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Coronavirus disease 2019 (COVID-19) and polyarthritis juvenile idiopathic arthritis (JIA) comorbidity in children at emergency Wisma Atlet Kemayoran: the first case report with two months follow up



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ABSTRACT

Background: Infection with SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) is often mild and asymptomatic in youngsters. However, in other circumstances, such as juvenile rheumatoid arthritis (JRA), COVID-19 necessitates special consideration because of the general immune system harm associated with autoimmune disorders and the iatrogenic side effects of corticosteroids. The multisystem inflammatory syndrome in children (MIS-C), which manifests 4-6 weeks after infection as a high fever, organ dysfunction, and markedly elevated markers of inflammation, is one manifestation of the COVID-19 disease that can cause secondary vasculitis or present with vasculitis or hyperinflammation manifestations. The association between MIS-C and SARS-CoV-2 infection shows that post-infectious immunological dysregulation plays a role in the pathogenesis. This study aimed to present a case of COVID-19 and JRA comorbidity in children at emergency Wisma Atlet Kemayoran.

Case Report: A 10-year-old boy was admitted to COVID-19 Emergency Hospital Wisma Atlet Kemayoran with complaints of anosmia. The patient had a history of polyarthritis JRA, has been diagnosed since January 2020 and has routinely received methylprednisolone 4 mg/day and one tablet of calcium lactate once daily. No abnormalities were discovered during a general physical examination or a Pediatric Gait, Arms, Legs, and Spine (pGALS) assessment. On laboratory testing, leukocytosis and thrombocytosis are present. Thorax and extremities were radiologically examined within acceptable bounds. According to national guidelines for mild COVID-19 in children, the patient got routine treatment, which included a multivitamin. The patient also continued receiving methylprednisolone and calcium lactate while he was treated. After 12 days of treatment, the patient tested negative for COVID-19. One month after treatment, there was no hyperinflammatory reaction or recurrence of JRA.

Conclusion: In pediatric patients diagnosed with COVID-19 and JRA, it is important to continue corticosteroid treatment with an adjusted dose. Even though this treatment has the possibility of causing immunosuppression which can complicate the healing process of COVID-19, we need to prevent the recurrence of JRA in patients.

Keywords: COVID-19, JIA, comorbidity, hyperinflammation.

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INTRODUCTION

On December 31, 2019, China reported a case of unexplained pneumonia with no known cause. There were 44 patients involved in this instance within 3 days, and the number of cases has since multiplied into the thousands. Epidemiological statistics initially indicated that 66% of Wuhan, Hubei Province, China patients had ties to or had been exposed to a seafood market or a live market. Results from the analysis of patient sample isolates

revealed infection with the coronavirus known as 2019 novel coronavirus (2019-nCoV), a new form of betacoronavirus.¹

The novel virus was identified by the World Health Organization (WHO) as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) on February 11, 2020, and the illness was designated as Coronavirus disease 2019 (COVID-19). When this virus was originally discovered, it was unclear whether humans could contract it from one another. Over time, there are increasingly more cases. Finally,

it was determined that human-to-human transmission of this pneumonia is possible. The WHO declared COVID-19 a global pandemic on March 11, 2020.

On March 2, 2020, Indonesia announced two cases of the first COVID-19. According to data as of March 31, 2020, there were 136 fatalities and 1,528 confirmed cases. The highest death rate in Southeast Asia for COVID-19 is seen in Indonesia, where it is 8.9%.² As of February 18, 2021, there were 85,334,285 recovered cases, 2,441,217 fatalities, and

110,442,632 new cases. The COVID-19 epidemic has spread to Europe and North America, where the number of cases and fatalities has surpassed that of China. With 28,453,526 instances as of February 18, 2021, the United States is leading the world in COVID-19 cases, followed by India with 10,950,201 cases. With 502,554 cases, America has the highest mortality rate in the world. Indonesia is ranked 19th with a total number of cases of 1,243,646, 162,182 active cases, 1,047,676 recovered cases and 33,788 deaths.³ Jakarta is the province with the highest number of cases, with 317,432 cases.

Based on data from the Indonesian COVID-19 task force as of February 18, 2021, there were several cases of COVID-19 in children, with details of positive cases of 2.8% in the 0–5-year age group and 9.1% in the 6–18-year age group. In addition, as many as 2.8% of patients in the age group 0–5 years and 9.4% of patients in the age group 6–18 years have been declared cured. However, it is regrettable that there were also cases of death in the children age group, with details of 0.7% of patients in the 0–5 years age group and 1.3% of patients in the 6–18 years group of children having been declared dead since the COVID-19 pandemic entered Indonesia in March 2020.⁴ This study aimed to present a case of COVID-19 and juvenile rheumatoid arthritis (JRA) comorbidity in children at emergency Wisma Atlet Kemayoran.

