



CLINICAL PROFILE AND OUTCOME OF COVID-19 INFECTION IN PEDIATRIC PATIENTS AT A TERTIARY CARE CENTRE

Paediatrics

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ABSTRACT

Objective: To describe the clinical profiles and outcome of COVID-19 infection in Pediatric age group. **Material & Method:-** This was a hospital based prospective study. A total of 166 admitted children in the age group of 0-18 years presented with symptoms of ILI were enrolled in our study. Out of these, 53 patients were positive by RTPCR method and 18 patients were positive by IgM antibody for COVID-19. Baseline clinical characteristics were collected and data were analyzed. **Results:-** Most of the patients had severe symptoms (40.84%) whereas moderate and mild symptoms were seen in (38.02%) and (21.12%) patients, respectively. Co-morbidities were found in 76.05% patients. The most common symptom was fever (94.36%) followed by cough (56.33%), shortness of breath (39.43%), nausea and vomiting (38.02%), diarrhea (29.57%), sore throat (12.6%), pain in abdomen (18.30%). Most common physical finding was fever (85.91%) followed by pallor (56.33%), respiratory distress (49.29%), hypotension (29.57%), hepatomegaly (15.49%). Among complications, pneumonia was seen in (53.52%) patients, followed by Shock (39.43%), MIS-C (25.35%), ARDS (4.22%). Thirty-nine patients (54.92%) were given oxygen inhalation while 25.35% required invasive ventilation. Most of patients were recovered and mortality was recorded in 16.90% patients. **Conclusion:-** Paediatric patients were mostly asymptomatic and less reported in the 1st wave of COVID-19 whereas in the 2nd wave of COVID-19, they suffered from severe symptomatic infection.

KEYWORDS

Covid-19, Influenza like illness (ILI), MIS-C

INTRODUCTION

Currently, the world is in throes of a pandemic of unprecedented magnitude^[1]. Corona virus disease 2019 (COVID-19) caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) is a major public health crisis threatening humanity at this point in time^[2]. The causative agent of the covid-19 pandemic is SARS-CoV2 which belongs to the betacoronaviruses of the family Coronaviridae. In December 2019, a cluster of adults with pneumonia of unexplained etiology was found by the Health Commission of Hubei province, China^[3]. On 11th March 2020, the World Health Organization (WHO) classified the outbreak as a pandemic^[4].

Modes of transmission of disease are direct inhalation of infected droplets and direct contact with surfaces and fomites soiled by infected respiratory secretions^[2]. Transmission to healthcare staff may happen during aerosol-generating events such as intubation, ventilation, suction, and nebulization in critical care unit^[5]. The incubation period is 2-14 days, with a median of 4-6 days^[5]. Among the affected children, a spectrum of manifestations was seen with varying grades of severity (asymptomatic/ mild/ moderate/ severe) and few deaths were also noted^[3]. The disease is mild in about 80% of the reported cases. In those with co-morbidities, the disease is often severe progressing to acute respiratory syndrome (ARDS) and multi-organ dysfunction (MODS)^[2].

The SARS-CoV-2 virus infects children at a similar rate as adults, but fortuitously, majority of the children, develop only a mild illness, and present predominantly with fever and dry cough^[6]. The view that COVID-19 disease course is always mild in children is now challenged by reports of children presenting with a rare, but very severe hyper inflammatory syndrome in the United Kingdom^[7,8], Italy^[9], Spain^[10], and New York City^[11]. Severe cases manifest as dyspnea and may rapidly worsen and develop ARDS, shock, multi-organ failure and coagulopathy. GI symptoms such as nausea, vomiting and loose stools are also reported in some affected children^[3]. Multisystem inflammatory syndrome in children (MIS-C) predominantly affects adolescents and children older than 5 years of age and to be associated with more cardiovascular involvement^[12]. Common laboratory findings include normal/low WBC counts with elevated CRP, Chest-Xray and CT-scan findings in moderate to severe illness are suggestive of diffuse bilateral involvement of lungs^[2]. A limited data on small number of children show increased levels of procalcitonin, C-reactive

protein and D-dimer in those with moderate to severe disease^[3]. There is lack of data regarding clinico-epidemiological profile of COVID-19 infection in pediatric age, so we have planned the study to assess clinico-epidemiological profile of pediatric age group for further strategy.

