

Clinical presentation, laboratory profile and immediate outcome of covid-19 patients in pediatric age group in a tertiary care centre- a retrospective observational study.

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Abstract

Background

SARS-CoV-2 infection presentation in children is usually milder than in adults but can be severe and fatal as well particularly in association with certain comorbidities.

Aims and objectives

To Study Demographic Profile of Children Affected by Covid 19. To Study Clinical Presentation and Laboratory Profile of Covid-19 And Immediate Outcome in Children Affected by Covid -19

Methods

This retrospective study was undertaken at a tertiary care paediatric teaching hospital. Patients aged 1month to 14 years who were diagnosed with COVID-19 and admitted in IMS & SUM hospital India. The data on clinical characteristics, Demographics profile and outcome of children (< 14 y) with COVID-19 illness from April 2020–October 2022 were reviewed and analysed.

Results

A total of 351 COVID-19-positive children (tested by reverse transcriptase polymerase chain reaction from nasopharyngeal and oropharyngeal swab) admitted during the study period. 35% children belong to age group 1-5 yr and Male children were affected more (64%) than female (36%). The most common symptoms in this study were fever (86%), cough (82%) and myalgia (48%). Abnormal CT findings ground glass opacity seen in about 24% cases. The mortality rate of patients with SARS-CoV-2 was 2% (7/351). Majority of children admitted with COVID-19 had mild to moderate illness except few groups due to the presence of comorbidities and malnutrition.

Conclusions

Children of all age groups were susceptible to COVID-19 illness with a slight male preponderance. Amongst infected, two-third were asymptomatic or had mild symptoms that required outpatient management and home isolation. The adverse outcomes were more commonly seen in infants and children > 10 y of age with associated malnutrition and comorbidities.

Keywords: Pandemic, Complications, COVID-19, direct cost, Multisystem Inflammatory Syndrome in Children (MISC)

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Introduction

Chinese authorities announced a cluster of severe pneumonia of unknown aetiology on 31st December 2019 in Wuhan province. By 7th January 2020, the causative agent had been identified as a novel corona virus (2019 nCoV). Later Human to human transmission was soon confirmed with a R0 of 2-3.5.² The pathogen was later renamed by WHO as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).¹ The incubation period of SARS-CoV2 was found to be between 3 and 14 days, with a median of 5 to 7 days.² Active viral replication has been proved in the cells of human respiratory tract, conjunctiva and gastrointestinal tract contributing to multiple routes of

transmission. Peak viral load is noted at the time of presentation which explains the transmission even in presymptomatic stage. The virus persists on inanimate objects for a variable period of time. The viruses are heat labile and also vulnerable to lipid solvents and alkaline pH. Coronavirus is positive sense, single stranded RNA. It is the largest known viral RNA.³ COVID-19 in paediatric age group may not initially present with fever and cough as often as adult patients.⁵ COVID-19 is generally a mild disease in children, including infants, causes fewer symptoms and less severe disease compared to adults, and is associated with much lower case-fatality rates. Preliminary evidence suggests that children are just as likely as adults to become infected with SARS-CoV-2, but are less likely to be symptomatic or develop severe symptoms.⁴ Clinical type in paediatric age group may range from mild to severe disease. Children with severe disease (defined as

