positivity rate between adults and children whereas the case fatality rate was 15 times less in  
6 children than in adults. Even with emergence of SARS-CoV-2 variants during the second wave, there  
7 is no concrete evidence to show that children are or would be affected more than adults in the  
8 upcoming wave in India.  
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1 COVID-19 affects children of all ages but rarely develop any severe or critical illness.<sup>1</sup> India has been  
2 hit by two major waves of COVID-19 pandemic with peaks in September 2020 and May 2021.<sup>2</sup> More  
3 than 2% of the 44.5 million population of Odisha were diagnosed with COVID-19 infections during  
4 this period. Despite the unprecedented scientific research efforts during this various phases of the  
5 pandemic, limited data exists on the overall direct and indirect disease impact on children. With a  
6 gradual decrease case positivity rate in the state there is a looming threat regarding a probable 3<sup>rd</sup>  
7 wave affecting the children severely. In this study, we retrospectively analysed the swab samples  
8 tested from 7<sup>th</sup> March 2020 to 17<sup>th</sup> August 2021 at ICMR-Regional Medical Research Centre,  
9 Bhubaneswar, Odisha.

10 A total of 553,763 Nasopharyngeal swabs were collected from COVID-19 suspected individuals from  
11 different districts of Odisha state and sent to the designated laboratory of the centre for testing and  
12 confirmation. Among these samples tested, 75,190 (13.6%) samples were found positive by RT-PCR  
13 test. Among the positive cases, 69,202 (92%) cases were from  $\geq 18$  years and 5,988 (8%) cases  
14 belonged to 0-17 years. The positivity rate among  $\geq 18$  years (13.8%) was relatively higher than 0-17  
15 years (11.6%) and comparable to the overall positivity (Figure 1). Among the children, the positivity  
16 rate was highest in the age group of 6-9 years (12.96%) and lowest among 0-5 years (9.07%).  
17 Females (11.49%) were having a slightly lower positivity rate than males (11.75%) in 0-17 years. The  
18 median age of childhood cases was 13 years (IQR-7) and the median age of above 18 years cases  
19 was 35 years (IQR-22) (Figure 2).

20 Our findings demonstrated that the positivity rate among the children was less than adults during  
21 the last two COVID-19 waves. The case fatality rate in Odisha state in the 0-17 years age group were  
22 0.05% and 0.03% respectively in 1<sup>st</sup> and 2<sup>nd</sup> wave, which is much lesser than overall case fatality  
23 (0.75%). In 2021, 4, 11 and 8 children succumbed of COVID-19 in the age groups of 0-6, 7-14, 15-18  
24 years respectively whereas the number of deaths were 3, 6 and 4 in the same age groups in the year  
25 2020. None of the children had any comorbidities as per the data collected during their sample  
26 collection. Being isolated in homes and institutions may have a greater psychological impact than  
27 the virus's physical effects which would be aggravated by the recent episodes of fear in them.<sup>3</sup> Fear  
28 of mutations causing more severe cases in children have no solid scientific evidence to date. The  
29 most successful technique for returning children to schools is to increase vaccine eligibility for  
30 children and adolescents while addressing vaccine hesitancy. Immunization of school teachers and  
31 staff is being prioritised to prevent occupational transmission, and there is a gradual emergence of  
32 evidence of vaccine effectiveness in adolescents.<sup>4</sup> Even without vaccination due to the high  
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1 prevalence of seropositivity, the children might incur natural immunity in preventing future  
2 infection or complications due to COVID-19.<sup>5</sup> Moreover, psychological impact on  
3 children/adolescents is significantly growing either due to the fear of the illness or forceful social  
4 isolation related to COVID-19. To maintain psychological well-being, one could focus on improving  
5 sleep habits and physical activity, as well as restricting internet use.<sup>6</sup> The study highlights that  
6 presently there is no such concrete evidence to show that children are or would be affected more  
7 than adults in the upcoming waves. To address any future upsurge, a collaborative effort from the  
8 private and public sectors is the need of the hour.  
9

### 17 **Ethics statements**

#### 20 **Patient consent for publication**

21 Not required.

#### 23 **Ethics approval**

24 Ethics permission was deemed unnecessary, as this was a retrospective study of seasonally  
25 collected, anonymised clinical data. No direct patient data were used.  
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#### 29 **Contributorship statement**

