

# Clinical Profile of COVID-19 Illness in Children—Experience from Tertiary Care Hospitals

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## ABSTRACT

**Objective:** Assessing detailed clinical profile as well as outcome in severe acute respiratory infection coronavirus infectious disease 2 (SARS-CoV-2) infected children.

**Methods:** This is a retrospective study undertaken at pediatric departments of tertiary care hospitals of Lahore, Rawalpindi and Mirpur AJK for the period of three months from July 2021 to September 2021. The clinical characteristics data as well as result of children under 18 years infected with COVID-19 were reviewed as well as analyzed.

**Results:** In total 2919 children that were suspected to be COVID-19 infected were verified for COVID-19 virus in flu emergency (n=1744), severe acute respiratory infection ward (n=825) and non-COVID (n=350). From these studies, 8.73% children tested positive for COVID-19 infection. Of the positive cases, 56.47% were managed for outpatients and 59% needed admission. Most children admitted had critical illness owing to malnutrition and other comorbidities.

**Conclusions:** Children of any age group are vulnerable to COVID-19 with minor male preponderance. Amongst infected, 2/3<sup>rd</sup> were asymptomatic or mildly symptomatic and needed outpatient management as well as home isolation. The adverse consequences were commonly observed in infants as well as children under 10 years of age with undernourishment and comorbidity.

**Keywords:** COVID-19, Pandemic, Comorbidities, Respiratory infection

## INTRODUCTION

COVID-19 pandemic was caused by SARS-CoV-2 and is global catastrophe of unparalleled magnitude. This infection affects every age group and severity varies from the mild flu to severe pneumonia leading to acute respiratory distress syndrome (ARDS), multi-organ dysfunction, shock, myocardial and kidney injury (Gupta et al., 2020; Pan et al., 2020). Surveillance data from around the globe reports that children account for approximately 13% laboratory-confirmed cases. Children from every age group are vulnerable to COVID-19 (Gupta et al., 2020; Stokes et al., 2020; Wu & McGoogan, 2020). This infection is asymptomatic in most of the children, though, critical illness is observed in a few (Dong et al., 2020; Han et al., 2021). In spite of the universal spread, epidemiological as well as clinical pattern of infection is mostly unclear, chiefly among children. Ever since COVID-19 is novel with much heterogeneity in spectrum as well as severity of infection for all groups internationally, it is relevant to study as well as identify clinical profile as well as outcome of infection in children. Many studies have assessed the illness but there is limit study on the clinical profile as well as outcome of COVID-19 infected children from Pakistan. Pediatric involvement of multiple system is reported in form of sequestered reports (Balasubramanian, Nagendran, Ramachandran, & Ramanan, 2020; Ramcharan et al., 2020). There is limited data on influence of underlying infection and pre-existing comorbidities on severity in children. Data reporting characteristics of strictly affected children is also limited. This paper aims to look at clinical features of SARS-CoV-2 infected children.

## METHODOLOGY

Retrospective study conducted at pediatric departments of tertiary care hospitals of Lahore, Rawalpindi and Mirpur AJK for the period of three months from July 2021 to September 2021. During COVID-19 outbreak, a devoted part for screening as well as triaging patients suspected for COVID-19 was set up near entrance of hospital. The part was managed by triage nurse, fortified with thermometer as well as pulse-oximeter. All children under 18 years coming here reporting recent fever, cough and/or

rapid breathing were referred to the flu emergency which was set up for preliminary management of suspected children. Besides, severe acute respiratory infection and COVID ward were set where COVID-19-suspected and confirmed patients were admitted respectively.

Admission criteria for suspected cases was respiratory distress, saturation less than 94%, poor peripheral perfusion and oral intake, seizures (Singh et al., 2022). Moreover, comorbidities and less than one year of age were considered for admission. RT-PCR sample was sent as per WHO guidelines (Singh et al., 2022). Children admitted to non-COVID areas were also screened upon development of symptoms afterward admission, originated from hotspots or had undisclosed exposure to infected person. Based on outcomes of RT-PCR and assessment, treatment in hospitals or isolation at home were recommended. Children testing positive COVID-19 as well as fulfilling admission standards were moved to ward.