hypoxia) developed respiratory or multiorgan failure or ARDS.⁵. Severe signs and symptoms are difficulty in breathing, persistent chest pain or chest tightness. Any child without these symptoms but has a chronic medical condition such as heart disease, lung disease or on chemotherapy should also be admitted.⁶In severely ill patients, there is rapid progression of disease with respiratory distress and need of mechanical ventilation following respiratory failure and organ failure. Unusual manifestations of covid 19 in paediatric age group in the form of Paediatric multi system inflammatory syndrome (PIMS). paediatric multi system inflammatory syndrome RT-PCR might be negative but antibody tests positive ⁷. The neurological manifestations reported with COVID-19 in children dizziness, headache, encephalopathy, myositis, taste and smell impairment and seizure etc ⁸. Diagnosis of COVID 19 is mostly based on molecular tests like RT-PCR of nasopharyngeal swab specimen for SARS-CoV-2. RT PCR tests are highly specific ⁹. In children, there is less derangement of the hematologic and biochemical parameters.¹⁰ Deranged laboratory parameters mostly assess the severity of COVID-19 and help full in treatment. The Chest X ray are usually normal in mild/ early disease. In those with severe disease, it is abnormal with bilateral infiltrates and sometimes complete white out of the lungs ¹¹. CT scans of the lungs are more sensitive than CxR. ¹¹ COVID 19 seem to affect children of different age group with a different frequency with diverse clinical presentation. So, this study is conducted with an aim to find out demographic profiles, clinical presentation and outcome of COVID 19 in paediatric age group.

Material and Methods

Study design

This was a hospital-based retrospective cross-sectional study.

Study setting

This study done in the Department of Paediatrics institute of medical science and sum Hospital, Bhubaneswar, Odisha. The

study period was from May 2020 to September 2021 (the first wave continued from May 2020 to January 2021 and the second wave from April 2021 to September 2021).

Participants

Patients aged 1month to 14 years who were diagnosed with COVID-19 (By reverse transcriptase polymerase chain reaction (RT-PCR) test on nasal and nasopharyngeal swabs) and admitted in IMS & SUM hospital India. The study population also included those children who were already admitted for other clinical illnesses in the Department of Paediatrics and subsequently tested positive for COVID-19 while inpatients Patient having Inadequate Data or who left against medical advice were excluded from this study.

Data measurement

Information regarding the study population was taken from both the departmental and hospital records.

Statistical analysis: Statistical analysis Data was saved in Microsoft® Excel® 2010. Percentages and means were calculated for the variables. P-value of < 0.05 was taken as significant.

Ethical consideration

Ethical clearance from the Institutional Ethics Committee was obtained before conducting this study.

Results

During COVID -19 pandemic total seventeen thousand four hundred sixty-two patient were admitted in Ims and sum hospital. Out of total admission only two percent (351) belongs to children below 14 years.

Table 1. Sociodemographic characteristics (n=351)

Variable	N(%)	
Age groups (age in year)	<1year	35(10%)
	>1yr to 5Yr	124(35%)
	5yr to 12yr	112(32%)
	>12	80(23%)
Gender	Male	224(64%)
	Female	127(36%)
History of contact	Present	298(85%)
	Absent	53(15%)

In this study 35% children belong to age group 1-5 yr and only 10% belongs to age group below 1 yr

Male children were affected more (64%) than female (36%)

Table 2. Relation between gender, complications, and risk factors.

Variables	Number of patients n (%)	Gender		p-value
		Male n (%)	Female n (%)	
History of travel				
Yes	228(65%)	56(16%)	27(7%)	0.06
No	123(35%)	168(48%)	100(28%)	
History of contact				
Yes	326(93%)	130(37%)	98(28%)	0.04
No	25(7%)	94(27%)	29(8%)	
Presence of comorbidities				
Yes	118(33%)	56(16%)	18(5%)	0.06
No	233(66%)	168(48%)	109(31%)	

Present study shows history of contact with Covid-19 in 93% mostly household contact.

Travel history was present in 65% cases 33% of children having comorbidities/chronic illness

Table 3. Clinical manifestations of COVID among children

Clinical characteristics	No. of children affected	Percentage affected
Fever	301	(86%)
Cough	289	(82%)
Rash	36	(10%)
myalgia	157	(48%)
Sore Throat	151	(43%)
Headache	110	(31%)
Conjunctival Congestion	35	(10%)
GI Symptom	159	(45%)
Respiratory Distress	42	(12%)
MIS-C	14	(4%)
CNS symptoms	24	(7%)
Asymptomatic	47	(13%)

