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Original Article

Paediatrics Section

Retrospective Study of COVID-19 Positive Paediatric Patients Admitted in a Tertiary Care Hospital, Mizoram, India

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ABSTRACT

Introduction: The clinical presentation and the difference in the pattern of presentation of paediatric Coronavirus Disease 2019 (COVID-19) positive cases between the first wave and second wave have not been studied in North Eastern region of India.

Aim: To study the socio-demographic factors, clinical presentations and also to compare the pattern of presentation of paediatric COVID-19 positive cases between the first COVID-19 wave and second COVID-19 wave.

Materials and Methods: A retrospective observational study of 85 paediatric COVID-19 positive cases admitted in Zoram Medical College, Mizoram, India, during the period from July 2020 to June 2021 was conducted. Children of age group <14 years were included in the study. The data like age, sex, type of testing done, possible primary contact, symptoms, treatment given, and prognosis were collected from the case sheets in the Medical Records Department. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Categorical outcomes were compared between study groups using Chi-square test/Fisher's Exact test.

Results: Records of total of 85 participants were included in the final analysis. The mean age of the study population was 6.59 years. Out of total, 45 (52.94%) were male patients. Majority, 46 (54.11%) had contracted the infection from their parents. The most common symptoms reported were fever (36.47%), cough (24.71%) and cold (22.4%). A total of 9.42% had co-morbidity. The mean duration of hospital stay was 10.14±5.2 days. In age group <5 years, (58.33%) were symptomatic when compared with 5 to 10 years (16.67%) and 25% in children >10 years (p<0.001). There was a significant difference in the mean age group admitted in first wave (2.91±2.94 years) versus second wave (11.38±2.91 years) (p<0.001).

Conclusion: The children less than 5 years were more symptomatic when compared with other age groups. Also, there was a transition in age group being infected, which was greater than 10 years old in the second wave. Hence, there is an urgent need to vaccinate the population less than 18 years of age.

Keywords: Age, Coronavirus disease 2019, Second wave, Symptoms

INTRODUCTION

Coronavirus Disease 2019 (COVID-19), which had originated from Wuhan city of Hubei Province, China in the month of December 2019, became a pandemic in less than 100 days. Globally, there have been 249,629,025 confirmed cases and 5,049,374 deaths reported till 5th November, 2021 [1].

In India, the first case was detected on 30th January 2020, a student who had returned from Wuhan city, China, to Kerala [2]. Subsequent to this, several cases came to be reported from different states of the country, mainly from international travellers; very soon local transmission followed in many areas. A salient facet of the COVID-19 pandemic is that children and adolescents have been found to be less affected [3-6]. In India, as of 5th November, 2021 there have been 148,922 active cases, 33,724,959 discharged cases and 459,873 deaths reported [7].

The first adult case in Mizoram was reported on 24th March, where a theologian tested positive for COVID-19 after his return from Amsterdam [8]. The estimated population of Mizoram as of 2021 was 1,308,967 and the paediatric population (0 to 14 years) constituted approximately 430,000 (as per estimation from the national average) [9].

Even though earlier studies had shown that children and adolescents were less affected by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) SARS-CoV-2 [3-6], they were at a vulnerable stage of their life and might pose a great challenge during the ongoing pandemic. The first paediatric case was reported on 14th July 2020 in Mizoram [10]. Since then, over a span of a year up till June 2021, 85 cases have been reported to our Institution [11].

As there was not much data reported regarding the paediatric COVID-19 Infection, the present study aimed at studying the demographic factors, clinical presentations, antibiotic usage and outcome. Any difference in the pattern of clinical presentation in the cases was also studied and data from the first wave was compared with second wave among the COVID-19 infected children who were admitted in Zoram Medical College (ZMC), Mizoram.

MATERIALS AND METHODS

This was a retrospective cohort study done at ZMC, Aizawl, Mizoram, India. The collected patients' data were analysed from July 2021 to August 2021. The study was approved by the Institutional Ethical Committee of ZMC on 17th Aug 2021, (ref no. F.20016/1/18-ZMC/IEC/24).

Inclusion criteria: The records of paediatric patients <14 years old, tested COVID-19 positive by real-time Reverse Transcription-Polymerase Chain Reaction (RT-PCR) test and by Rapid Antigen Test (RAT), admitted in the wards of ZMC, Mizoram during July 2020 to June 2021 were included in the study.

Exclusion criteria: Patients aged greater than 14 years were excluded from the study. Based on the inclusion and exclusion criteria, the data of total 85 participants were analysed in the present study.

