

Original research article

Clinical profile of COVID 19 infection in children admitted in a dedicated COVID 19 treatment centre in South India

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Abstract

Background: COVID19 pandemic had affected millions of people worldwide. In contrast with adults, children had milder disease though transmission rate was high. During second wave of COVID 19, more children were affected

Aim: To describe and compare the clinical profile of COVID 19 infection in children between the first and second waves.

Methods: This was a descriptive cross-sectional study done by retrospective chart analysis. The study population included children from age group 1 month to 12 years admitted with a diagnosis of COVID 19 infection at a tertiary care centre in Kerala.

Results: A total of 322 case records were analyzed and 52 were excluded due to incomplete data. Of the 270 records of children, 51(18.9%) were in 1st wave and 219 (81.1%) were in 2nd wave. Among the major clinical symptoms, fever and respiratory complaints were more common. There was significant difference in the mean age of children in 2 waves (2.47 years in 1st wave and 3.70 in second wave, P value 0.023). The proportion of asymptomatic patients were significantly higher during the 1st wave 39 (77%) compared to 2nd wave 98 (45%) with a significant p value of <0.001. Subgroup analysis was done for the presenting symptoms in which gastrointestinal and respiratory symptoms were predominant in the 2nd wave. There was no child mortality during both waves.

Conclusion: The study showed significant difference in the presenting symptoms during the 1st and 2nd waves of COVID19 pandemic with higher rate of respiratory and gastrointestinal symptoms during the 2nd wave and more asymptomatic cases during the 1st wave. Since the symptomatology of presentation was evolving, the suspicion of COVID 19 as causative agent for respiratory and gastrointestinal symptoms should remain high.

Keywords: COVID 19, clinical profile, asymptomatic, symptomatic, waves, age

Introduction

The outbreak of novel corona virus disease (COVID 19) was initially noticed in a seafood market in Wuhan city in Hubei Province of China in mid-December 2019 and then spread all over the world. WHO (under International Health Regulations) had declared this outbreak as a “Public Health Emergency of International Concern” (PHEIC) on 30th January 2020. WHO subsequently declared COVID 19 infection as a pandemic on 11th March 2020 ^[1]. The COVID 19 virus transmission mainly occurs by respiratory secretions and infects all the age groups. Severity of COVID 19 infection can be classified into mild, moderate and severe ^[2]. In contrast to adults less number of children were affected by COVID 19 infection and majority of them had a milder course. Asymptomatic infections were also common which probably had added to community transmission.

COVID 19 infection affects all age groups but the frequency and severity was found to be less in pediatric population as cited in studies in the initial phase of pandemic. The impact of COVID 19 during the first two waves of pandemic had been different in children. Compared to first wave, in the second wave more number of children and neonates were affected in almost all countries. Post COVID multi system inflammatory syndromes were also reported in many children. Therefore, a wealth of data of children with COVID 19 infection was needed for the early identification, proper case management and to plan follow up. This was also needed in making policies for planning the prevention of transmission of COVID 19. Many studies were done on the clinical profile of COVID19 infected children showed difference in the systemic involvements. Moreover the studies reported with comparison of two waves

were also less in number. With this background this study was done to describe the clinical profile of COVID 19 infection in children and to compare the clinical profile of children admitted during first and second waves of COVID19 infection.

Materials and Methods

The current study was done in Department of Pediatrics, Government medical College, Kollam, which was the dedicated tertiary level COVID19 treatment centre for the Kollam district, Kerala state, India. The study design was descriptive cross sectional study done by retrospective chart analysis.

The study was approved by Institutional Ethical Committee with IEC No2/EC-4/2021/GMCKLM Dated 15th July, 2021.

Study population

All children in the age group of 1 month to 12 years who got admitted with a diagnosis of COVID 19 infection were included in the study.

Inclusion criteria

Children tested positive for COVID 19 infection by RTPCR test or rapid antigen test as per WHO ^[3] and state guidelines ^[1].

Exclusion criteria

Children below 1 month and above 12 years were not included in this study

Collection of primary data

The retrospective chart review was done in the case records from September 2020 to December 2021. All consecutive children admitted in the study settings who satisfied the inclusion criteria were taken for the study. A total of 322 case records taken, 52 case records were excluded from the study due to incomplete data. Finally 270 case records were included in the analysis. The first wave of COVID 19 pandemic was considered from September 2020 to April 2021 and second wave was considered from May 2021 to December 2021 as per state recommendations ^[4].