Severe as well as critical cases needful of intensive care, ventilation in addition to organ support were managed in ICU. Other patients were managed in ward. Investigations comprising CBC, serum biochemistry and chest radiograph were conducted. Coagulation summary, arterial gases, inflammation markers such as C-reactive protein, serum ferritin, pro-calcitonin and CPK-MB were assessed. All children infected were managed according to standard WHO protocol (Singh et al., 2022).

Paracetamol was used to control fever and intravenous fluids to uphold adequate hydration as well as maintain electrolyte balance was used as needed. Early nutrition was considered in noncritical children. Children who developed respiratory distress were put on oxygen support with no particular guidelines, ICMR guidelines were followed with modifications (Singh et al., 2022). For above 12 years hydroxychloroquinone, azithromycin and oseltamivir were administered. Empirical antibiotics were given to kids where shock or sepsis was suspected (Ramcharan et al., 2020). Children emerging with multisystem inflammatory syndrome (MIS-C) were coped using IVIG in addition to methylprednisolone according to CDC guidelines (Rajgor, Lee, Archuleta, Bagdasarian, & Quek, 2020). Cases of admitted kids were reviewed and details of management were recorded. Inclusion criteria was age up to 18

years and at least 1 positive RT-PCR. Demographic details, clinical presentation, comorbidities, treatment and labs were recorded. Ethical approval was obtained from Institutional Ethics Committee. Descriptive stats was used.

## RESULTS

From April-October 2020, 54,486 children reported to screening center based on symptoms such as flu emergency (n=4184), general OPD (n=50,302). In total 2919 of the suspected children tested positive in flu emergency (n=1744), SARI ward (n=825) and non-COVID area (n=350) of the hospital. Of these positive cases, 56.47% kids were asymptomatic or mildly symptomatic and were managed on outpatient basis with home isolation. 100 children, of which 59 were males, needed admission. Mortality was 11.4%. Median admittance age was 62.5 months and median duration from start of infection to diagnosis was 4 days. Commonest symptom was fever, cough, fast breath and nausea which were

80%, 35%, 47% and nausea 34% respectively. Among symptomatic children mild, severe and critical was 27%, 42% and 31 respectively. ratio of kids admitted in diverse ages showed that 59% of admitted kids has other comorbidities. Hematological malignancy and tuberculosis were most common. Amongst 29 deaths, 27 kids were admitted in while 2 reported to hospital dead. Max ratio of deaths was 29.62% in infants and 33.33% in kids above 10 years of age. Most common complications were 18% respiratory distress trailed by 16% kidney injury, 15% encephalopathy and 9% myocarditis. 9% kids showed signs of MIS-C. Among children needing respiratory support, oxygen inhalation was needed in 54% while 11% were noninvasively ventilated and mechanical ventilation was given to 35%. For baseline labs, 2/3<sup>rd</sup> children reported abnormal CBC, 55% showed leukocytosis, 12% leukopenia and 285 lymphopenia. Pneumonia was confirmed radiologically in 44%.

Table 1: Distribution of COVID-19 infected children from different parts of hospital

	Non-COVID area* (%)	Flu emergency (%)	SARI ward (%)
Total screened (n=2919)	12	59.7	28.3
Brought dead (n=2)	1	1	0
Total positive (n=255)	23.5	58	18.5
Children admitted with infection in diverse zones (n=100)	40	20	40
Managed as outpatient and isolation (n=144)	11.8%	84.7	3.5
Transfer (n=10)	30	50	20

