

ORIGINAL RESEARCH

To examine the clinical manifestations of Covid-19 in paediatric patients

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ABSTRACT

Aim: To examine the clinical manifestations of Covid-19 in paediatric patients. **Material and methods:** The research was conducted over the period of 2 years from dec 2020 to dec 2022 in. Patients reported to OPD of clinic. This study included individuals under the age of 18 who had a medical history of respiratory or gastrointestinal symptoms, or fever, and had been recently exposed to a confirmed case of COVID-19. **Results:** A cohort of 200 children underwent evaluation. Fifty percent of the total number of children, which is equivalent to 100 individuals, was confirmed to have contracted COVID-19 through a positive SARS-CoV-2 RT-PCR test. Fifty percent of the patients who were diagnosed with COVID-19 had a pre-existing chronic medical condition. It was observed that 71% of the children exhibited fever, while 37% of them displayed excessive crying and dry cough. These patterns include Pattern A, characterised by minimal symptoms with only one or two present; Pattern S, marked by a sudden onset of four symptoms within the initial 24-36 hours; and Pattern D, which involves a sequential onset of symptoms over a period of several days. **Conclusion:** It is imperative for clinicians to acknowledge that the clinical manifestations of COVID-19 in paediatric patients are more diverse than previously documented and distinct from those observed in adults. Frequently, these symptoms are non-specific and may include gastrointestinal manifestations, thus necessitating heightened clinical vigilance.

Keywords: Children, clinical, coronavirus disease 2019, Fever, Pattern

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INTRODUCTION

The pandemic known as Corona virus disease 2019 (Covid-19) is attributed to the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The phenomenon originated in China and subsequently disseminated to other nations [1]. The World Health Organisation declared the COVID-19 outbreak as a pandemic on March 11, 2020. The incidence of Covid-19 infection among children has increased over time, despite initial reports indicating a lower prevalence of paediatric cases during the early stages of the pandemic. In December of 2019, a group of pneumonia cases with an unknown cause were discovered in the city of Wuhan, China. Subsequently, on January 12th, 2020, a novel coronavirus was identified as the culprit. During the initial phases of the epidemic, the infection primarily affected adults, who subsequently transmitted the infection to their families, including children. On January 20th, 2020, the initial documented instance of SARS-CoV-2 infection in a paediatric patient was reported in Shenzhen, China. On January 26th, 2020, the initial instance of an infant case was documented in

Xieogan, China. The majority of the children contracted the infection through their relatives [6]. The primary origin of infection stems from individuals who have contracted COVID-19, regardless of whether they exhibit symptoms or not [4].

The primary mode of disease transmission is through the inhalation of infected droplets that are expelled by an infected individual during coughing and sneezing. An additional means of transmission involved the transfer of respiratory secretions onto surfaces and fomites, followed by direct contact with said surfaces and fomites. Viral particles have been identified in faecal matter as well. The feco-oral route of transmission has not been conclusively established. The incubation period for children typically ranges from 2 to 10 days. The median incubation period has been determined to be 5.1 days. According to research, a minority of individuals may exhibit symptoms subsequent to a 14-day quarantine period, however, a significant majority of 97.5% of symptomatic cases will manifest within 11.5 days following the onset of infection. These findings have

been reported in sources [6,7]. The clinical presentation of the condition bears resemblance to that of an acute viral respiratory tract infection, characterised by symptoms such as fever, cough, sore throat, breathlessness, and other constitutional manifestations including headache and body pains. However, individuals with comorbidities frequently experience a progression towards multi-organ dysfunction. While respiratory symptoms are more prevalent in children, symptoms related to the gastrointestinal system such as vomiting and diarrhoea are also observed.⁸ The paediatric population exhibits diverse clinical manifestations, and the CT chest results differ from those of the adult population. Additionally, co-infection is frequently observed in paediatric patients with pneumonia [9]. A significant portion of children who have contracted the virus exhibit no symptoms, however, they may still play a role in the transmission of the disease. The paediatric population exhibits less severe symptoms and a more favourable prognosis compared to adults, although severe cases have been identified in individuals with comorbidities [10].