CASE PRESENTATION

A 10-year-old boy came to the COVID-19 Emergency Hospital Wisma Atlet Kemayoran with complaints of anosmia and coughing 5 days before entering the hospital. Patients did not complain about fever, sore throat, and shortness of breath. The patient came to be brought by the public health center because it was confirmed that COVID-19 was based on a swab examination carried out 4 days before entering the hospital. The patient was brought along with 4 family members who were also confirmed to have COVID-19. The patient has had a history of JRA since January 2020. The patient has been receiving treatment and control at the Gatot Subroto Army Hospital and received 4 mg/day of methylprednisolone and 1

Table 1. pGALS examinations performed on the patient

pGALS Screening Questions		
Is there any pain?	No	
Has trouble getting dressed?	No	
Have difficulty walking?	No	
	Appearance	Movement
How to walk	Normal	Normal
Arm	Normal	Normal
Leg	Normal	Normal
Back	Normal	Normal

calcium tablet once daily. In the patient's family, none of them had a history of JRA or a history of previous immune disease. The patient has a complete immunization history.

In vital signs, no abnormalities were found. On head-to-toe physical examination, no abnormalities were found. However, the patient has an underweight nutritional status with a BMI of 15.4 Kg/m². We performed a pGALS (Pediatric Gait, Arms, Legs and Spine) examination to determine whether there were indications of extremity abnormalities that JRA patients usually possess. In Table 1 below, we can see that the patient had no abnormality in the extremity. Figure 1 and 2 depict the patient's gait and upper extremities appearance according to the pGALS checklist.

We also conducted a Pediatric Symptom Checklist-17 (PSC-17) examination to assess whether there were mental or behavioral abnormalities after being diagnosed with JRA. In Table 2 below, we can see that the patient did not have any mental or behavioral disorders. The patient also has good mental development according to his age.

On laboratory examination, there was thrombocytosis (507,000 cells/ μ l) and leukocytosis (12,800 cells/ μ l). On the x-ray examination, we did a chest x-ray (Figure 3) and an x-ray of the extremities (Figure 4 and 5).

The patient was diagnosed with Confirmed COVID-19 mild symptoms and JRA and was treated for 12 days at the COVID-19 Emergency Hospital Wisma Atlet Kemayoran by receiving multivitamin therapy, methylprednisolone 4 mg/day and calcium lactate 1 tablet/day. During treatment, the patient showed normal vital signs and suffered no worsening symptoms of COVID-19 or JRA. The patient went



Figure 1. Examination of the patient's gait according to the pGALS checklist.



Figure 2. Examination of the patient's upper extremities according to the pGALS checklist.

home with a negative PCR swab result. After treatment, we followed up with

the patient for 2 months to monitor the possibility of Multisystem Inflammatory Syndrome in Children (MIS-C). While we monitor, patients are routinely controlled at the Gatot Subroto Army Hospital to continue JRA therapy. At the end of the second month, the patient was found to have no MIS-C.

DISCUSSION

The immune system responds to this virus in two ways: first, by an innate immune response involving type I interferon (IFN), and then, second, through an adaptive immunological response that may result

in a cytokine storm. An early peak of the IFN response appears to be critical for this efficient control, which tries to restrict and eliminate the virus.⁵ Recovery requires the cessation of IFN activity produced during the innate immune response.⁶ Following the first IFN response, macrophages are

Table 2. PSC-17 examination in patients.

Put a tick in the column that best describes your situation	Never	Sometimes	Often	Assessment		
				I	A	E
1. Fidgety, unable to sit still	✓				0	
2. Feels sad, unhappy	✓			0		
3. Daydreams too much	✓				0	
4. Refuse to share	✓					0
5. Does not understand other people's feelings	✓					0
6. Feels hopeless	✓			0		
7. Has trouble concentrating	✓			0	0	
8. Fights with other children	✓					0
9. Is down on him or herself	✓			0		
10. Blames others for his or her troubles	✓					0
11. Seems to be having less fun	✓			0		
12. Does not listen to rules	✓					0
13. Acts as if driven by a motor	✓				0	
14. Teases others	✓					0
15. Worries a lot	✓			0		
16. Takes things that do not belong to him or her	✓					0
17. Distracted easily	✓				0	
Total Score				0	0	0



Figure 3. Chest X-ray showing no pneumonia infiltrate.



Figure 4. Antebrachii left lateral X-ray showing bones and joints within normal limits, no limb deformities.



Figure 5. X-ray manus dextra et sinistra anteroposterior shows good bone density and trabeculation and does not narrow between joints.

induced to generate chemoattractants and proinflammatory cytokines by activating IFN- α/β receptors.⁷ Antigen-presenting cells delivering the spike protein antigen to T cells induce another response to the virus by activating B cells and causing them to produce anti-spike immunoglobulin. The coated virus can be absorbed into macrophages through Fc receptors when this immunoglobulin binds to the viral spike protein.⁷ In the adaptive phase, these macrophages release proinflammatory cytokines that could contribute to a cytokine storm.^{7,8} In COVID-19, cell/tissue damage most likely happens in two ways: (1) directly from the virus through viral replication; and (2) negatively from an inflated immune response that results in a cytokine storm, or excessive and uncontrolled production of proinflammatory cytokines.^{9,10}

