

Rehabilitation management of pediatric post-Covid 19 syndrome: A case report

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Case Report

ABSTRACT

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Indonesia is one of the countries with highest rate of COVID infection in pediatric population. Although the symptoms of acute COVID infection in children are mostly mild, several studies report frequent post-COVID persisting symptoms in pediatric population, causing limitations in daily activities. This case report discusses rehabilitation therapy in a 12 years old child diagnosed with post-COVID syndrome. Rehabilitation therapy in the form of breathing exercise, muscle strengthening, and aerobics exercise can improve subjective complaints, cardiopulmonary endurance, and quality of life at two weeks follow-up. Further research is needed to determine the correlation between rehabilitation therapy and the outcome of children with post-COVID 19 syndrome.

Indonesia merupakan salah satu negara dengan tingkat infeksi COVID yang tinggi pada anak. Meskipun gejala infeksi akut COVID pada anak mayoritas ringan, namun beberapa studi melaporkan kejadian gejala pasca COVID yang frekuensi pada populasi anak sehingga menyebabkan limitasi pada aktivitas sehari-hari. Laporan kasus ini membahas terapi rehabilitasi pada anak yang terdiagnosis dengan sindroma pasca COVID. Terapi rehabilitasi berupa latihan pernapasan, penguatan otot, serta aerobik dapat meningkatkan keluhan subjektif, ketahanan kardiopulmonar, serta kualitas hidup pada follow up 2 minggu. Dibutuhkan penelitian lebih lanjut untuk mengetahui hubungan antara terapi rehabilitasi dan keluaran anak dengan sindroma pasca COVID 19.

INTRODUCTION

In Indonesia, SARS-CoV-2 or COVID-19 infection reached 4.22 million cases as of October 2021. The prevalence of COVID-19 in Indonesia pediatric population is also relatively high; with around 2.9% of Indonesian children infected with COVID-19 per October 2021.¹

COVID-19 infection may cause persisting symptoms of post-acute sequelae. This condition is often referred to as long COVID or post-COVID syndrome. There is still no consensus regarding

the definition of post COVID Syndrome, but the condition is often defined to as symptoms persisting for more than 12 weeks after acute COVID infection resolves, in the absence of other explanatory causes.²

Several studies about post COVID syndrome in adults stated that common persisting symptoms include fatigue, shortness of breath, sleep disturbances, and gastrointestinal disturbances.^{3,4} In adult patients with acute COVID infection requiring hospitalization, the

incidence of long COVID is documented to be higher.⁵

Children with acute COVID infection tend to have milder symptoms compared to adults. Several proposed hypothesis of the mechanism include less expression of ACE II receptors, higher immune system function, and better blood coagulation regulation in children.⁶ However, up to this date, there have been no studies that correlate severity of symptoms in acute COVID infection and the incidence of long COVID in children.

Studies related to long COVID in pediatric population are still limited, but several studies document frequent incidence of persisting symptoms after acute COVID infection. Buonsenso, et al in their study stated that about 46 out of 129 children (35.6%) who had been infected with COVID experienced persistent symptoms within 60-120 days after acute infection resolved.⁷ Post COVID symptoms documented in pediatric population were similar to that of adults, which include fatigue, insomnia, shortness of breath, and concentration difficulties.^{7,8}

Persisting post-COVID symptoms may become a heavy burden for patients and causing a significant decrease in quality of life, especially for children who are still in the process of growth and development. Therefore, appropriate rehabilitative management is important to restore the patient's function after COVID-19 infection. This study specifically discusses the rehabilitative management of post COVID syndrome in children which is still not widely discussed in the scientific world today.

CASE ILLUSTRATION

A 12-year-old boy came to the emergency ward of Cipto Mangunkusumo General Hospital in July 2021 with chief complaints of worsening dyspnea three days prior to admission. The dyspnea persists at rest and worsens with activity. The patient also experienced abdominal discomfort with watery diarrhea three times in a day since one day prior. The patient has no other existing medical condition

before this admission.