Initially, it was believed that hospitalisation may not be necessary for children due to the milder course of COVID-19. However, subsequent research has demonstrated that COVID-19 can result in moderate to severe respiratory illness, necessitating hospitalisation, including admission to the intensive care unit.[11]. According to research findings, neonates were identified as the demographic group with the greatest susceptibility to experiencing severe manifestations of COVID-19 infection. The virus was detected in various bodily fluids and excretions, including bronchopulmonary lavage fluid, sputum, nasal swabs, pharyngeal swabs, and faeces.

The confirmation of clinical diagnosis has been achieved through the utilisation of RT-PCR on nasopharyngeal swabs [12]. In the paediatric population, frequently observed CT-chest findings include ground glass opacities, bilateral shadowing in localised areas, and subpleural lesions in the lower and posterior segments. Conversely, in adults, a significant proportion of cases exhibit a bilateral patchy shadowing pattern. However, there is a lack of correlation between chest findings and clinical recovery, as evidenced by studies [13]. The utilisation of CT scans in paediatric patients with suspected pneumonia should be approached with caution due to the potential for harmful radiation exposure.

MATERIAL AND METHODS

The research was conducted over the period of 2 years from dec 2020 to dec 2022 in. Patients reported to OPD of clinic. This study included individuals under the age of 18 who had a medical history of respiratory or gastrointestinal symptoms, or fever, and had been recently exposed to a confirmed case of COVID-19.

Exclusion criteria were applied to patients who presented with tracheostomy, severe neurological comorbidities, recent use of sedatives, or unaccompanied children without their primary carer. The specimens were subjected to reverse transcriptase-polymerase chain reaction (RT-PCR) using nasopharyngeal swabs to detect the presence of severe acute respiratory syndrome corona- virus 2 (SARS-CoV-2). The study examined 20 pre-existing symptoms in patients who satisfied the inclusion criteria prior to their assessment at the emergency department. The term "gastrointestinal symptoms" was operationally defined as the occurrence of diarrhoea, vomiting, nausea, or abdominal pain. Pneumonia was defined as the existence of either augmented respiratory effort or oximetry levels below 93%.

The data obtained from confirmed COVID-19 patients was subjected to analysis through the utilisation of case counting and descriptive statistical methods. The analysis involved the computation of median (range), quartiles, and percentages. We generated diagrams for each patient to depict the temporal sequence of symptom manifestation. The temporal axis is depicted by a horizontal line, denoting the duration in days leading up to admission. The term "time zero" denotes the specific day on which the initial symptom of a given condition or illness first manifests. The temporal onset of each symptom was recorded above the horizontal axis.

RESULTS

A cohort of 200 children underwent evaluation. Fifty percent of the total number of children, which is equivalent to 100 individuals, were confirmed to have contracted COVID-19 through a positive SARS-CoV-2 RT-PCR test. Due to the varying clinical presentations among chronic patients, they were delineated from those who were previously asymptomatic.

Fifty percent of the patients who were diagnosed with COVID-19 had a pre-existing chronic medical condition. The prevalent ailment among the subjects was cancer, accounting for 17% of the cases, trailed by chronic lung disease at 13%, obesity at 9%, chronic kidney disease at 7%, and neurological disorders at 5%. Four patients were diagnosed with multiple chronic conditions. Based on the assessed symptoms, it was observed that 71% of the children exhibited fever, while 37% of them displayed excessive crying and dry cough. Additionally, 5% of the children were found to have hyposmia, as indicated in Table 2. Gastrointestinal symptoms were prevalent, with a quarter of the patients exhibiting solely digestive symptoms. All patients who did not exhibit any symptoms related to the respiratory or gastrointestinal systems were found to have compromised immune systems.

Table 1: Gender and age of the children's

Age	Number	%
Below 5	27	27
5-10	39	39
10-15	28	28
Above 15	6	6
Gender		
Boys	31	31
Girls	69	69

Table 2: Symptoms of the children's

	Number	%
Fever	71	71
Excessive crying	26	26
Dry Cough	37	37
Rhinitis	26	26
Sore throat	25	25
Headache	23	23
Abdominal pain	23	23
Conjunctival hyperemia	23	23
Vomiting	23	23
Diarrhea	23	23
Shortness of breath	21	21
Fatigue	26	26
Hyporexia	19	19
Myalgia	15	15
Dysgeusia	9	9
Arthralgia	9	9
Productive cough	9	9
Rash	9	9
Hoarseness	6	6

Table 3: Demographic and Clinical Characteristics, of Pediatric Patients With COVID-19