Procedure

The case sheets of the paediatric COVID-19 positive patients were collected from the Medical Records Department from July 2020 to June 2021, as the first paediatrics COVID-19 case was reported on 14th July 2020. The data regarding the age, sex, type of testing done, possible primary contact, symptoms, severity of symptom, treatment given and prognosis were collected from the case sheets of the paediatric COVID-19 patients The sampling technique used was convenient sampling.

Type of symptoms was considered as primary outcome variables. The classification of symptoms into asymptomatic, mild, moderate and severe was classified according to the guidelines given by the Ministry of Health and Family Welfare (MoHFW) [12]. Age and gender were considered as other relevant variables. The COVID-19 wave and symptoms like fever, cough, cold, diarrhoea, headache, vomiting and rash were considered as explanatory parameters.

STATISTICAL ANALYSIS

The data obtained was entered in Microsoft Excel and analysed using the Statistical Package for the Social Sciences (SPSS) software version 22.0. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Quantitative parameters, the mean values were compared between study groups using independent samples t-test (<2 groups). Categorical outcomes were compared between study groups using Chi-square test/ Fisher's Exact test. Here, $p<0.05$ was considered significant.

RESULTS

A total of 85 participants were included in the final analysis. Mean age of the study participants was 6.59±5.1 years. The baseline characteristics like age, gender, diagnostic tests used, history of positive contact, symptoms classification, types of symptoms, and co-morbidity are shown in [Table/Fig-1]. The [Table/Fig-2] shows the types of medications used like antibiotics, multivitamins, duration of stay in hospital and previous medications received before getting admitted in hospital. One child received steroids and two received antiepileptic drugs previously. After admission, four children were on

Parameters	Summary [N(%)]
Age (Mean±SD) (in years)	6.59±5.1 (0.02, 16.0)
Gender	
Male	45 (52.94%)
Female	40 (47.06%)
Diagnostic test used	
RAT	53 (62.35%)
RT-PCR	31 (36.47%)
TrueNAT	1 (1.18%)
History of positive contact	
Parents	46 (54.11%)
Grandparents	7 (8.24%)
Relatives/neighbours/other family members	18 (21.18%)
Not known	14 (16.47%)
Symptomatic	60 (70.59%)
Types of symptoms	
Mild	53 (62.35%)
Moderate	7 (8.24%)
No symptoms	25 (29.41%)
Symptoms	
Fever	31 (36.47%)
Cough	21 (24.71%)
Vomiting	6 (7.06%)
Diarrhoea	9 (10.59%)
Cold and coryza	19 (22.4%)
Constipation	1 (1.18%)
Haematemesis	1 (1.18%)
Noisy breathing	1 (1.18%)
Abdominal pain	2 (2.35%)
Seizure	2 (2.35%)
Headache	5 (5.88%)
Irritable	2 (2.35%)
Weakness/lethargy	4 (4.71%)
Oral ulcer	1 (1.18%)
Decreased feeding	3 (3.53%)
Anosmia	1 (1.18%)
Sore throat	4 (4.71%)
Rash	4 (4.71%)
Headache	5 (5.88%)
Co-morbidity	
Epilepsy	2 (2.35%)
Extra pulmonary TB with asthma	1 (1.18%)
Nephritic syndrome with cleft palate	1 (1.18%)
Pulmonary TB	1 (1.18%)
Renal stones	1 (1.18%)
Ventricular Septal Defects (VSD)	1 (1.18%)
VSD and cleft palate	1 (1.18%)
Nil	77 (90.58%)

[Table/Fig-1]: Descriptive Characteristics of baseline parameters in study population (N=85).
RT-PCR: Reverse transcription polymerase chain reaction; NAT: Nucleic acid amplification testing; TB: Tuberculosis

Parameters	Summary [N (%)]
Previous medications received	
Antiepileptic	2 (2.35%)
Digitalis glycosides	1 (1.18%)
Steroids	1 (1.18%)
Antibiotics	
Oral penicillin with beta-lactamase inhibitors (Amoxicillin plus clavulanic acid)	23 (27.05%)
Antituberculosis treatment started	1 (1.18%)
Oral macrolide antibiotics (Azithromycin)	3 (3.53%)
Oral cephalosporin	3 (3.53%)
Injection cephalosporin	1 (1.18%)
Doxycycline	3 (3.53%)
Injection amoxicillin (Penicillin derivatives)	2 (2.35%)
Injection amoxicillin plus injection Taxim (Cephalosporin)	1 (1.18%)
Injection Taxim (Cephalosporin)	1 (1.18%)
Nil	47 (55.29%)
Other medications/interventions	
Antipyretic (Paracetamol)	51 (60%)