## DISCUSSION

Dealing with COVID-19 has been a challenge for the resource reserved developing country. Inadequate health care amenities and large susceptible population, most of which is already afflicted with comorbid circumstances posed trials on every aspect. This retrospective research highlights clinical profile of COVID-19 infected children coming to a tertiary care pediatric hospital. Most children were asymptomatic or showed mild flu-like indications. The common indication was fever trailed by cough in addition to fast breathing, but a significant proportion showed gastrointestinal symptoms. Most of the children needed admission owing to associated illnesses as well as severe infection. It was observed that the complication rate was higher in the current study, probably due to the bias of referring to author center i.e. higher ratio of severely infected children as well as comorbidities. The adversarial outcomes were common in infants as well as children above 10 years. The tendency of overall footfall of kids attending hospital was proportionate to lockdown and no lockdown era of country (April-October 2020). However, next peak was linked with return of migrant population, overpopulation and seasonal effect of upwelling in vector borne illnesses (dengue and malaria). Mean age and gender of kids admitted to hospital with COVID-19 infection was comparable to readings published elsewhere (Dong et al., 2020). Children belonging to any age were vulnerable for infection as reported by other researches (Shekerdeman et al., 2020; Singh et al., 2022). Although clinical features of infection in kids is diverse, yet fever in addition to cough were found to be commonest of all as reported here. Range of clinical indications stated by other publishers are heterogeneous based on setting and cohort investigated (Han et al., 2021; Liguoro et al., 2020). Unlike studies on infection severity from dissimilar situations, more than 2/3<sup>rd</sup> of admitted cases here showed severe/critical illness. Comparable to reports of Dong et al. (Dong et al., 2020), infants were more susceptible infection and showed severe disease. Though, data on association of infection severity and sex is scarce in children. A striking opinion of current research is that major ratio of infected children needed admission due to underlying comorbidities. Comorbid illness among infected children have been also reported from US/Canada, India and China (Banerjee, Guha, Das, Nandi, & Mondal, 2020; Lu et al., 2020; Shekerdeman et al., 2020). Nearly 50% admitted COVID-19 infected children had malnourishment and low weight which led to further complication of infection and morbidity. No complete data is still present that

explain the influence of COVID-19 on children who are fully nourished and those that are undernourished or have an underlying disease; nonetheless it is sensible to think that latter possibly are at an elevated risk of developing serious illness. The mortality observed in current study is significantly higher as compared to that which is reported internationally (Hoang et al., 2020; Meena, Yadav, Saini, Yadav, & Kumar, 2020). The reasons proposed for this are that there might be a referral bias and only the most severely ill children were admitted, higher transport time owing to restricted means for the duration of lockdown, comorbidities, undernourishment and contagions prevalent. In contrast to the studies that report lab parameters there was a larger proportion of kids who had raised D-dimers, thrombocytopenia, leukocytosis and anemia (Hoang et al., 2020; Lu et al., 2020; Meena et al., 2020; Qiu et al., 2020; Rajgor et al., 2020; Rodriguez-Morales et al., 2020). This can be due to increased comorbidities such as leukemia, secondary infections as well as sepsis. However, ratio of kids reporting elevated serum ferritin, hypoalbuminemia and high levels of CPK-MB were identical to other publications (Qiu et al., 2020; Rodriguez-Morales et al., 2020). Most admitted children suffered severe illness leading to higher ratio of children having biomarkers of inflammation. Contrary to published data on the ventilation of infected individuals, higher percentage of kids in present study needed oxygen and ventilation (Patel, 2020). The existence of comorbidities, such as tubercular meningitis, pulmonary tuberculosis, dispersed staphylococcus infections as well as liver abscess played a part in the need of enhanced respiratory support in the study. Children who had MIS-C in current paper were identical to other reports (Acharyya, Acharyya, & Das, 2020; Verdoni et al., 2020; Viner & Whittaker, 2020). This study has a particular share of limits of retrospective strategy and absence of long-term follow up after discharge. Despite these shortcomings, this is a preliminary information on clinical features as well as outcomes of COVID-19 infection in children.

## CONCLUSION

Children belonging to all ages were found to be equally vulnerable to COVID-19 with a minor male majority. Amongst positive cases, 2/3<sup>rd</sup> were asymptomatic/mildly symptomatic with only need of outpatient administration in addition to home quarantine. Though fever in addition to other respiratory indications made commonest clinical indication, many possibly will present with gastrointestinal

indications. Most children admitted had severe/critical illness owing to malnourishment and basic comorbidities.

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