



Clinical Profile, Laboratory, Radiology and Outcomes of COVID-19 Patients in Children at Mataram University Hospital

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Abstract

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BACKGROUND: Coronavirus disease 2019 (COVID-19) is atypical pneumonia that has spread since December 2019 and named as severe acute respiratory syndrome coronavirus 2.

AIM: This study aimed to understand the characteristics of pediatric patients with COVID-19 from the aspect of clinical picture, anthropometric status, and laboratory and radiology findings in Mataram University Hospital.

MATERIALS AND METHODS: This qualitative study with descriptive approach. A total of 149 subjects were collected based on the purposive sampling.

RESULTS: This study was dominated by female gender (59.1%), age under 12 months old (81.9%), normal body height per age 113 subjects (78.7%), normal body weight per age 117 (78.5%), and normal body weight per body height 94 (63.1%). The clinical findings included cough 47 subjects (31.5%), fever 36 subjects (24.2%), cold 28 subjects (18.8%), and shortness of breath 20 subjects (13.4%). Meanwhile, in physical examination, rhonchi was found in 19 subjects (12.8%), lymphocytosis in 59 subjects (59.1%), leukocytosis in 49 subjects (32.9%), and normal chest radiograph was found in 94 subjects (63.1%). The outcome of patients 80.3% recovered, 19.7% referred, and 0% died.

CONCLUSION: The clinical picture of children with COVID-19 at UNRAM Hospital was dominated by cough and fever, normal anthropometric status, leukopenia, normal radiological examination, and mostly patient outcomes were recovered.

Background

The coronavirus disease 2019 (COVID-19) pandemic has been announced by the WHO since March 11, 2020. According to the Indonesian Pediatricians Association (IDAI), the number of Indonesian children infected with COVID-19 from December 2020 to March 2021 was 260 thousand. IDAI NTB data in July 2021 stated that the number of child cases with confirmed COVID-19 was 1551, the number of children who died was 25, the number who were isolated independently was 365 [1].

Manifestations of COVID-19 in children are generally mild with low fatality rate and various of clinical, laboratory, and radiological features. The clinical manifestations of COVID-19 patients in children are fever (60%), cough (65%), diarrhea (15%), sore throat (5%), fatigue (5%), vomiting (10%), and fast breathing (10%), with clinical spectrum varies from asymptomatic to critical cases [2].

Although child age group shows the low incidence rate with small possibility of critical cases, this age group needs special attention considering the potential source of transmission and long-term impact

on growth and development; meanwhile, there are no data regarding clinical, laboratory, and radiological symptoms of children in Mataram University Hospital, so it is necessary to conduct this study to determine the characteristics, laboratory, and radiology of pediatric patients with COVID-19.

Materials and Methods

This qualitative research used the descriptive approach. This research was carried out at Mataram University Hospital in July 2022. The population in this study was children with COVID-19 who were treated at Mataram University Hospital. The inclusion criteria in this study were children aged 0–18 years old and positive for COVID-19. The exclusion criteria in this study were incomplete medical record data.

Univariate analysis was provided to overview the variables including clinical, laboratory, radiological, and outcome in pediatric patients with COVID-19 in the form of frequency distribution and percentage data from the variables.

Results and Discussion

As many as 149 respondents met inclusion criteria, 88 respondents were female (59.1%), while males were 61 respondents, (60.9%), children aged <12 months were 122 respondents (81.9 %), 23 respondents aged 1–5 years old (15.4%), and 4 respondents aged 5–12 years (2.7%).

Table 1: Clinical description of pediatric patients with covid-19 at Mataram University hospital

Characteristics	Criteria	n	Total (%)
Complaint	Fever	36	24.2
	Cough	47	31.5
	Short of breathness	20	13.4
	Common cold	28	18.8
	Vomit	10	6.7
	Diarrhea	6	4.0
	Total	149	100

Based on age category, children aged 1–5 years old and children 5–12 years old are hospitalized over time. The peak incidence occurred in January 2021 and there were more hospitalizations in children aged 1–12 years old [3]. Research found their ages ranged from 1 day to 213 months, with an average age 84 months [4]. There were three cases of COVID-19 in neonates (aged 3, 4, and 5 days old, respectively) born from mothers with confirmed COVID-19. These findings suggest that children of all ages susceptible to severe acute respiratory syndrome corona-virus-2 (SARS-CoV-2). SARS-CoV-2 can cause severe childhood illness through acute COVID-19 and multisystem inflammatory syndrome in children (MIS-C). MIS-C is a post infection hyperinflammatory complication of SARS-CoV-2 [3].