MATERIAL AND METHOD

This was a hospital based prospective study, conducted in department of paediatrics, R.N.T. Medical College, Udaipur, Rajasthan from month of June 2021 to October 2021 during second wave of Covid-19 pandemic with prior approval from Institutional Ethics committee. A total of 166 admitted patients including newborns and children up to 18 years presenting with symptoms and signs suggestive of Covid-19 were included in the study and tested for RT-PCR in throat and nasopharyngeal swab samples and serology for COVID-19 antibodies. 71 children out of 166 patients were found positive for COVID-19 (53 patients positive by RTPCR method and 18 patients positive by IgM antibody for COVID-19).

A detailed history including age, sex, residence, symptom suggestive of ILI, any co-morbid conditions, socioeconomic status, Covid-19 vaccination history of parents, history of contact with Covid-19 positive family member or other person, and general physical examination data were recorded. Laboratory findings, complications, and outcome of patients were also recorded on a prestructured proforma. All these patients were managed as per protocol.

Complete Blood Count, CRP-Q, Serum-ferritin, liver and renal function test, urinalysis, serum electrolyte, D-dimer, IL-6, blood glucose, chest X-ray were performed in admitted patients. Peripheral smear and rapid antigen test for Malaria, Dengue serology (NS1 and IgM antibodies) and blood culture were examined to rule out other clinical conditions. Cardiac evaluation (2D Echo), cerebrospinal fluid (CSF) analysis was performed for selected cases with suspected myocarditis or meningoencephalitis, respectively. ABG and Neuroimaging were done whenever required

RESULT

The present study was conducted over a period of 5 months from June 2021 to October 2021. A total of 71 admitted patients, 42(59.15%) males and 29 (40.84%) females with 1.4:1 male: female ratio was included in our study. Most of patients were in the age group of 1-5 years (29.57%) (Table-I).

Table-I: Demographic data of Covid-19 positive children

Age	Male	Female	No.(%)
0-1 month	5	2	7(9.85%)
1month -1year	8	11	19(26.76%)
1-5 year	13	8	21(29.57%)
6-10 year	5	0	5(7.04%)
11-15 year	9	5	14(19.71%)
16-18 year	2	3	5(7.04%)
TOTAL	42(59.15%)	29(40.84%)	71(100%)

Out of these, 53 were RT-PCR positive for SARS-CoV-2, whereas 18 patients were RT-PCR negative and IgM antibodies found positive (Table-II).

Table II: Screening tests for COVID-19 in study population

Covid-19 test	Patients
RT-PCR	53
COVID-19 IgM antibodies	18
Negative by either tests	95
Total	166

Most of the patients had severe symptoms (40.84%) whereas moderate and mild symptoms were seen in (38.02%) and (21.12%) patients, respectively (Table-III).

Table-III: Disease severity classification of Covid-19 positive children

Mild	27(38.02%)
Moderate	15(21.12%)
Severe	29(40.84%)

Forty-six patients (64.78%) had history of positive household contact, out of which 52.11% had close contact with COVID-19 positive family members and 12.67 % patients had contact from outside the family with COVID-19 positive or resident of hotspot area or recent travel from high-risk country/area (Table-IV).

Table-IV: Exposure of patients to COVID-19 confirmed case

Family-member	37(52.11%)
Non-family member	9(12.67%)
Exposure unknown	25(35.21%)

Most common pre-existing Co-morbid condition observed was anaemia seen in 39(54.92%) patients and malnutrition was found in 11(15.49%) patients. Other co-morbidities found were type-1DM, hypothyroid, pulmonary TB, down syndrome with CHD (Table-V).

