

# Clinical Characteristic of Covid-19 Infection in Pediatric: A Systematic Review

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## Abstract

SARS-CoV-2 is a new type of corona virus that has been identified as a cause of COVID-19 cases. This disease is transmitted quickly, causes a global pandemic and can affect all ages, including children. In children, cases are still rare and hard to be found. Because the prevalence of events in children tends to be smaller than in adults, information about the clinical characteristics of COVID-19 infection in children is still lacking. The aim of this research is to find out the clinical characteristics of COVID-19 infections in children. Conducting a literature review of various scientific studies related to the clinical characteristics of COVID-19 infection in children. The most common clinical symptoms found in pediatric patients with COVID-19 infection are coughing, fever and gastrointestinal symptoms where these symptoms usually tend to be mild to moderate and often the symptoms are not specific or asymptomatic. Laboratory results are generally normal but the CT-Scan results show suspicion towards pneumonia in the majority cases of children.

**Keywords:** *Clinical characteristics, COVID-19, Children.*

## Introduction

A new type of corona virus has been identified as the cause of a group of pneumonia cases detected in Wuhan City in early 2020. WHO officially named this disease as coronavirus 2019 (COVID-19) and the International Coronavirus Study Group (CSG) decided to name the virus SARS-CoV-2.<sup>1</sup>

At 26 April 2020, there were 2,804,796 total confirmed positive cases worldwide with 193,710 fatal cases (6.90%). Based on this, there are studies that use

data based on a certain time span. The study took data from 149,760 laboratory confirmed cases in the United States from 12 February to 02 April 2020. The cases were analyzed based on known age. The results obtained were among 149,082 (99.6%) cases, 2,572 (1.7%) were children aged <18 years.<sup>2,3</sup>

Based on the most recent case reports, 90% of the 2,143 children diagnosed through laboratory examinations or clinical symptoms of COVID-19 infection are reported to be asymptomatic, mild or moderate. The remaining 5.2% are heavily infected and 0.6% are in critical condition. Children and adolescents infected with SARS-CoV-2 generally only experience mild symptoms and radiological manifestations. Children rarely experience severe cases of infection or are in a critical condition.<sup>4,5</sup>

Therefore, based on these data it can be said that cases of COVID-19 infection among children are still quite rare and symptoms tend to be milder or absent,

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so this article review needs to be done to increase anticipation regarding the clinical characteristics of COVID-19 infection in children.

### Method

The method used in compiling this article review is use research journals related to COVID-19 infection in children. The journals used in the study of literature are obtained through a database of international journal providers Elsevier and the Scientific Journal of Indonesia through Google Scholar. Journal searches are performed using the keywords “COVID-19” and “child”.

### Result and Discussion

Coronavirus (CoVs) is a group of RNA viruses with a single, encapsulated strain. This virus can mutate quickly and zoonoses (risk of spreading from animals to humans). One example of this virus is SARS-CoV which appeared in 2002 and causes severe acute respiratory syndrome. SARS-CoV-2 which currently appears is a new type of corona virus causing COVID-19 outbreaks in China and various other countries, causing a global pandemic.<sup>6</sup>

This virus spreads through droplets when infected patients cough, talk loudly or sneeze. Contact with the mouth, nose or conjunctiva of the eye through contaminated hands is also a source of transmission. Close contact with patients infected with SARS-CoV-2 is one of the ways in which infections occur in children. In addition, it has been reported that SARS-CoV-2 can also be transmitted via aerosols, the fecal-oral route and from mother to baby. This virus can still live in feces after a few weeks leading to transmission of oral-stool. Thus, because live virus strains can be isolated from feces, this indicates the potential for infection from bodily waste.<sup>7,8,9,10</sup>

Although this virus spreads very quickly, the cases in children are much lower compared to adults. One reason that may cause cases of COVID-19 in children tends to be lower because children have less outdoor activity and do less international travel so that the chance of contacting the virus is smaller.<sup>11,(12)</sup>