30 DB & SP designed the study. GCD, SS, JT, DP, SR, JS, UKR and RRN were involved in testing and  
31 analysis of data. GCD, SS, HRC, and DB, were responsible for data analysis and valuable inputs. SP,  
32 DB, GCD, and SS wrote the manuscript. All authors have read and approved the final manuscript.  
33

#### 36 **Patient and Public Involvement**

37 The section is not applicable as this was a retrospective study of seasonally collected, anonymised  
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#### 42 **Acknowledgement**

43 The authors gratefully acknowledge all the healthcare workers for their tireless dedication at each  
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#### 51 **Conflict of Interest**

52 None to declare

#### 54 **Data availability**

55 All data and statistical code to reproduce the tables and figures in the manuscript are available on  
56 request to the corresponding author.  
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## References

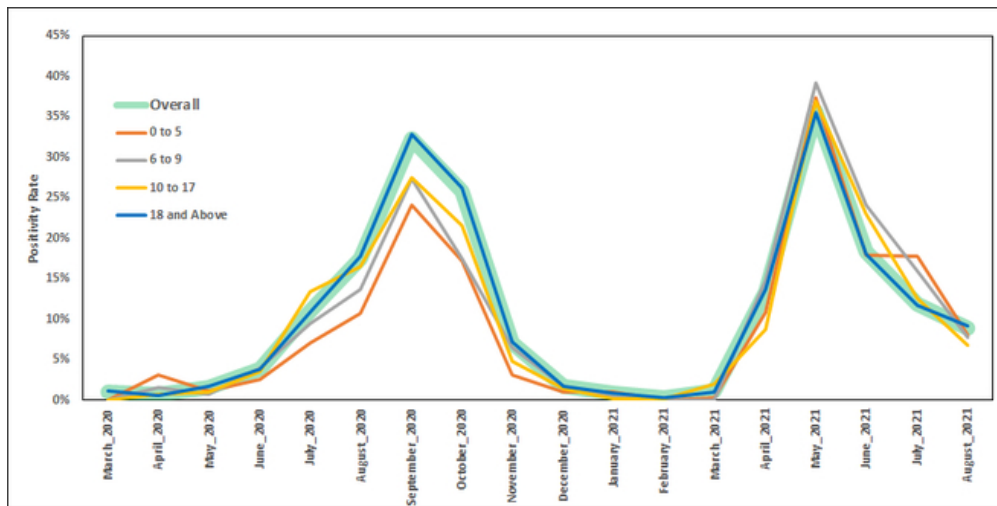
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<<Insert Figure 1: Positivity rate during various months in various age groups>> (I have the permission to use the image as it is created by myself and approved by all co-authors)

<<Insert Figure 2: Epidemic curve by age group for COVID-19 in children>> (I have the permission to use the image as it is created by myself and approved by all co-authors)

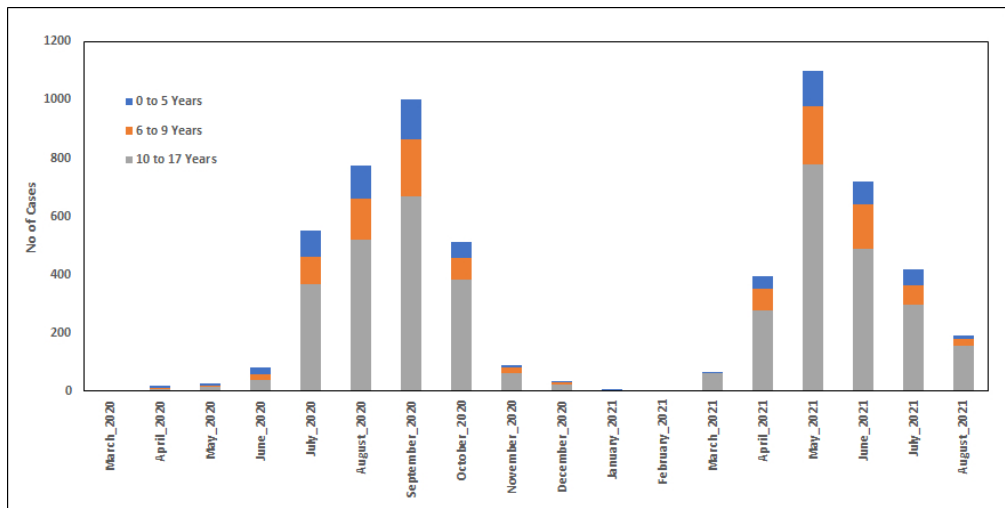
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