Methodology

The details of clinical features, laboratory parameters, treatment given and final outcome of these children were collected retrospectively from case sheets after they got discharged. Details of co morbid conditions like asthma, allergic rhinitis, atopy, drug allergy, malnutrition, bedridden children, immune-compromising conditions like nephrotic syndrome on steroids, etc. were also collected. The details were entered in a Data Extraction Proforma and verified by two independent study team members. The study variables included Age, Gender, co morbid conditions, Clinical features related to various systems and Clinical severity graded according to state guidelines ^[1].

Data Analysis

All data were entered in MS Excel and statistical analysis done using MS Excel Statistical Package and Epi Info version 7. The categorical variables were summarized as percentage and quantitative variables were summarized as mean with SD or median with interquartile range according to the distribution of variables. Chi Square test was done for association of categorical variables and t test for continuous variables. p value of <0.05 was considered as significant.

Results

A total of 322 case records were analyzed and 52 were excluded due to incomplete data. Finally 270 records of children were included who were tested positive for COVID 19 from September 2020 to December 2021. Of this 51 (18.9%) cases were positive during 1st wave (September 2020 to April 2021) and 219 (81.1%) were positive during second wave (May 2021 to December 2021). The mean age of distribution in both waves together was found to be around 3.96.

The baseline characteristics like age, gender, symptoms, clinical severity and comorbid status were shown in table 1. Majority of children were in less than 1 year age group followed by 1 to 5 years age group. Around half of study population were symptomatic.

Table 1: Baseline characteristics of study population

Parameters	Summary [n (%)] N=270
Age group	
< 1 year	109 (40.4)
1-5 year	91(33.3)
> 5 year	70(25.6)
Mean age in each group	

< 1 year	0.46±0.37,0.39-0.53
1-5 year	3.2±1.2,2.92-3.4
> 5 year	8.5±2.1,8-9
Male: female ratio	150:120(55.6:44.4)
Asymptomatic	137(50.7)
Symptomatic	133(49.3)
-Mild	44(33)
-Moderate	82(62)
-Severe	7(5)
Comorbidity	13(4.8)
No comorbidity	257(95.2)

The presenting symptoms of COVID positive children were analyzed. The major findings are given in Table 2. Most of the patients in both waves were asymptomatic. Fever was the most predominant symptom, followed by respiratory symptoms. Among the respiratory symptoms, both upper respiratory and lower respiratory had equal representations.

Table 2: Type of symptoms in study population

Symptoms	Summary [n(%)] n =270
Asymptomatic	137(50.7)
High fever	15(5.6)
Mild fever	61(22.6)
Loose stools	5(1.9)
Lower respiratory symptoms	14(5.2)
Myalgia	4(1.5)
Seizures	3(1.1)
Upper respiratory symptoms	16(5.9)
Vomiting	15(5.6)

Subgroup analysis of first and second COVID waves

The clinical profile of both first and second waves were compared as part of subgroup analysis. The mean age was 2.4 years in 1st wave and 3.7 years in 2nd wave. This was statistically significant with P value<0.05). There was no statistical significant difference in gender, co morbidity status and clinical severity between the 1st and the 2nd COVID 19 waves.

The major findings were given in Table 3 which shows comparison of clinical profile in both waves.

Table 3: Comparison of clinical parameters in both waves

Parameters	1 st wave N=51	2 nd wave N= 219	P value
Age (years)-mean ±SD	2.47±2.9	3.7±3.5	0.023*
CI (95%)	1.6 to 3.2	3.2 to4.2	
Male: Female ratio	49:51	57:43	0.297 [#]
Comorbidity			
Yes	2(3.9)	11(5)	0.73 [#]
No	49(96.1)	208(95)	
Clinical status			
Symptomatic	12(23)	121(55)	<0.001 [#]
Asymptomatic	39((77)	98(45)	
Clinical Category			
Mild	5(9.8)	29(13.2)	
Moderate	7(13.7)	65(29.7)	
Severe	0	7(3.2)	
* independent sample t test, # Chi square test			

In the next step of analysis, the clinical symptoms were analyzed in both waves. The second wave had 55% of children with symptoms compared to 23% in first wave. This difference was statistically significant with P value <0.001 with χ^2 value 16. Majority of children in 1st wave presented with fever only. Respiratory symptoms were more common in 2nd wave compared to 1st wave. Similarly Gastrointestinal symptoms like vomiting and diarrhea were more during 2nd wave but this findings were not found to be statistically significant. CNS manifestations like seizures were present in 2nd wave only (3%).

