



P-ISSN: 2664-3685

E-ISSN: 2664-3693

www.paediatricjournal.com

IJPG 2022; 5(1): 76-80

Received: 09-01-2022

Accepted: 16-02-2022

Dr. Mithila Das Mazumder

Assistant Professor,

Department of Paediatrics,

Vydehi Institute of Medical

Science and Research Centre,

Bangalore, Karnataka, India

The prevalence of COVID-19 disease in children & its abnormal characteristics

Dr. Mithila Das Mazumder

DOI: <https://doi.org/10.33545/26643685.2022.v5.i1b.170>

Abstract

The recent significant coronavirus disease 2019 (COVID-19) pandemic has taken an unprecedented toll on COVID-19-infected people who are gravely unwell. While there is indication that the burden of COVID-19 infection in hospitalized children is lower than in adults, there are just a few publications detailing COVID-19 in pediatric intensive care units to date (PICUs). COVID-19 There is two stages to the symptoms in youngsters. Upper and lower respiratory symptoms can occur in the first week, but they are milder and less common than in adults. However, signs of MIS-C or multisystem involvement can appear 2-3 weeks after infection, and COVID-19 should be investigated. Fever, rash, and respiratory issues are the most prevalent reasons for admission.

Keywords: COVID-19, children & its abnormal, symptoms in youngsters, Fever, rash, and respiratory

1. Introduction

SARS-2 causes a respiratory infection known as Coronavirus Disease 2019 (COVID-19) (SARS-CoV-2). In the United States and around the world, children have been documented considerably less times than adults ^[1]. The majority of instances in children are minor, and supportive care is the most common treatment ^[2]. Children make up over 22% of the US population, and over 17% of all cases were reported to the CDC.

Over 7.8 million children have tested positive in the United States since the epidemic began, accounting for 17.4% of all cases in the 49 states reporting by age. Children accounted for 1.7-4.1% of all hospitalizations recorded, with 0.1-1.6% of child COVID-19 cases requiring hospitalization ^[1]. The most common underlying conditions were chronic lung disease (including asthma), cardiovascular disease, and immunosuppression. Chronic lung disease (including asthma), cardiovascular disease, and immunosuppression were the most common underlying conditions ^[3].

In Europe and North America, children and adolescents have been showing signs of an inflammatory disorder that resembles Kawasaki disease and toxic shock syndrome. The majority of patients tested positive for COVID-19 during initial laboratory testing, leading to the theory that the condition is linked to COVID-19. The youngsters were given anti-inflammatory drugs including parenteral immunoglobulin and steroids. WHO has developed a preliminary case definition and case report form for children and adolescents with multisystem inflammatory illness. The preliminary case definition is based on clinical and laboratory results in children who have previously been reported, and it is used to identify suspected and confirmed cases ^[3]. Data on clinical presentations, severity, consequences, and epidemiology is desperately needed.

The most recent coronavirus species to be verified in the globe is SARS-CoVirus species COVID-19, which was discovered in Wuhan, China in December 2018. When infected people cough or sneeze, the virus is transferred primarily by tiny droplets ^[4]. The death rate is believed to be between 2 and 5%, depending on the age and health state of the affected person. Since this disease is recent and there is very little experience with the virus, more knowledge and reports of symptoms, clinical findings, and laboratory abnormalities in children can help other experts better understand the disease and better influence ongoing efforts to contain the global pandemic.

2. Methodology

2.1 Strategy for searching

The signs and symptoms of 11,058 adults and 1,056 children and adolescents from 15 countries were compared in a comprehensive systematic review and meta-analysis of 148

Corresponding Author:

Dr. Mithila Das Mazumder

Assistant Professor,

Department of Paediatrics,

Vydehi Institute of Medical

Science and Research Centre,

Bangalore, Karnataka, India

studies published between December 1, 2019 and March 28, 2020, which included 149 patients with confirmed SARS-CoV-2/COVID-19 (the majority, 87 percent). In 14 percent of children, asymptomatic infection was discovered, compared to only 5% of adults. The signs and symptoms of children were similar to those of adults; however they were less common [5]. Gastrointestinal problems were shown to be more common in children than adults [5, 6].