Table 2: Overview of anthropometric status in children with COVID-19 at Mataram University hospital

Characteristics	Criteria	n	Total (%)
Body height/Age	Severely stunted	23	15.4
	Stunted	13	8.7
	Normal	113	78.7
	Total	149	100
Body weight/Age	Severely underweight	19	12.8
	Underweight	13	8.7
	Normal	117	78.5
	Total	149	100
Body weight/Body height	Severe malnutrition	23	15.4
	Mild malnutrition	7	4.7
	Normal	94	63.1
	Overweight	22	14.8
	Obese	3	2
	Total	149	100

Another study showed that the average age was 7 years (range 1 month–15 years). In this study, 37 (54%) patients were female [5]. Besides that, other study [6] found 8 pediatric patients with COVID-19 were treated in ICU, their age range from 2 months to 15 years old. In pediatric patients (even newborns), it has been reported more and more. According to the latest report from China, 965 confirmed patients under the age of 19 were reported nationwide, no deaths occurred in the group aged 9 and younger. Children have special immunity response system that is different from adults; therefore, pediatric patients with COVID-19 have their own clinical characteristics and therapeutic responses. The gender of the respondents was dominated by

male. It is known that males appear more susceptible to SARS-CoV-2 infection [7].

Table 3: Laboratory overview of children with covid-19 at Mataram University hospital

Characteristics	Criteria	n	Total (%)
Laboratory	Anemia	38	25.5
	Leukopenia	32	21.5
	Leukocytosis	49	32.9
	Thrombocytopenia	7	4.7
	Thrombocytosis	29	19.5
	Lymphopenia	24	16.1
	Lymphocytosis	59	39.6
Total	149	100	

Based on the above, gender was found have significant influence on the occurrence of COVID-19 while based on age most children can be infected with COVID-19 from neonate to teenager (0 months–15 years). The most common complaint was cough 47 respondents (31.5%).

Table 4: Radiological features of children with COVID-19 at Mataram University hospital

Characteristics	Criteria	n	Total (%)
Chest X-ray	No infiltrat	94	63.1
	Unilateral infiltrat	25	16.8
	Bilateral infiltrat	25	16.8
	Increase of air bronchogram	25	16.8
	Total	149	100

In this study, it was found that the most common clinical features were fever and cough (Table 1). Based on the classification of COVID-19 disease, this study was included as mild degree due to its symptoms (fever, cough, runny nose, diarrhea, and others). This can also affect the radiological results because the patient's symptoms still mild; therefore, X-ray image shows no infiltrate in the lung fields.

In the initial cases of COVID-19 occurring in Wuhan, children affected by COVID-19 often experienced main symptom cough and other accompanying symptoms such as fever and difficulty in breathing [8]. Most of the symptomatic COVID-19 patients are hospitalized with severe symptoms [4]. Moreover, the most common clinical findings in COVID-19 children are cough and fever. Previous studies have shown that patients with COVID-19 presented with symptoms of dry cough, dyspnea, fever, and fatigue [6]. Other findings include myalgia, rhinorrhea, headache, nausea/vomiting, abdominal pain, diarrhea, sore throat, and loss of smell or taste [8]. In this study, it was found that several respondents also experienced diarrhea, it is known that this can occur without any respiratory symptoms. Diarrhea, vomiting, and abdominal pain are the most frequent gastrointestinal symptoms in children with COVID-19 cases [9]. In this case, cough is the most common symptom experienced by patients with COVID-19 (Table 1).

Height per age was dominated by normal category in 113 respondents (78.7%), Body weight per age was dominated by normal category in 117 respondents (78, 5%), body weight per body height was dominated by normal categories in 94 (63.1%) (Table 2).

Besides that, adequate and healthy nutrition is important before or during infection disease. The

body's energy and nutritional needs increase in case of infection, especially when accompanied by fever. In this study, the majority of respondents with COVID-19 had normal nutritional status [10].