Table-V: Co-morbid condition associated with COVID-19 patients

Co-morbid condition	Number
Anemia	39 (54.92%)
SAM	11 (15.49%)
Diabetes Mellitus	1 (1.40%)
Hypothyroid	1 (1.40%)
Pulmonary Tuberculosis	1 (1.40%)
Down syndrome with CHD	1 (1.40%)
Total	54 (76.05%)

Most common presenting symptoms were fever (94.36%) followed by Cough (56.33%), shortness of breath (39.43%), sore throat (12.67%) and rhinorrhoea (7.04%). Gastrointestinal tract symptoms, including diarrhoea, nausea vomiting, and abdomen pain were present in 29.57%, 38.02% and 18.30% patients, respectively. Neurological symptoms were seen in only 2 (2.81%) patients. Most common physical finding was fever (85.91%), followed by pallor (56.33%), respiratory distress (49.29%), hypotension (29.57%), hepatomegaly (15.49%), oedema (9.85%), conjunctival hyperaemia (8.45%), hepatosplenomegaly (5.63%), icterus (4.22%), lymphadenopathy (4.22%) and rash in (2.81%) patients (Table-VI).

Table-VI: Clinical characteristics of COVID-19 positive children

Symptom	Number (%)	Signs	Number (%)
Fever	67(94.36%)	Fever	61 (85.91%)
Cough	40(56.33%)		
Shortness of breath	28(39.43%)	Pallor	40(56.33%)
		Respiratory distress	35(49.29%)

Nausea and vomiting	27(38.02%)	Hypotension	21(29.57%)
Diarrhea	21(29.57%)	Hepatomegaly	11(15.49%)
		Oedema	7(9.85%)
Pain in abdomen	13(18.30%)	Conjunctival hyperemia	6(8.45%)
Excess cry/irritability	10(14.08%)	Hepatosplenomegaly	4(5.63%)
Sore throat	9(12.67%)	Icterus	3(4.22%)
Rhinorrhea	5(7.04%)	Lymphadenopathy	3(4.22%)
Refusal to feed	5(7.04%)	Rash	2(2.81%)
Myalgia	4(5.63%)		
Headache	3(4.22%)		
Bleeding	2(2.81%)		
Rash	2(2.81%)		
Seizure	1(1.14%)		
Altered sensorium	1(1.14%)		

Anaemia was found in 54.92%, leucopenia in 25.35% and leucocytosis in 28.16% patients. Most of patients had normal leucocyte count (46.47%). NL ratio >3 was observed in 19.71% patients, and thrombocytopenia observed in 33(46.47%) patients. CRP-Q was raised in most of COVID-19 positive patients (78.87%), serum ferritin, IL-6 and D-dimer were raised in 22.53%, 38.02% and 52.11% patients, respectively.

Chest X-ray was performed in almost all COVID-19 positive patients and abnormal findings seen in 66.91% patients like peribronchial cuffing, heterogeneous opacity, ground glass opacity, areas of consolidation, hyperinflation etc. Of them CT- Thorex was performed in 10 and found abnormal in 7(9.85%) patients. CT-scan finding observed were multiple scattered and confluent ground glass opacities, areas of consolidation and CT severity score>10 (Table-VII).

Table-VII: Laboratory parameters of Covid-19 positive children

Parameters	Number (%)
Anemia (Hb<10mg/dL)	39(54.92%)
Leucopenia (<4000/ μ L)	18(25.35%)
Leucocytosis(>11,000/ μ L)	20(28.16%)
Thrombocytopenia(<1,50,000/ μ L)	33(46.47%)
Raised CRPQ (>5mg/dL)	56(78.87%)
Serum ferritin (>400ng/mL)	16(22.53%)
IL-6 (>4.4pg/mL)	27(38.02%)
D-dimer (>500ng/mL)	37(52.11%)
NLR (>3)	14(19.71%)
CXR	47(66.19%)

All admitted patients required treatment. 54.92% patients required oxygen support by nasal mask or HFNC and 25.35% required invasive ventilation. Apart, 39.43% required inotropic support whereas steroids, IVIG, antiviral (ramdesivir or acyclovir) and enoxaparin were given to 47.88%, 32.39%, 35.21% and 19.71% patients, respectively (Table-VIII).

Table-VIII: Treatment given in Covid-19 positive children

Parameters	Number (%)
Oxygen therapy	39(54.92%)
Invasive ventilation	18(25.35%)
Inotropic drugs	28(39.43%)
IVIG	23(32.39%)
Systemic steroids	34(47.88%)
Ramdesivir	25(35.21%)
Enoxaparin	14(19.71%)

Pneumonia was found in 53.52% patients, Shock in 39.43%, MIS-C in 21.95%, ARDS in 4.22%, hepatic dysfunction in 4.22%, meningitis 4.22% patients (Table-IX).