The child mortality was zero in this study.

The comparison of symptoms in both waves is given in Table 4 and the inferential statistics of symptomatology is given in Table 5.

Table 4: Comparison of type of symptoms between 1st wave and 2nd wave of COVID 19

Parameters	1 st wave N=51	2 nd wave N= 219
Asymptomatic	39(28.5)	98(71.5)
High fever	2(13.3)	13(86.7)
Mild fever	7(11.5)	54(88.5)
Loose stools	0(0)	5(100)
Vomiting	1(6.7)	14(93.3)
Upper respiratory symptoms	1(6.3)	15(93.8)
Lower respiratory symptoms	1(7.1)	13(92.9)
Myalgia	0(0)	4(100)
Seizures	0(0)	3(100)

Table 5: Comparison of symptomatic patients in both waves

Parameters	1 st wave N = 12	2 nd wave N =101	P value
GIT symptoms			
Yes	1(9)	19(19)	0.69
No	10(91)	82(81)	
Respiratory symptoms			
Yes	2(17)	28(28)	0.72
No	10(83)	73(72)	
CNS symptoms- Seizures			
Yes	0	3(3)	
No	12	98(97)	

Discussion

In the current study comprising of 270 children, majority were admitted during the second wave of pandemic (19% children in first wave and 81% children in the second wave). This was in contrast with the observations by Fanai, *et al.* in which 56% children were admitted during the first wave⁵. But in the study done by Hippich, *et al.*, more number of young children were affected in addition to older adults in the second wave⁶. The predominance of Omicron variant might be the reason for increased admissions during this period. The mean age of children admitted in both waves together was 3.96 years. Similar finding was also reported by Fanai *et al.*¹⁵. In another large study done in China in a group of 171 children only 18% were of age below 1 year and median age of presentation was found to be 6.7 years⁷. The present study showed that 49% of children were symptomatic when combining the first and second wave together. But symptomatic infection were more during the second wave compared to first wave (23% in 1st wave vs 55% in 2nd wave). But in the study done by Elizabeth *et al.*, symptomatic children were more in the first wave⁵. In the present study 51% of children were asymptomatic. This was comparable to the study done by Sarangi, *et al.* in which 58% children were asymptomatic⁸. But in the study done by Shekerdamain *et al.*, 29% of children were asymptomatic⁹ and in the study done by Rao *et al.* in India, 22% of children were asymptomatic¹⁰. The above studies were done in the mid period of both waves which may be the reason for the difference in the proportion of asymptomatic children with COVID. The present study was done combining the data of both waves. Another study done in France, had reported that children were susceptible to SARS-CoV2 infection but rarely display any physical signs of the disease which favored the possibility that children were facilitators of transmission¹¹. The present study showed that the mean age in 1st wave was 2.47 years compared to 3.7 years in second wave and the difference was statistically significant. Similarly older children were more infected in the study done by Elizabeth *et al.*⁵ and Murugan *et al.*¹² and the difference were also statistically significant in these studies. This showed that older children were more infected in the second wave. This might be due to less stringent measures during the second wave of COVID and partial reopening of schools.

The present study showed that gastro intestinal, respiratory symptoms and seizures were more common in second wave compared to first wave. This was similar to the study done by Elizabeth *et al.* A systematic review done by Hoang *et al.* also reported increased proportion of respiratory symptoms and seizures in second wave¹³. The mortality reported in the present study was nil. This was consistent with the study done by Ramteke *et al.*¹⁴. Similarly no mortality was reported in pediatric population in the many other studies^{15,16}. In the study done by Suryawansh *et al.*, only one mortality was reported and it was associated with co morbidity¹⁷.

The present study had some limitations. The study was done in a single centre which was the nodal centre for COVID19 for the district which could predispose to referral bias. Similarly the sample size for the first wave was not large enough for a robust statistical comparison with second wave.

Conclusion

This study provides a detailed look at the patients admitted in a tertiary pediatric COVID care centre,

during the 1st and 2nd waves of the COVID 19 pandemic. The data showed statistically significant change in presenting symptoms in both waves with higher rate of respiratory and gastrointestinal symptoms during the 2nd wave while 1st wave had more of asymptomatic cases. Since the symptomatology of presentation was evolving, the suspicion of COVID 19 as causative agent for respiratory and gastrointestinal symptoms should remain high.

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Ethical statement: Approval obtained from Institutional Research Committee and Institutional Ethics Committee.

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