Laboratory result in this study was dominated by lymphocytosis in 59 respondents (59.1%), leukocytosis in 49 respondents (32.9%), and thrombocytopenia in 7 respondents (4.7%) (Table 3).

In another study [6], the number of leukocytes, neutrophils, lymphocytes, platelets, and hemoglobin were normal or slightly increased in patients with severe COVID-19. Laboratory findings are often normal but its result often includes leukopenia, lymphocytopenia, and increased procalcitonin or C-reactive protein (CRP) [8]. Leukopenia is considered as the key laboratory finding in COVID-19 patients and directly related to the severity of diseases such as CRP. However, leukopenia, lymphopenia, and elevated CRP were more common in influenza A and B patients.

In particular, the abnormal values in severe COVID-19 patient group showed organ dysfunction followed by elevated alanine aminotransferase (ALT), aspartate aminotransferase and creatinine, the platelet count is lower, the albumin level is low meanwhile D-dimers, ferritin, CRP, procalcitonin usually increase. Laboratory results in patients who were hospitalized on day 0 when compared to laboratory values on day 7 changed significantly, i.e., the values continued to increase [3]. A study found that leukopenia, increased CRP levels, high erythrocyte levels and increased ALT levels indicate immune response of children with COVID-19 is weak, meanwhile children with COVID-19 are rarely significantly decreased and levels of inflammatory indicators such as reactive C-protein are usually normal or transiently elevated [11].

On the other hand, COVID-19 with moderate or severe symptoms had markedly increased monocytes in the whole blood count. Monocytes are the important contributors of innate immunity as well as adaptive immune system in the human body [12]. Several studies also obtained laboratory findings in children with COVID-19. Most of the laboratory data showed normal leukocyte count (69.6%), with 15.2% having hyperleukocytosis and 15.2% having leukopenia. Neutropenia and lymphopenia were reported in 6% and 3%, respectively [4]. Laboratory results in pediatric patients with severe or critical COVID-19 who survived in intensive care showed abnormalities in both laboratory results and an exaggerated immune response that caused long-term lung damage and severe health complications [6].

The chest X-ray were dominated by normal result (no infiltrat) in 94 respondents (63.1%), meanwhile unilateral infiltrates, bilateral infiltrates and increased water bronchogram were found in 25 respondents (16.8%) (Table 4).

In the previous study among 44 children, 38 were positive for peribronchial cuffing (86.3%), all

were bilateral [8]. Central predominant location is seen in 36 patients (81.8%) and found in only 10 patients (22.7%). Consolidation is seen in 18.2%. Unilateral consolidation accounted for 11.3% and bilateral 6.8%. When unilateral, the left lower (6.8%) and right upper (4.5%) lobes were affected. If bilateral, the distribution is symmetrical and there is a slight predilection for the upper zone.

In addition, X-ray results obtained around 36.0% of pediatric COVID-19 patients did not show abnormal imaging findings [11]. Among patients with abnormal imaging findings, there were unilateral lesions; bilateral lesions were approximately 29.4%. Another study also found that 1026 children with confirmed COVID-19 had normal X-rays findings and 28% had bilateral lesions [8].

The radiological examination of children with COVID-19 mostly had no abnormalities or were normal and many only showed small amount of local invasion, indicating that children with COVID -19 has only mild lung injury and good prognosis [11]. The possible causes include children have healthier airways because they are not exposed to cigarette smoke and air pollution for long time, both of which are suspected of contributing to COVID-19, many other types of viruses found in children's lungs and respiratory tract, the number of angiotensin-converting enzyme-2 receptors in children's lungs are lower than adults and children's immune system is not perfect and children like to enjoy relatively limited outdoor activities, they are usually infected by their families. The combined effect of these factors leads to mild conditions in children with COVID-19. However, even so this condition can be contagious, because the disease COVID-19 has hidden, mild, and asymptomatic characteristic. Pediatric patients with COVID-19 may be the main link in transmission of SARS-CoV-2.

The patient outcome was 80.3% cured, 19.7% referred, and 0% died. The same thing was also found in a study conducted by Qi *et al.* (2021) that 90% of COVID-19 patient outcomes in children were good and the mortality rate was only 0.3% in children with comorbidities [10].