Cough syrup	8 (9.41%)
Antihistamine	17 (20%)
Oral rehydration solution	6 (7.05%)
Zinc	24 (28.23%)
Oxygen	4 (4.71%)
ICU	0 (0.0%)
Multivitamins	56 (65.88%)
Vitamin C	41 (48.23%)
Vitamin B/B Complex	2 (2.35%)
Vitamin D/D3	4 (4.71%)
Nebuliser	**N (%)**
Adrenaline	1 (1.18%)
Asthalin	1 (1.18%)
Salbutamol	1 (1.18%)
Days Hospitalised (Mean±SD)	**10.14±5.2 (1.0, 25.0)**

[Table/Fig-2]: Descriptive analysis of medications and antibiotics given in study population (N=85).
ICU: Intensive care unit

oxygen support but none were admitted in the Intensive Care Unit (ICU). The mean duration of hospital stay was 10.14±5.2 days.

The [Table/Fig-3] shows the comparison of age and gender between symptomatic and asymptomatic children. More number of patients were found symptomatic amongst the age group <5 years i.e. 35 (58.33%) when compared with other age groups and the finding was also statistically significant (p<0.001) while there was non-significant difference in gender and contact with symptoms (p>0.05) [Table/Fig-3].

Parameters	Symptoms		Chi-square	p-value
	Yes (N=60)	No (N=25)		
Age group				
<5 Years	35 (58.33%)	3 (12%)	15.893	**<0.001**
5-10 Years	10 (16.67%)	11 (44%)		
>10 Years	15 (25%)	11 (44%)		
Gender				
Female	26 (43.33%)	14 (56%)	1.136	0.286
Male	34 (56.67%)	11 (44%)		
Contact				
Parents	28 (46.67%)	18 (72%)	6.231	0.101
Grandparents	6 (10%)	1 (4%)		
Relatives/ neighbours/ other family members	13 (21.67%)	5 (20%)		
Not known	13 (21.67%)	1 (4%)		

[Table/Fig-3]: Comparison of age, gender and contact with symptoms (N=85).
Chi-square test; used for calculating p-values

The number of paediatric COVID-19 positive children who got admitted in the COVID-19 Ist wave was 48 and in IInd wave was 37. There was a statistically significant difference in mean age of the paediatric children infected between the Ist and IInd COVID-19 waves (p<0.001), while there was non-significant difference in gender and symptoms when compared between the paediatric COVID-19 cases reported during the Ist and IInd COVID-19 waves (p>0.05) [Table/Fig-4].

There was non-significant difference in presence of symptoms and symptoms like fever, cough, vomiting, diarrhoea, cold and coryza,

Parameters	COVID-19 wave		p-value
	Ist wave (N=48)	IInd wave (N=37)	
Age (in years) (Mean±SD)	2.91±2.94	11.38±2.91	**<0.001^**
Age group			
<5 Years	38 (79.17%)	0 (0%)	*
5-10 Years	10 (20.83%)	11 (29.73%)	
>10 Years	0 (0%)	26 (70.27%)	
Gender			
Female	24 (50%)	16 (43.24%)	0.536$
Male	24 (50%)	21 (56.76%)	
Symptoms			
Yes	37 (77.08%)	23 (62.16%)	0.134$
No	11 (22.92%)	14 (37.84%)	
Classification of symptoms			
Mild	34 (91.89%)	19 (82.61%)	0.412$
Moderate	3 (8.11%)	4 (17.39%)	
Symptoms present			
Fever	20 (41.67%)	11 (29.73%)	0.257$
Cough	14 (29.17%)	7 (18.92%)	0.277$
Vomiting	1 (2.08%)	5 (13.51%)	0.081$
Diarrhoea	6 (12.5%)	3 (8.11%)	0.725$
Cold and coryza	14 (29.17%)	5 (13.51%)	0.086$
Abdominal pain	1 (2.08%)	1 (2.7%)	1.000$
Headache	2 (4.17%)	3 (8.11%)	0.649$
Sore throat	2 (4.17%)	2 (5.41%)	1.000$
Rash	3 (6.25%)	1 (2.7%)	0.629$
Oxygen	3 (6.25%)	1 (2.7%)	0.629$

[Table/Fig-4]: Comparison of parameters between Ist and IInd waves of COVID-19 (N=85).
*No statistical test was applied due to 0-value in one of the cells; $:Chi-square test; ^: Independent samples t-test

headache, abdominal pain, rashes and sore throat between Ist and IInd COVID waves (p>0.05). No statistically significant difference was observed in oxygen requirement between Ist and IInd COVID-19 waves among the admitted paediatric patients (p>0.05) [Table/Fig-4].