2.2 Data collection & outcomes

The main outcome was the frequency of laboratory abnormalities, with the mean and standard deviation of laboratory values being collected wherever available. In our study, hypoxemia (oxygen saturation of .92%), central cyanosis, acute respiratory distress syndrome (ARDS), and the necessity for a ventilator, critical life support, or intensive care unit (ICU) support were all deemed serious diseases [10]. COVID-19 was used to classify mild disease, with any severity level below that being labelled as severe disease.

2.3 Data synthesis & analysis

For analysis, papers were divided into two groups: mild group and severe group, which included studies on children with mild and severe COVID-19 [10, 11]. A meta-analysis was performed for each of the laboratory parameters reported in the relevant studies to provide pooled prevalence estimates with their 95 percent confidence intervals (95 percent CI).

The Chi-square test and the I² statistic were used to determine whether the included studies were heterogeneous.

3. Result

3.1 Clinical Findings

3.1.1 Children of all ages

Children and adults have similar COVID-19 symptoms, although the frequency of symptoms differs. Children under the age of 20 with established Coronavirus 2 causes severe acute respiratory illness (SARS-CoV-2) infection had a prevalence of asymptomatic infections for about 15-42 percent [8, 9]. Among the 69,703 laboratory-confirmed cases reported to the CDC by children aged 20 by May 30, 2020, both males and females were impacted equally.

Table 1: in children aged 0 to 9 years; the following symptoms were the most common

| Symptoms | Population affected in Percentage |
|-----------------------|-----------------------------------|
| Temperature rise | 45% |
| Cough | 47% |
| Breath shortness | 6% |
| Myalgia | 12% |
| Rhinorrhea | 6% |
| Sore throat | 12% |
| Headaches | 15% |
| Nausea & Vomiting | 9% |
| Abdominal pain | 9% |
| Diarrhea | 13% |
| Loss of smell & taste | 1% |

Table 2: The following symptoms were more common in children aged 10 to 19 years old

| Symptoms | Population affected in Percentage |
|-----------------------|-----------------------------------|
| Temperature rise | 37% |
| Cough | 40% |
| Breath shortness | 13% |
| Myalgia | 35% |
| Rhinorrhea | 7% |
| Sore throat | 30% |
| Headaches | 47% |
| Nausea & Vomiting | 9% |
| Abdominal pain | 7% |
| Diarrhea | 13% |
| Loss of smell & taste | 9% |

COVID-19 has been related to an increased risk of myocarditis, but the risk is small (0.15%). Gastrointestinal hemorrhage has been recorded in adults but not in children [9]. Neurologic impairment was seen in 22% of children hospitalized with confirmed SARS-CoV-2 infection; however it was only temporary in 88 percent.

3.1.2 Infants <12 months of age

According to clinical trials in China, infants with SARS coronavirus 2 (SARS-CoV-2)-related bronchiolitis are more likely to develop respiratory symptoms than those with other coronaviruses or influenza. Feeding difficulties and a fever with no obvious cause are two further clinical symptoms [12]. In infants aged 3 months and younger, fever is the most prevalent symptom (73 percent), followed by cough (38%), rhinitis (36%), respiratory discomfort (26%), and poor feeding (24%). Only four of the infants experienced medical issues (atrial septal defect, intussusception, hypogammaglobulinemia, brain trauma). Three were asymptomatic, 58 were hospitalized, 13 were admitted to the intensive care unit (ICU), and two required mechanical ventilation in a detailed analysis of 63 infants aged 3 months with laboratory-confirmed SARS-CoV-2

infection. Fever (73%) was the most common symptom, followed by cough (38%) and rhinitis (36%), respiratory discomfort (26%), poor feeding (24%), vomiting (14%), and diarrhea (14%).

3.2 Laboratory Findings

Laboratory testing has a wide range of outcomes. In a meta-analysis of 66 studies in children involving 9335 children (0 to 19 years) with confirmed SARS-CoV-2, the following laboratory abnormalities were discovered (mean proportion) (including 1208 with MIS-C) [13].

- An increase of 54% in C-reactive protein (CRP).
- Lactate dehydrogenase activity rose by 37%, with a 47 percent increase in serum ferritin.
- 35% of D-dimers have high levels
- There is a 21% increase in procalcitonin levels.
- Lymphocytic leukemia affects 8% of persons.