Conclusion

In this study, it was concluded that the most sex in this study was male, the most age group was children aged <12 months with the most anthropometric status in terms of weight/age, height/age, and weight/height were normal. The most common complaint among pediatric patients with COVID-19 at Unram Hospital was fever. On physical examination of the lungs and radiological examination, most of them were normal. In the most laboratory examination is lymphocytosis.

References

1. IDAI NTB. COVID-19 Anak NTB; 2021. Available from: <https://corona.ntbprov.go.id/storage/dokumen/img-20210726-wa0001.jp> [Last accessed on 2023 Feb 01].
2. Xia W, Shao J, Gou Y, Peng X, Li Z, Hu D. Clinical and CT features in pediatric patients with COVID-19 infection: Different point from adult. *Pediatr Pulmunol.* 2020;55(5):1169-74. <https://doi.org/10.1002/ppul.24718>
PMid:32134205
3. Martin B, DeWitt PE, Russell S, Anand A, Bradwell KR, Bremer C, et al. Characteristics, outcomes, and severity risk factors associated with SARS-CoV-2 infection among children in the US national COVID cohort collaborative. *JAMA Netw Open.* 2022;5(2):e2143151. <https://doi.org/10.1001/jamanetworkopen.2021.43151>
PMid:35133437
4. Bourkhissi L, El Fakiri K, Nassih H, El Qadiry R, Bourrahouat A, Sab IA, et al. Laboratory abnormalities in children with novel Coronavirus disease 2019. *Clin Med Insights Pediatr.* 2020;14:1-4. <https://doi.org/10.1177/1179556520955177>
PMid:32958991
5. Sun D, Li H, Lu XX, Xiao H, Ren J, Zhang FR, et al. Clinical features of severe pediatric patients with coronavirus disease 2019 in Wuhan: A single center's observational study. *World J Pediatr.* 2020;16(3):251-9. <https://doi.org/10.1007/s12519-020-00354-4>
PMid:32193831
6. Serrano CO, Alonso E, Andrés M, Buitrago NM, Espin IM, Barriocanal MB, et al. Pediatric chest x-ray in covid-19 infection. *Eur J Radiol.* 2020;131:109236. <https://doi.org/10.1016/j.ejrad.2020.109236>
PMid:32932176
7. Indriyani SA, Dewi NE, Kartasasmita CB. Characteristics and outcomes of children with COVID-19: Evidence from West Nusa Tenggara Province, Indonesia. *Arch Pediatr Infect Dis.* 2021;9(4):e111762. <https://doi.org/10.5812/pedinfect.111762>
8. Deville JG, Song E, Ouellette CP. COVID-19: Clinical Manifestations and Diagnosis in Children. United States: Up to Date; 2021. Available from: <https://www.uptodate.com/contents/covid-19-clinical-manifestations-and-diagnosis-in-children> [Last accessed on 2023 Feb 01].
9. D'auria E, Calcaterra V, Verduci E, Ghezzi M, Lamberti R, Vizzuso S, et al. Immunonutrition and SARS-CoV-2 infection in children with obesity. *Nutrients.* 2022;14(9):1701. <https://doi.org/10.3390/nu14091701>
PMid:35565668
10. Qi K, Zeng W, Ye M, Zheng L, Chao L, Hu S, et al. Fitur klinis, laboratorium, dan pencitraan COVID-19 pediatrik. A systematic review and meta-analysis. *Medicine (Baltimore).* 2021;15:1-8.
11. Espin IM, Barriocanal MB, Serrano CO, Alonso E, Andrés M, Buitrago NM, et al. Pediatric chest x-ray in covid-19 infection. *Eur J Radiol.* 2020;131:109236. <https://doi.org/10.1016/j.ejrad.2020.109236>
PMid:32932176
12. Siddiqui M, Gltekingil A, Bakırcı O, Uslu N, Baskın E. Comparison of clinical features and laboratory findings of coronavirus disease 2019 and influenza A and B infections in children: A single-center study. *Clin Exp Pediatr.* 2021;64(7):364-9. <https://doi.org/10.3345/cep.2021.00066>
PMid:34015895