Table-IX: Complication among COVID-19 patients

Complication	Number
Pneumonia	38 (53.52%)
Shock	28 (39.43%)
MIS-C	18 (25.35%)
ARDS	3 (4.22%)
Hepatic Dysfunction	3 (4.22%)
Meningoencephalitis	3 (4.22%)

AKI	2 (2.81%)
DIC	2 (2.81%)

Majority of patients 57(80.28%) were recovered and successfully discharged. Mortality was recorded in 12(16.90%) patients and most common cause of death was pneumonia observed in (91.66%) patients (Table-X).

Table-X: Outcome of Covid-19 positive children

Parameters	Number (%)
Discharge	57(77.46%)
LAMA	2(2.81%)
Death	12(16.90%)
Causes of death (n=12)	
SAM with Pneumonia	11(91.66%)
AES with MODS	1(8.33%)

DISCUSSION

The clinical suspicion of SARS-CoV-2 infection in children had been a challenge for pediatricians worldwide. Many case series have been published but most of them had collected few clinical features. A broader description of the disease is of paramount importance for the clinical suspicions of SARS-CoV-2 infection in children.

In this prospective study, we described the clinical profile and outcome of Covid-19 positive children at a tertiary care hospital in southern Rajasthan. The disease was seen in all age groups, but the children less than five years of age accounted for more than half of the cases (58.53%), which is similar to other studies reported by (63%) **Kumar et al.**^[13] and (61.29%) **Nallasamy et al.**^[14]. This can be attributed to the inability of this age group to comprehend and follow social distancing norms and their frequent close contact with parents. There is slight male predominance in our study (59.15%), which is similar to study reported by (56%) **Sarangi B et al.**^[15].

According to the disease severity classification released by MOFHW on 20th April 2021, most of patients presented with severe disease (40.84%) which was contrast to the study of **Sahana et al.** found mild illness in 50% of cases^[16]. That may be because the severity of illness was forcing them to take hospital care and we have taken only admitted patients. Most of children had history of contact with Covid-19 positive family member which was also found in (66%) **Guo CX et al.**^[17]. Of the 71 children, 76.05% were found to have pre-existing co morbidities and **Nallasamy et al.**^[14] reported co-morbidities in 19% in their study. while many studies have noted malignancy or chronic neurological conditions as one of the pre-existing co morbidity, we observed anemia (54.92%) and malnutrition (15.49%) as the most common entity.

Fever was the commonest presenting symptom, followed by respiratory symptoms. Among respiratory symptom, cough being the main symptom seen in 56.33% of cases. **Guo CX et al.**^[17] and **Cordova EB et al.**^[18] in their study also noted that fever and respiratory symptoms were the commonest presenting complains. On physical examination most common finding noted was fever (85.91%) and respiratory discomfort (49.29%). **Cordova EB et al.**^[18] in their study noted pharyngeal erythema (60%) as most common physical finding. In our study thrombocytopenia was observed in almost half (46.47%) of the cases. Majority of patients had significantly raised inflammatory markers with severe disease and atypically presented cases, which was also observed by **Irfan O et al.**^[19] and **Kumar et al.**^[6] in their study. Most common complication developed in COVID-19 positive patients in our study was atypical pneumonia (53.52%) followed by shock (39.43%), which was also reported **Cordova EB et al.**^[18] (64.9% pneumonia) in their study. Multisystem inflammatory syndrome was reported in 18 (25.35%) cases. Swann OV et al found an incidence of MIS-C 11% in their study^[20]. High incidence in our study may be due to the fact that our study was conducted in second wave of COVID-19 pandemic.

Half of our patients (54.92%) required respiratory support. Supportive and symptomatic treatment was given depending upon the clinical condition of the patients and outcome was noted. Mortality in our study recorded was 16.90% which is higher compared to other study like (4%) in **Shekerdeman LS et al.**^[21] and most common cause of death, observed was pneumonia. We concluded that in our mortality proportion, severe malnourishment 11(91.66%) was main contributing factor.

CONCLUSION

Children are considered to have asymptomatic infection or milder disease only but they can have severe disease with high mortality.

Declarations

Funding: None

Conflict of interest: None

Ethical approval: The Study was Approved from Institutional Ethical Committee

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