The most common symptoms in our study were fever (86%), cough (82%), myalgia (48%)

Only few developed complications like MIS-C (4%), RDS (12%), CNS complications (7%)

Table 4: Laboratory and radiological findings of children with COVID-19 disease

CBC		N(%)
Lymphopenia		14(4%)
Leucopenia		28(8%)
Anemia	Mild	70(20%)
	Moderate	35(10%)
	severe	6(2%)
Thrombocytopenia (mild)		35(10%)
Transaminitis		196(56%)
Deranged coagulation profile		
↑ PT/aPTT/INR		21(6%)
Elevated D-dimer (>1 ug/L)		7(2%)
Deranged KFT		42(12%)
Abnormal chest x-ray Ground glass opacity		105(30%)
Abnormal chest CT-findings Ground glass opacity		84(24%)

Most common radiological findings are abnormal x-ray (ground glass opacity 30%), abnormal CT findings (ground glass opacity 24%). Anaemia was seen in 30% cases along with

leukopenia, lymphopenia and thrombocytopenia was seen in 8%,4% and 10% cases respectively

Table 5: Treatment of children with COVID-19 disease

Treatment	N(%)
Conservative (paracetamol, oral fluids, oral antibiotics)	168(48%)
Oxygen via mask/nasal prongs	105(30%)
Invasive ventilation	21(6%)
Drugs used	
Azithromycin	35(10%)
Anticoagulants	14(4%)
Steroids	168(48%)
Remdesivir	112(32%)
Low molecular weight heparin	84(24%)
Outcome	
Discharge	344(98%)
Mortality	7(2%)

Most of the children were managed conservatively with Paracetamol and other supportive measures. Children with severe respiratory disease were managed with Steroid (48%), Antiviral

agent (Remdesivir) 32% and low molecular weight heparin in 24% cases.

Table 6. Clinical course and outcome of children with SARS-CoV-2 infection admitted in COVID ward

Characteristic (N = 100)	N	%
Respiratory support		
NIV(CPAP, HFNC,)	147	(42%)
Mechanical ventilation	10	(3%)
Length of hospital stay (d) (Mean $\pm$ SD/Median (IQR))	6.95 $\pm$ 3.69/7	
Outcome		
Discharge	344	(98%)
Death	7	(2%)
Transfer to other hospitals	0	(0%)

CPAP Continuous positive airway pressure airway pressure 42% was the primary modality of respiratory support, although only 3% cases needed mechanical ventilation.

Table 7. Frequency of complications.

Complication	Total of 50 patients n (%)	Male n (%)	Female n (%)
RDS/ARDS	21(6%)	14(4%)	7(2%)
Pneumothorax	6(2%)	5(2%)	1(0.2%)

MISC	14(4%)	14(4%)	0(0%)
Seizures	21(6%)	14(4%)	7(2%)
COVID-19 encephalitis	28(8%)	21(6%)	7(2%)
GBS	7(2%)	0(0%)	7(2%)
Shock	147(42%)	84(24%)	63(18%)
COVID-19 pneumonia	189(54%)	126(36%)	63(18%)
Myocarditis	14(4%)	7(2%)	7(2%)
Transaminitis	196(56%)	119(34%)	77(22%)
Acute kidney injury	49(14%)	28(8%)	10(3%)

Most common complications observed was pneumonia (54%) followed by shock 42(%). Males having comorbidities% /chronic illness were had more complications. All most all deaths are due to associated comorbidities.