DISCUSSION

The present study showed that the mean age of the study population was 6.59±5.1 years and this was comparable with a study done by Dong Y et al., which showed their median age was 7 years [13] and also another study done by Lu X et al., had a median age of 6.7 years [14]. Majority were males i.e. 45 (52.94%) in the present study, which is comparable with a study done by Dong Y et al., which reported 56.6% were boys [13]. A positive contact history was observed with parents (54.11%), grandparents (8.24%) and with relatives/friends/other family members (21.18%). The history of paediatric cases getting infected from family clusters were comparable with the brief report published regarding two family clusters by Ji LN et al., [15].

The present study showed that 37 (77.08%) of the children had symptoms in the Ist wave compared to 23 (62.16%) of children in the IIst wave. Most of the children in both the waves had mild symptoms. In the present study, 25 (29.41%) were asymptomatic. A study done by Shekerdemian LS et al., also showed that asymptomatic/mild infection was observed in 29% [16]. A study done by Fakiri KE et al., in Morocco showed that 73% were asymptomatic [17]. The

Serial no.	Authors's name and year of publication	Place of study	Number of subjects	Age considered	Parameters compared	Conclusion
1	Shekerdemian LS et al., 2020 [16]	North America	48	<21 years	Male (52%) Asymptomatic/mild (29%) Therapy received (61%) Co-morbidity (87%) Mortality (4.2%)	Severity of illness seems to be less in children. Co-morbidity was associated with mortality.
2	Fakiri KE et al., 2020 [17]	Morocco	74	<18 years	Male (46%) Asymptomatic (73%) Mortality (0%)	The infection was mostly mild in paediatric population.
3	Rao S et al., 2021 [18]	Mumbai, India	123	<14 years	Male (57.7%) Asymptomatic (21.9%) Co-morbidity (32%) Mortality (11.4%)	Severe disease was observed in children with co-morbidity.
4	Ramteke S et al., 2021 [19]	Bhopal, India	30	<14 years	Male (60%) Asymptomatic (70%) Co-morbidity (0%) Mortality (0%)	Severe infection is not a major manifestation of COVID-19 in children.
5	Sarangi B et al., 2020 [20]	Pune, India	50	<18 years	Male (56%) Asymptomatic (58%) Co-morbidity-2 in number Mortality (0%)	Higher disease burden in lower socio-economic status and mild disease was observed.
6	Banerjee S et al., 2020 [21]	West Bengal, India	41	<12 years	Male-24 in number Asymptomatic (26.8%) Co-morbidity (61%) Mortality-1 child died	The course of illness appears to be less severe in children than adults.
7	Suryawanshi MM et al., 2022 [22]	Nagpur, India	150	<or equal to 12 years	Male (54%) Asymptomatic (82.7%) Co-morbidity (3.3%) Mortality- 1 child died	Majority of children were asymptomatic and severity of illness was associated with co-morbidity.
8	Present study	Mizoram, India	85	<14 years	Male (52.94%) Asymptomatic (29.41%) Antibiotic use (44.71%) Co-morbidity (9.4%) Mortality (0%)	Children less than 5 years were comparatively more symptomatic when compared with other age groups.

[Table/Fig-5]: Comparison of parameters with other similar studies.
Comparison of parameters with other similar studies [16-22, Present study]

study done by Rao S et al., in Mumbai showed a high mortality of 11.4% [18]. The present study findings were comparable with many previous studies, showing that majority of paediatric COVID-19 cases were asymptomatics when compared with adults and also the mortality was very less when compared with adults [17,19,20].

The mortality reported in the present study was zero. Few other studies also showed that mortality was zero [17,19,20]. Comparison of various study findings with the present study has been done in [Table/Fig-5] [16-22]. The present study showed that the mean age of children infected in the first wave was 2.91 years as compared to 11.38 years in the second wave. This difference in the mean age of the paediatric COVID-19 patients getting admitted in the wards was also statistically significant. More number of children in the age group greater than 10 were getting infected and getting admitted in the second COVID-19 wave. This was comparable with the data published by the MoHFW, Government of India [23]. A study done by Hippich M et al., also showed that in the second wave, more cases of paediatric COVID-19 and younger population were getting infected in addition to older adults [24].

Limitation(s)

The present study was a retrospective study and hence the findings of the study should be interpreted with caution.

CONCLUSION(S)

The mortality in the present study cases was zero and also there was a difference in the mean age of the paediatric COVID-19 patients getting admitted in the first wave and second wave. Since the mean age of the paediatric COVID-19 patients getting admitted in the second wave was 11.38 years, we strongly recommend that it is high time that the children above 10 years should also be considered for vaccination at the earliest to prevent infection. The present study also showed that more symptomatic cases were less than 5 years of age. Hence, proper health awareness about COVID appropriate behaviour should be insisted from the parents and should be followed all times when interacting with their children.

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