Parameter	Chronic medical illness (n=50)		Previously healthy=50		Total
	Number	%	Number	%	
Girls	39	78	30	60	69
Immunosuppression	15	30	0	0	45
Pneumonia	15	30	20	40	35
Admitted	30	60	19	38	49
Past antibiotic	14	28	8	16	22
Past symptomatic	36	72	33	66	69
Clinical symptomatic					
Almost asymptomatic (Pattern A)	8	16	15	30	23
Sudden (Pattern S)	25	50	19	38	44
Disperse (Pattern D)	15	30	20	40	35

Among the observed indicators, it was found that 61% of the children exhibited pharyngeal erythema, 25% displayed irritability, and 21% presented rhinorrhea and conjunctival hyperemia. The initial clinical manifestation reported by the majority of patients was pyrexia, observed in 71% of cases, followed by coughing in 37%. Subsequently, fatigue, rhinitis, and excessive crying were each reported by 26% of the patients. The deliberate manifestations that were sought in patients, including expectoration, mucopurulent rhinorrhea, posterior nasal discharge, mucopurulent conjunctival discharge, and epistaxis,

were not observed. The study identified several manifestations that were deliberately sought and observed in a single patient, including nasal mucosa edoema, rhonchi, cyanosis, lymphadenopathy, grunting, and wheezing. Upon examination of the symptom appearance chronology diagrams, three distinct patterns were identified. These patterns include Pattern A, characterised by minimal symptoms with only one or two present; Pattern S, marked by a sudden onset of four symptoms within the initial 24-36 hours; and Pattern D, which involves

a sequential onset of symptoms over a period of several days. (Table 3).

With the exception of two individuals, all patients diagnosed with pneumonia were admitted. A total of three patients were diagnosed with a syndrome resembling Kawasaki disease. Among the cohort of patients under study, mechanical ventilation was required by a total of five individuals. Two of these patients were diagnosed with cystic fibrosis, while the remaining individual had undergone a kidney transplant and unfortunately passed away. The mortality rate observed in this particular investigation was 4%.

DISCUSSION

The diagnosis of SARS-CoV-2 infection in paediatric patients has posed a significant challenge for medical professionals across the globe. Numerous case series have been disseminated in the literature, albeit predominantly retrospective in nature and characterised by limited clinical feature collection. A comprehensive delineation of the ailment holds significant significance in the medical assessment of SARS-CoV-2 contagion in paediatric patients. Despite the limited sample size, our study investigated a diverse range of clinical presentations in a heterogeneous cohort of paediatric patients. The testing capacity for SARS-CoV-2 in India is constrained and restricted to individuals who satisfy the national epidemiological criteria. A considerable number of children exhibiting symptoms that align with COVID-19 within the community are not subjected to testing, leading to a lack of diagnosis. The utilisation of our inclusion criteria facilitated the examination of patients who would have otherwise remained untested. The findings presented in this study could potentially prompt a reevaluation of the epidemiological criteria utilised for identifying cases of COVID-19 in paediatric patients. It is of significance to note that the present investigation obtained information from paediatric patients who received medical attention or treatment at a tertiary healthcare facility, with 50% of the cohort presenting with a persistent medical ailment. As a result, it is probable that the study cohort predominantly comprises individuals who exhibit the most severe manifestation of the disease. Statistical analysis was not performed due to the fact that the study was designed as a case series description, the sample size was limited, and there existed a significant age disparity between the two groups. According to reference [14], the incidence of adult patients presenting with digestive symptoms in the absence of respiratory symptoms is infrequent. Conversely, this presentation appears to be more prevalent in paediatric populations. The findings of our study indicate that SARSCoV-2 infection frequently manifests with non-specific indications and symptoms. Additionally, the presence of digestive symptoms, in the absence of respiratory symptoms,

should be regarded as a potential indicator of the infection. Up to 50% of patients have reported experiencing loss of taste and smell, which has been suggested as a significant distinguishing symptom among adults. This information has been documented in literature [15]. The occurrence of chemosensory dysfunction in children is infrequently documented in literature [16]. However, our findings indicate that both hyposmia and dysgeusia are not uncommon. The incidence of pneumonia in paediatric patients with COVID-19 has been documented to be as high as 65% based on radiologic criteria, while its occurrence based on clinical criteria is infrequently reported. Through the examination of solely clinical characteristics, we have identified that 35% of patients have developed pulmonary infection. The identification of distinct clinical presentations of COVID-19 has the potential to facilitate the identification of individuals who are at an elevated risk of experiencing unfavourable prognoses.[17] The findings of our study indicate that the occurrence of the sudden pattern, commonly referred to as 'S', is linked to the development of pneumonia in individuals with pre-existing chronic medical conditions. Furthermore, as demonstrated in the study conducted on young adults [17], obesity has been identified as a significant risk factor for unfavourable outcomes, specifically pulmonary complications, in paediatric patients afflicted with COVID-19.