According to national guidelines, the diagnosis of COVID-19 is confirmed using RT-PCR with specimens taken from nasopharyngeal swabs and detection of lesions by chest CT-Scan. Intake of nasopharyngeal swabs are performed on all patients, including children.<sup>13</sup>

The severity of COVID-19 is classified based on clinical symptoms, laboratory testing and chest X-ray imaging, including asymptomatic infections, mild, moderate, severe and critical cases. The diagnostic criteria are as follows:

- 1. Asymptomatic:** Without clinical symptoms and signs, chest imaging is normal while the 2019-nCoV nucleic acid test shows positive results.
- 2. Mild:** Symptoms of acute upper respiratory tract infections including fever, fatigue, myalgia, cough, sore throat, runny nose and sneezing. In some cases there is no fever, but often there are gastrointestinal symptoms
- 3. Medium:** With pneumonia, fever and cough are common, mostly dry cough followed by productive cough. Some may have wheezing and wet or dry crackle. Some cases may not have clinical signs and symptoms, but chest CT shows subclinical lung lesions.
- 4. Severe:** Early respiratory symptoms such as fever and cough, can be accompanied by gastrointestinal symptoms such as diarrhea. Dyspnea occurs by central cyanosis and decrease in oxygen saturation is followed by other manifestations of hypoxia
- 5. Critical:** Children can quickly develop into acute respiratory distress syndrome (ARDS) or respiratory failure and may also experience shock, myocardial injury or heart failure, acute kidney injury, encephalopathy and coagulation dysfunction. Organ dysfunction can be life threatening.<sup>14,(15)</sup>

Based on the results of the Chang TH et al study, analyzes conducted in all age groups of children (neonates-adolescents) showed the majority of patients had mild to moderate infections (98%) with more than half (59%) patients who had symptoms of fever and 46% had symptoms cough. Only 12% of patients have gastrointestinal symptoms. About 26% of patients have no specific symptoms. On the results of laboratory tests, the Chang TH et al study showed lymphopenia in 32% of cases. Some children (9%) even experience severe lymphopenia. Radiological examination results on 3 children showed consolidation and ground glass opacity. In 27% of cases there were no lesions in the lungs.

Chen J et al results showed that among the 12 pediatric patients infected with COVID-19, the main symptom most commonly experienced was coughing (75%) followed by fever (58.3%) and then 4 patients

reported having diarrhea (33.3 %). On laboratory examination, most patients (11/12) had normal white blood cell levels and 2 patients had lymphopenia. Dynamic changes from the laboratory that included WBC, the results of leucocyte and platelet counts occurred in 3 patients. Data collected from days 8-14 of the 3 patients showed normal laboratory results.

In the study of Xiaoxia L et al, the most common complaint experienced by pediatric patients at the Children's Hospital of Wuhan was coughing (48.5%). After that followed by pharyngeal erythema (46.2%) then fever with a range of 37.5oC (41.5%). From the results obtained, 32.1% of pediatric patients suffer from fever above 38oC with the majority temperature ranges ranging from 38.1 oC - 39 oC. Other symptoms were diarrhea (8.8%), fatigue (7.6%), rhinorrhea (7.6%) and vomiting (6.4%). In addition, 4 out of 171 children (2.3%) are known to have decreased oxygen saturation to below 92% and 26.7% of children have tachypnea. 42.1% of children also reported experiencing tachycardia while 27 other children (15.8%) were reported asymptomatic. Investigations showed that the CT scan results of 56 patients (32.7%) showed ground glass opacity and local spot images in 32 people (18.7%). Bilateral shading was also seen in 21 children (12.3%) and interstitial abnormalities occurred in two children (1.2%).