3.3 Abnormalities of COVID- 19 in children

3.3.1 Lab abnormalities in mild COVID-19

Hematological problems were observed in 20 of the 24 studies that were examined, including 610 pediatric patients with mild COVID-19 [20]. A reduced neutrophil count was the most prevalent hematologic abnormality, with a PPE of

38%. C - Reactive protein (CRP), Procalcitonin (PCT), and Lactate Dehydrogenase (LDH) levels were also found to be elevated. The degree of heterogeneity varied among the

measures studied, but inflammatory biomarkers had a higher level of heterogeneity [12].

Table 4: Result of meta-analysis for pediatric patients with mild abnormalities (hematologic)

| Measure | Total no. cases studied | Sample Size | Pooled Prep% | 95% CI | I ² % | P Value |
|---------------|-------------------------|-------------|--------------|--------|------------------|---------|
| ↑ WBCs | 2 | 193 | 12 | 7 | 15 | 0.25 |
| ↓ WBCs | 16 | 416 | 19 | 10 | 60 | 0.01 |
| ↑ Neutrophils | 5 | 36 | 10 | 1 | 0 | 0.84 |
| ↓ Neutrophils | 6 | 50 | 38 | 18 | 54 | 0.01 |
| ↑ Lymphocytes | 10 | 108 | 18 | 8 | 40 | 0.03 |
| ↓ Lymphocytes | 16 | 421 | 14 | 7 | 82 | 0.01 |
| ↑ Platelets | 6 | 77 | 17 | 5 | 0 | 0.53 |
| ↑ Hemoglobin | 4 | 39 | 10 | 0 | 43 | 0.20 |
| ↓ Hemoglobin | 3 | 25 | 5 | 0 | 0 | 0.34 |

3.3.2 Lab abnormalities in severe COVID-19

Only 6 out of the 24 research added on the review addressed laboratory abnormalities in children with severe COVID-19, with a total of 14 pediatric patients [22, 24]. A lower-than-expected frequency of changes in leukocyte count was detected, with only a few patients (4/16, 25%) having higher

counts. Only one patient (11.1%) experienced a rise in CD8+ cell counts in two trials (n=9 patients) that reported lymphocyte subsets. Natural killer cell numbers were down 66.6 percent (6/9) of the time. In up to 75% of instances, IL-10 was the most commonly increased cytokine.

Table 5: Characteristics of laboratory findings in severe COVID-19.

| Number of cases (patients) | | 10 | 1* | 2 | 2* | 1 | 1 |
|----------------------------|-----------|--------------|--------------|---------|---------|---------|---------|
| Age | | 3, 172 | 11, 13 | 1 | Infant | 1 | 12 |
| Hematologic | | | | | | | |
| WBCs | ↑n (%) | 2 (25) | 1 (50) | 0 | 1 (100) | 0 | 0 |
| | ↓ N (%) | 0 | 0 | 0 | - | 0 | 0 |
| | Mean (SD) | 8.1 (4.0) | 8.0 (5.3) | 8.0 | 20.4 | 4 | 12.0 |
| Neutrophils | ↑n (%) | 2 (25) | - | 0 | - | - | 1 (100) |
| | ↓ N (%) | 1 (12.5) | - | 0 | - | 0 | 0 |
| | Mean (SD) | 4.3 (3.5) | - | 1.9 | - | 0.8 | 7.8 |
| Lymphocytes | ↑n (%) | 2 (25) | 0 | 1 (100) | 0 | - | 0 |
| | ↓N (%) | 1 (12.5) | 1 (50) | 0 | 1 (100) | - | 0 |
| | Mean (SD) | 3.0 (1.7) | 2.0 (0.7) | 5.21 | 10 | 2.21 | 2.50 |
| Hemoglobin (g/L) | ↑n (%) | 1 (12.5) | 0 | 0 | - | - | - |
| | ↓N (%) | 3 (37.5) | 1 (50) | 0 | - | - | - |
| | Mean (SD) | 119.4 (27.6) | 126.5 (37.5) | 112 | - | - | 110 |
| Platelets | ↑n (%) | - | 0 | 1 (100) | - | - | - |
| | ↓N (%) | - | 0 | - | - | - | - |
| | Mean (SD) | - | 192.7 (13) | 410 | 232 | 215 | 190 |
| CD3 + T (%) | ↑n (%) | 3 (37) | - | - | - | - | 0 |
| | ↓N (%) | 0 | - | - | - | 1 (100) | 1 (100) |
| | Mean (SD) | 69 (9.9) | - | - | - | 40.1 | 40.1 |
| CD8 + T (%) | ↑n (%) | 1 (12) | 0 | 0 | 0 | 0 | 0 |
| | ↓N (%) | 0 | - | - | - | 0 | 0 |
| | Mean (SD) | 29.7 (12.5) | - | - | - | 18.7 | 16.7 |
| CD4 + T (%) | ↑, n (%) | 4 (50) | 0 | 0 | 0 | 0 | 0 |
| | ↓N (%) | - | 0 | 0 | 0 | 0 | 0 |
| | Mean (SD) | 35.0 (6.1) | - | - | - | 21.2 | 21.2 |