CONCLUSION

It is imperative for clinicians to acknowledge that the clinical manifestations of COVID-19 in paediatric patients are more diverse than previously documented and distinct from those observed in adults. Frequently, these symptoms are non-specific and may include gastrointestinal manifestations, thus necessitating heightened clinical vigilance.

REFERENCES

1. Zhui N, Zhang D, wang W, Lix, yang B, Song J et al. china novel virus investigating and research team. A novel corona virus from patients with pneumonia in china. *N Engl J med.* 2020; 382(8):727-733
2. WHO. Corona virus 2019 (Covid 19) situation report- 51, 2020
3. Li Q, Guan X, Wu p, Wang X, Zhou, Tong Y et al. Early transmission dynamics in wuhan, china of novel corona virus- infected pneumonia. *N Engl J Med.* 2020; 382(13):1199-1207.
4. Chan JF, Yuan S, Kok KH, To KK, Chu H, Yang J et al. A family cluster of pneumonia associated with the 2019 novel corona virus indicating person to person transmission: study of a family cluster. *Lancet.* 2020; 395(10223):514-523.
5. Lin GT, Zhang YH. Epidemiological investigation of a covid- 19 family cluster out break transmitted by a 3-Month Old Infant. *Health Info Sci Syst.* 2021, 9.6.
6. Cheng-Xian Guo, Li He, Yen SY, Meng XG, Tan W, Yang GP et al. Epidemiological and clinical features of pediatric covid- 19. *BMC Med.* 2020; 18(1):250.

7. Laner SA, Grantz KH, Br Q, Jones FK, Zheng Q, Moredith HR et al. The incubation period of corona virus disease 2019 (covid-19) from publicly reported confirmed cases: estimation and application. *Ann intern Med.* 2020; 172(9):577-582.
8. Lu X, Zhang L, Du H, Zhang J, Li YY, Qu S et al. Chinese paediatric novel corona virus study team. SARS-CoV-2 infection in children. *N Engl J Med.* 2020; 282(17):1663-1665.
9. Xia W, Shao J, Guo Y, Peng X, Li Z, Hu D. Clinical and CT features in pediatric patients with covid-19 infection: different points from adults. *Pediatric pulmonol.* 2020; 55(5):1169-1174n
10. Ludrigsson JF. Systematic reviews of Covid-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatric.* 2020; 109(6):1088-1095
11. Parri N, Lenge M, Buonsenso D. Corona virus infection in paediatric emergency departments (CONFIDENCE) research group. Children with Covid-19 in paediatric emergency departments in Italy. *N Enl J med.* 2020; 382(14):1370-1371.
12. Lio W, Zhang Q, Chen J, Xiang R, Song H, Shu SI et al. Detection of covid-19 in children in early January 2020 in Wuhan, China. *N Engl J med.* 2020; 382(14):1370-1371.
13. Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jaing Z et al. epidemiology of covid-19 among children in china. *Paediatrics.* 2020; 145(6):e20200702.
14. Pan L, Mu M, Yang P, et al. Clinical characteristics of COVID-19 patients with digestive symptoms in Hubei, China: A descriptive, cross-sectional, multicenter study. *Am J Gastroenterol.* 2020;115:766-73.
15. Chi H, Chiu N-C, Peng C-C, et al. One-seventh of patients with COVID-19 had olfactory and gustatory abnormalities as their initial symptoms: A systematic review and metaanalysis. *Life.* 2020;10:158.
16. Mak PQ, Chung KS, Wong JSC, Shek CC, Kwan MYW. Anosmia and ageusia: Not an uncommon presentation of COVID-19 infection in children and adolescents. *Pediatr Infect Dis J.* 2020;39:E199-200.
17. Steinberg E, Wright E, Kushner B. In young adults with COVID-19, obesity is associated with adverse outcomes. *West J Emerg Med.* 2020;21:752–5.