In the study of Su et al found that among 9 pediatric patients, 2 children had a fever in the range of 37.4-38.5 oC (22.2%) and 1 child had a cough (11.2%) and 6 others did not symptomatic (66.7%). In addition, based on the results of laboratory tests, 8/9 (88.9%) children have normal levels of white blood cells or decreased levels of white blood cells that are consistent with the characteristics of viral infections. Six children (66.7%) showed an increase in CKMB. ALT, AST and liver and kidney tests are within normal limits. The results of radiological examination found bronchitis in two children (22.2%) and one person with bronchial pneumonia (11.1%). One boy who was older than his twin showed pulmonary consolidation and ground glass opacity on the first day of hospitalization but the lesions disappeared after five days of treatment. In five other children (55.6%) no abnormal radiological features were found.

In the study of Sun et al at the Children's Hospital of Wuhan in pediatric patients with severe COVID-19 infection, the most common symptom was polypneu (8/8), followed by fever (6/8), cough (6/8), phlegm

(4/8), diarrhea (3/8), muscle fatigue/pain (1/8), headache (1/8) and constipation (1/8). The results of pulmonary auscultation examination showed the presence of rales in the left or right lobe in 5 patients (5/8) while in 3 other people there were rales (3/8). For the CT scan results showed there were six patients with bilateral pneumonia and two patients with unilateral pneumonia. CT scan images also include many features such as spotting (7/8), *ground glass opacity* (6/8), pleural effusion (1/8) and *white-lung like images* (1/8). Patients with severe COVID-19 infection, septic shock and multiple organ dysfunction syndrome are the most common complications in critically ill patients.

In the study of Du et al several differences were found in clinical features between adult patients and pediatric patients. The findings show that the most common clinical symptoms in children are fever and dry cough but when compared with adults, these symptoms tend to be less common in children. In addition, other reports show that a decrease in lymphocyte counts is one of the more common clinical features. But in pediatric patients, there is no significant reduction in lymphocyte levels. On the other hand, the number of neutrophils in pediatric patients actually decreases so that it can be stated that lymphocyte levels cannot be an indicator of diagnosis of pediatric cases.

In the study of Du et al, also found that an increase in LDH is more common in pediatric patients than adult patients so that children are more likely to suffer heart muscle damage. In contrast, elevated levels of CRP and IL-6 are seen in adults, but not in children. For the results of chest X-ray examination, the majority of children and adult patients found abnormalities in the form of pneumonia and often bilateral. However, pneumonia in adult patients is more severe than in children. Even among patients who are not asymptomatic, 62.5% of cases have pneumonia. Therefore, lung damage caused by SARS-CoV-2 remains relatively clear.

In this study it was suggested that the pathogenesis of SARS-CoV-2 is closely related to the interaction of viruses with angiotensin-converting enzyme 2 (ACE2) cell surface receptors. The number of ACE2 receptors in children is lower than in adults so this is likely the main reason why children experience fewer symptoms and organ dysfunction. In short it can be said that most cases of COVID-19 infection in children are classified as mild.

Management for adult patients and children is

generally not much different. However, in severe but non-emergency cases, administering oxygen to younger pediatric patients is recommended using nasal prong (nasal prong) or nasal cannula to make it more acceptable. In addition, in adult patients with a critical condition (septic shock), norepinephrine is considered a first-line treatment. Epinephrine or vasopressin can be given afterwards to reach the MAP target. Whereas in pediatric patients, epinephrine is considered as a first-line treatment while norepinephrine is only additional if shock still occurs even though the dose of epinephrine given is optimal.<sup>22,23</sup>

### Conclusion

The conclusions of the many journals that have been reviewed as intended are to find out the clinical characteristics of COVID-19 infection in pediatrics. The authors conclude that the clinical characteristics of pediatric patients with COVID-19 infection include clinical symptoms and examination results. The most common clinical symptoms found in pediatric patients with COVID-19 infection are coughing, fever and gastrointestinal symptoms where these symptoms usually tend to be mild to moderate and often the symptoms are not specific or asymptomatic. For the investigation itself, it is generally obtained the results of a normal leukocyte level, but the results of the CT-scan of the majority of pediatric patients show spots, consolidation, ground glass opacity which indicates suspicion toward pneumonia.

**Ethical Clearance:** The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Indonesia.

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