Three weeks prior to admission, the patient was diagnosed with COVID-19 from PCR swab, as he was in close contact with a positive family member. Initially the patient did not develop any symptom so he was self-isolating at home. The patient received vitamin D, vitamin C, and paracetamol from primary health care facility nearby. Antivirus medication was not indicated for COVID-19 patients with no symptoms at the time.

One week after the patient tested positive for COVID, he started to develop dyspnea. Initially he felt easily fatigued when doing basic daily activity associated with shortness of breath, but the symptom disappeared after he rest. The patient had no other complaints other than fatigue and dyspnea. Despite developing symptoms, several days later when he did a follow up testing on the 10th day, the PCR test showed negative result. However, the symptoms of shortness of breath, especially during activities, persisted until it worsened and the patient was admitted to hospital.

The patient was then treated at RSCM pediatric ward. The patient's oxygen saturation at admission reached 95% , hence he was given oxygen supplementation of 3 LPM nasal cannula for two days, afterwards the patient's saturation improved and the oxygen supplementation was stopped. The patient felt anxious because of his shortness of breath, he was then consulted to the psychiatry department of RSCM and was diagnosed with generalized anxiety disorder.

The patient is able to mobilize but his shortness of breath worsens with position change, standing, and 5-meters walk. On physical examination, vital signs were within normal limits. Laboratory examinations, chest X-Ray (Fig. 1), and echocardiography were also within normal limits. On examination of 6 minute walk test (6-MWT), the patient can walk 180 m distance with several stops along the walk. The 6MWT result obtained is interpreted as cardiorespiratory endurance below the reference value according to his age. The 30

second sit-to-stand test showed poor results of muscle and cardiopulmonary endurance, the patient can only do 2 repetitions with an increase in heart rate of 126 bpm after the test. On PedsQL examination, a score of 69.3 was

obtained which indicated a reduced quality of life. Spirometry results showed obstructive disorders with FEV1/FVC 60.4% prediction, accompanied by post-bronchodilator reversibility with FEV1/FVC 78% prediction.

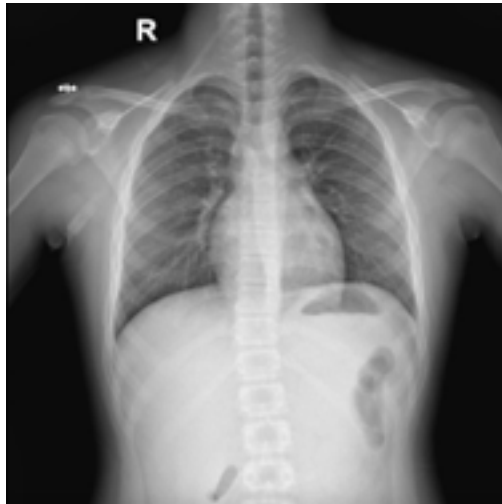


Figure 1. Chest X-Ray of the patient
Examination and expertise of chest x-ray showed lung and heart condition were within normal limit

The patient was diagnosed with Post-COVID19 Syndrome, persistent asthma, and generalized anxiety disorder. The rehabilitation problems of this patients are dyspnea, low cardiorespiratory endurance, fatigue, and decreased quality of life. The rehabilitation management planned for the patient are as follows; for optimization of respiratory efficiency: diaphragmatic breathing exercise in 5x10 repetitions/day with incentive spirometry 3 x 5 seconds hold at 1250 mL every 3 hours. For reducing obstruction: pursed lip breathing 5x10 repetitions/day. For cardiopulmonary reconditioning: standing for 15 minutes 5 times per day, when the patient able to achieve Borg dyspnoea scale ≤ 2 while standing still; sit to stand exercise 5 x 5 repetition / day, heel raise exercise 3 x 10 repetition / day, and walking in place for 15 minutes with 50 steps/minute by metronome. Aerobic exercise: walking 15 minutes per day, if the patient can walk continuously for 15 minutes without stopping, the duration is

increased by 5 minutes increment. Followed by active range of motion (ROM) exercises for hips, knees, ankles, and shoulders with chest expansion, each for 3x10 repetitions/day.