4. Discussion

Up to 10% of newborns who test positive for COVID-19 may develop severe illness that necessitates the use of supplemental oxygen and other rigorous treatments. In general, test alterations are minimal in children with mild illness. When compared to people with moderate disease, With a PPE of only 13%, the leukocyte count is larger, and the general pattern of derangement is uneven. Elevated CK-

MB levels were reported to be greater than local criterion in one-third of mild COVID-19 cases in children. This could be a sign of viral infiltration in cardiac tissue, which is one of the organs that produces the viral receptor (angiotensin converting enzyme2; Diffusion of oxygen), or cardiac ischemia as a result of the mysterious disease's frequent intravascular coagulopathy.

We suggest that PCT levels in children be monitored on a

regular basis as a potential indicator of bacterial superinfection (pulmonary or systemic) and clinical deterioration the most common laboratory findings in children with severe COVID-19 are listed in Table 5. Surprisingly, we found that female children have higher leukocyte and neutrophil counts, as well as higher LDH levels, when comparing male and female infants. The disparities between children and adults must be examined further because lymphopenia and immunological dysregulation can affect the severity of sickness.

5. Conclusion

Since the outbreak began, almost 7.8 million children have tested positive in the United States, accounting for 17.4 percent of all cases in the 49 states reporting by age. Children were responsible for 1.7-4.1 percent of all hospitalizations, with 0.1-1.6 percent of kid COVID-19 cases necessitating hospitalization. The leukocyte count is larger in persons with moderate disease, with a PPE of only 13%, and the general pattern of derangement is uneven. Elevated CK-MB levels were reported to be greater than local criterion in one-third of mild COVID-19 cases in children. Children who were not previously vulnerable become vulnerable as a result of the COVID19 catastrophe. Health, education, and family support services should use the lessons learned from the crisis to establish more resilient and crisis-proof kid policies, data, and service infrastructures.