Discussion

There is a large amount of information published for adult COVID-19 patients regarding the Clinical presentation, complications, comorbidities, and treatment¹². However, there is a paucity of the data for paediatric COVID-19. Our study aimed to assess the clinical presentation, comorbidities, complications, treatment patterns and outcome of paediatric COVID 19 children. This retrospective study highlights the clinical profile of children with SARS CoV-2 infection from a tertiary care paediatric teaching hospital in eastern India. Most of the children were either asymptomatic contacts or had mild flu-like symptoms. The most common presentation was fever followed by cough and fast breathing, but a substantial proportion had gastrointestinal symptoms as well. The spectrum of clinical features reported in other published studies are heterogeneous¹³. A significant proportion of children required admission due to associated comorbidities and severe illness. Most common comorbidities were chronic respiratory disease (27%), congenital heart defect (23%) and malnutrition in 12% cases. Prata-Barbosa et al.¹⁴ concluded that 41% of the patients had comorbidities which included predominantly neuromuscular diseases (30%), chronic respiratory disease (20%), once hematological disease (20%), congenital heart defect (13%), diabetes (7%), chronic liver disease (3%), undernutrition (13%), and obesity (3%). The mean age and sex distribution of children admitted with SARS-CoV-2 infection in our study was comparable with the other published studies elsewhere¹⁵. Children of all age groups were susceptible to COVID-19 infection as reported elsewhere¹⁶. A study conducted by Chua et al.¹⁷ found that 55.4% of the infected patients were male, but in our study we found 64% of the patients were male. Although the clinical features of COVID-19 illness in children are diverse, but fever and cough were the most common symptoms reported in our study. Gastrointestinal symptoms also more common in this study. The spectrum of clinical features reported in other published studies are heterogeneous and comparable to our study.¹⁸ Unlike the studies on disease severity from different settings, more than two third of the admitted cases in this study had mild to moderate illness. Similar to the results reported by Dong et al.¹⁸. Infants had more severe disease in our study

particularly with associated comorbidities. However, the data on relationship of disease severity and gender are limited in children. Sarangi et al. studied the epidemiological and clinical characteristics of COVID-19 affected Indian children during initial phases of pandemic and found that most of them only had mild symptoms and a striking observation of this study was that a high proportion of children with SARS-CoV-2 infection required admission in view of their underlying comorbid illness.¹⁹ Comorbidities among children with SARS-CoV-2 have been reported in studies from China^[15], India (61%)^[17] and US/Canada (83%)²⁰. The mortality rate observed in this study is little bit lower than that reported globally in both children and adults²¹. Contrary to published literature on laboratory parameters²², a higher proportion of children in this study had anaemia, leukopenia, thrombocytopenia and elevated D-dimers. It can be attributed to higher rate comorbid illness), secondary bacterial infections and sepsis in our study. Most of the admitted children had severe and critical illness that resulted in higher proportion of them with these biomarkers of inflammation which were consistent to the studies described by Samprathi et al.²³ and Cui et al.²⁴. In accordance with the available literature on ventilation in SARS-CoV-2²⁵, oxygen and ventilatory support requirement is low in our study. Few cases in presence of comorbidities, like preexisting cardiorespiratory illness accounted for increased need of respiratory support in the present study. Children with MIS-C seen in this study was similar to previous reports from India and other parts of the world²⁶. The study has its share of limitations of retrospective design and lack of long term follow up of comorbidities after discharge. Despite these limitations in our study, this study provides a comprehensive data on clinical presentations, laboratory profile and outcomes of COVID-19 in children from eastern India.

Conclusion

Children of all age groups were susceptible to COVID-19 illness with a slight male preponderance. Amongst infected, two-third were asymptomatic or had mild symptoms that required outpatient management and home isolation. Though fever and other respiratory symptoms make up the commonest clinical presentation, many may present with gastrointestinal symptoms. Majority of children admitted with COVID-19 had severe to critical illness due to the presence of malnutrition and underlying comorbidities.

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Ethical Clearance

The study was approved by the Institutional Ethics Committee

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6 Recommendations

Cough etiquette's to be marinated in all cases of respiratory tract infection and selected cases should be screened for SARS-CoV-2 infection

Limitations

Single-centre design with limited sample size. Lack of long-term follow-up for recurrence or chronic complications

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Conflict of interest and source of fundings

The authors declare that the research was conducted in the absence of any commercial or financial relationships with no conflict of interest.

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