At two weeks follow-up after rehabilitation program, the patient no longer felt dyspnea at rest. He still felt fatigue, but with lower intensity as he can carry out daily activities by himself without problem. He can attend online school well and routinely done the prescribed exercise. On physical examination, vital signs were within normal limits. Other test results showed improvements, even though the patient's result is still below normal reference value. The 6MWT results showed 335.7 m walking distance, and the patient can do 9 repetitions in 30 second sit-to-stand test with heart rate of 98 bpm after test. His PedsQL score improved to 79.2 which indicates a good quality of life.

The patient and his parents were already given consent to participate in this case report study. Researchers explained about benefit,

alternatives, and guarantee of no personal privacy data disclosure.

DISCUSSION

The existing evidence suggests that post-COVID syndrome has frequent incidence in pediatric population, although most children experienced mild or no symptoms at the time of acute infection.

Most studies related to post-COVID syndrome in children stated that the most frequently experienced symptom was fatigue. Other common symptoms include persistent cough and shortness of breath, gastrointestinal symptoms (constipation/diarrhea), insomnia, and difficulty concentrating. Post-COVID symptoms are also most often found in children aged 10-15 years.^{7,8,9} This is in line with clinical findings observed in our patient.

Brackel et al's study on 89 children diagnosed with post-COVID syndrome stated that around 74% of children experienced moderate to severe limitations in daily activities such as going to school.⁸ This further demonstrates the importance of proper rehabilitation management in children with post COVID syndrome.

The patient was given treatment in the form of exercises that are specifically targeted for each rehabilitation problem. Breathing exercises are prescribed to reduce dyspnea, increase endurance and reduce fatigue levels. Functional strengthening exercise and aerobic exercise are expected to increase cardiopulmonary and muscular endurance, as well as to reduce fatigue.

A physical exercise program is initiated when the patient's dyspnea has improved and his breathing condition is stable. Exercise is not contraindicated for patients with asthma and even beneficial, but care should be taken to ensure that optimal therapy has been achieved to reduce the likelihood of exercise-induced bronchoconstriction (EIB).¹⁰

The physical exercise prescribed for the patient was initiated at low intensity. In addition to the fact that the patient has just started asthma

therapy, overtraining can cause dysregulation of systemic inflammatory response that may slow down post-COVID 19 recovery process.¹¹ Therefore, low-intensity physical exercise using appropriate weights, volumes, and repetitions for strengthening will provide better outcomes for the patient.^{12,13}

The recommended rehabilitation management for children with acute COVID-19 infection includes early mobilization and activity in all condition when appropriate. Other rehabilitative measure with invasive/non-invasive mechanical ventilation therapy, lung recruitment maneuvers, positioning, and upper airway clearance techniques maybe considered depending on the severity of acute infection.^{14,15}

We conducted searches on leading journal database sites such as Pubmed, EBSCOhost, and Cochrane. However, so far there have been no studies discussing the management of post-COVID rehabilitation in pediatric patients.

Nevertheless, rehabilitative management in the form of physical exercise theoretically will have beneficial effect on post-COVID patients as it may enhance immune system function, prevent pulmonary complications, improves cardiovascular health, and stimulate brain plasticity thereby improving mental health.¹² This is shown by significant progress for the patient at two weeks follow-up post-rehabilitation intervention.

CONCLUSION

This case report showed that rehabilitation management in the form of breathing exercises, muscle strengthening, and aerobic exercise in pediatric patients with post-COVID 19 syndrome may improve subjective complaints, cardiopulmonary endurance, and quality of life after two weeks follow up. Further studies are needed to determine the relationship between associated rehabilitation therapy and post-COVID syndrome outcomes in pediatric population.

CONFLICT OF INTEREST

The authors declared no conflict of interest

in this study.

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