6. References

- Ismail SA, Saliba V, Bernal JL, Ramsay ME, Ladhani SN. SARS-CoV-2 infection and transmission in educational settings: A prospective, cross-sectional analysis of infection clusters and outbreaks in England. *The Lancet Infectious Diseases*. 2021;21(3):344-353.
- Jiehao C, Jin X, Daojiong L, Zhi Y, Lei X, Zhenghai Q, *et al*. A case series of children with 2019 novel coronavirus infection: clinical and epidemiological features. *Clinical Infectious Diseases*. 2020;71(6):1547-1551.
- Yang PU, Liu P, Li D, Zhao D. Corona Virus Disease 2019, a growing threat to children? *The Journal of infection*. 2020;80(6):671.
- Liguoro I, Pilotto C, Bonanni M, Ferrari ME, Pusiolo A, Nocerino A, *et al*. SARS-COV-2 infection in children and newborns: a systematic review. *European journal of pediatrics*. 2020;179:1029-1046.
- Stokes EK, Zambrano LD, Anderson KN, Marder EP, Raz KM, Felix SEB, *et al*. Coronavirus disease 2019 case surveillance-United States, January 22–May 30, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(24):759.
- Poletti P, Tirani M, Cereda D, Trentini F, Guzzetta G, Sabatino G, *et al*. Association of age with likelihood of developing symptoms and critical disease among close contacts exposed to patients with confirmed sars-cov-2 infection in Italy. *JAMA network open*. 2021;4(3):e211085-e211085.
- Bellino S, Punzo O, Rota MC, Del Manso M, Urdiales AM, Andrianou X, *et al*. COVID-19 disease severity risk factors for pediatric patients in Italy. *Pediatrics*. 2020;146(4).
- Viner RM, Ward JL, Hudson LD, Ashe M, Patel SV, Hargreaves D, *et al*. Systematic review of reviews of symptoms and signs of COVID-19 in children and adolescents. *Archives of disease in childhood*. 2021;106(8):802-807.
- Han MS, Choi EH, Chang SH, Jin BL, Lee EJ, Kim BN, *et al*. Clinical characteristics and viral RNA detection in children with coronavirus disease 2019 in the Republic of Korea. *JAMA pediatrics*. 2021;175(1):73-80.
- Badal S, Bajgain KT, Badal S, Thapa R, Bajgain BB, Santana MJ. Prevalence, clinical characteristics, and outcomes of pediatric COVID-19: A systematic review and meta-analysis. *Journal of Clinical Virology*. 2021;135:104715.
- Ma H, Hu J, Tian J, Zhou X, Li H, Laws MT, *et al*. A single-center, retrospective study of COVID-19 features in children: a descriptive investigation. *BMC medicine*. 2020;18(1):1-11.
- Henry Brandon Michael, Benoit Stefanie de Oliveira W, Maria Helena Santos, Hsieh Wan Chin, Benoit Justin, Ballout Rami A, *et al*. Laboratory abnormalities in children with mild and severe coronavirus disease 2019 (COVID-19): A pooled analysis and review. *Clinical Biochemistry*, S0009912020303313, 2020.
- Henry BM, Lippi G, Plebani M. Laboratory abnormalities in children with novel coronavirus disease 2019. *Clinical Chemistry and Laboratory Medicine (CCLM)*. 2020;58(7):1135-1138.
- De Souza TH, Nadal JA, Nogueira RJ, Pereira RM, Brandão MB. Clinical manifestations of children with COVID-19: A systematic review. *Pediatric pulmonology*. 55(8):1892-1899.
- Deville JG, Song E, Ouellette CP. COVID-19: Clinical manifestations and diagnosis in children. *Up To Date*, Post, TW (Ed), Up To Date, Waltham, MA, 2021.
- Kabeerdoss J, Paliana RK, Karkhele R, Kumar TS, Danda D, Singh S. Severe COVID-19, multisystem inflammatory syndrome in children, and Kawasaki disease: immunological mechanisms, clinical manifestations and management. *Rheumatology international*. 2021;41(1):19-32.
- Parri N, Lenge M, Cantoni B, Arrighini A, Romanengo M, Urbino A, *et al*. COVID-19 in 17 Italian pediatric emergency departments. *Pediatrics*. 2020;146(6).
- Steinberger S, Lin B, Bernheim A, Chung M, Gao Y, Xie Z, *et al*. CT features of coronavirus disease (COVID-19) in 30 pediatric patients. *American Journal of Roentgenology*, 2020, 1303-1311.
- Irfan O, Muttalib F, Tang K, Jiang L, Lassi ZS, Bhutta Z. Clinical characteristics, treatment and outcomes of paediatric COVID-19: A systematic review and meta-analysis. *Archives of disease in childhood*. 2021;106(5):440-448.
- She J, Liu L, Liu W. COVID-19 epidemic: disease characteristics in children. *Journal of medical virology*. 2020;92(7):747-754.
- Chen Y, Zhou H, Zhou Y, Zhou F. Prevalence of self-reported depression and anxiety among pediatric medical staff members during the COVID-19 outbreak in Guiyang, China. *Psychiatry research*. 2020;288:113005.
- Zimmermann P, Curtis N. Why is COVID-19 less severe in children? A review of the proposed mechanisms underlying the age-related difference in severity of SARS-CoV-2 infections. *Archives of*

- disease in childhood. 2021;106(5):429-439.
23. Nino G, Zember J, Sanchez-Jacob R, Gutierrez MJ, Sharma K, Linguraru MG. Pediatric lung imaging features of COVID-19: A systematic review and meta-analysis. *Pediatric pulmonology*. 2021;56(1):252-263.
 24. Parri N, Magistà AM, Marchetti F, *et al*. Characteristic of COVID-19 infection in pediatric patients: early findings from two Italian Pediatric Research Networks. *Eur J Pediatr*. 2020;179:1315.
 25. Osmanov IM, Spiridonova E, Bobkova P, Gamirova A, Shikhaleva A, Andreeva M, *et al*. Risk factors for long covid in previously hospitalised children using the ISARIC Global follow-up protocol: A prospective cohort study. *medRxiv*. 2021.
 26. Rajmil L. Role of children in the transmission of the COVID-19 pandemic: a rapid scoping review. *BMJ paediatrics open*. 2020;4(1).