Most of those affected have modest symptoms, but they can develop into serious clinical conditions, particularly those marked by acute respiratory distress syndrome (ARDS) and cytokine storms that can be fatal.¹¹ Uncontrolled immune activation causes a cytokine storm, which results in hyperinflammation and multiorgan illness.¹² Everyone is susceptible to getting this new virus, although COVID-19 only affects a small percentage of people with more serious illnesses. Elderly patients, smokers, and people with chronic illnesses like diabetes mellitus or hypertension are the main risk categories.^{13–15} We noticed that children were less affected by the epidemic and typically developed milder forms of illness when exposed.^{16,17} Only 2% of cases in a cohort analysis of 72,314 COVID-19 participants were reported by Wu et al. to be under the age of 19.¹⁸ According to the Centers for Disease Control and Prevention's (CDC) Report, children under the age of 18 were admitted to hospitals and intensive care units (ICU) at rates that were lower than those of adults aged 18 to 64 (10% - 33% and 1.4% - 4.5%, respectively). However, compared to older kids (1–17 years) and adults, babies have a greater hospitalization rate (15%–62%).¹⁹ 15% of pediatric children have leukocytosis, and 15% have leukopenia in their blood counts, which are generally normal. Erythrocyte sedimentation rate

(ESR) and C-reactive protein (CRP) are frequently within the normal range. Nearly half of the children had chest CT results similar to but milder than those reported in adults.²⁰

Protective Immunology Mechanisms in Children

Trained Immunity

Following initial antigen stimulation (infection or vaccination), trained immunity is the functional reprogramming of innate immune cells to a more active state through metabolic reprogramming (enhanced Krebs cycle) and epigenetic changes (acetylation and methylation leading to increased transcription of interleukin [IL]-1 gene, IL-6 gene, and TNF- α). It can impact localized cells (such as lung macrophages and dendritic cells) and progenitor cells of myeloid and monocyte cell lines.²¹ It has been hypothesized that nations with routine BCG vaccination had lower COVID-19-related morbidity and mortality rates.²² Previous research has shown that trained immunity and heterologous immunity are two potential mechanisms underlying the non-specific protection offered by the BCG vaccine.²³ Heterologous immunity refers to activating CD4 and CD8 memory cells independently of the presence of an antigen (in this case, the BCG vaccine).^{24–27} This activation could be brought on by secondary infection-stimulating cytokines. At the promoter regions of the genes encoding proinflammatory cytokines like interleukin 6 (IL-6) and TNF- α (tumor necrosis factor α), the BCG vaccine is known to cause histone alterations and epigenetic changes in human monocytes.²⁸ In cases of COVID-19, this results in a more active innate immune response following re-stimulation (trained immunity), which may help with successful viral clearance. Recent research by Art et al. has shown that BCG vaccination lowers viremia levels following yellow fever immunization, and this impact is correlated with the production of cytokine responses.²³

Immunity Changes

When newborns are exposed to infectious stimuli, the innate response predominates, and the adaptive response is less noticeable. The cytokines IL-6, IL-8, IL-

10, and TNF- α were released at higher levels in younger children in response to the toll-like receptor (TLR) stimulation, resulting in a stronger innate response.²⁹ The poorer illness course observed in newborn infants with COVID-19 compared to older children may be due to insufficient adaptive responses.³⁰ Elderly people have been found to have several abnormalities in their innate immunity, including decreased dendritic cell number and function, reduced TLR induction, increased pro-inflammatory cytokines, decreased macrophage and neutrophil function, decreased natural killer (NK) cell activity, decreased $\gamma\delta$ T cell proliferation and number.^{31,32}

Comorbid

Co-morbidities such as heart disease, cerebrovascular disease, and obesity are linked to higher mortality in persons with COVID-19. The anamnesis shows the presence of a JRA, a rheumatic disease most often found in children. JRA was defined as the presence of objective signs of arthritis in at least one joint lasting more than 6 weeks in children younger than 16 years, and other types of arthritis in children were excluded. Arthritis is defined as swelling of the joints or the presence of two or more signs: limited range of motion, tenderness, pain when moving, or the joints feeling warm. There are currently no complaints of JRA in this patient, but the patient has a history of prolonged fever accompanied by joint pain and difficulty moving. Before these symptoms appeared, the patient was diagnosed with typhoid fever in early 2020. It is yet unknown what causes this condition. According to the most widely recognized approach, infection, stress, and trauma are the main etiological causes, and secondary immunogenic pathways can be used to distinguish between genetic and environmental influences.⁹

On physical examination with the pGALS examination, carried out on February 13, 2021, there was no pain, difficulty dressing or difficulty walking. In addition, there were no deformities or abnormalities in the patient's joints. In acute JRA patients, it is usually characterized by warm joints, which do not look erythematous. In addition, swelling

or joint effusion can also be found, which causes limited joint movement. JRA can be classified into several types, namely:

- Type of onset of polyarthritis: arthritis of more than 4 joints, usually affects the finger joints and is symmetrical, and can also affect the knee, ankle, and elbow joints.
- Type of onset of oligoarthritis: signs of arthritis are found in 4 joints or less. Large joints are more commonly affected and usually in the extremities.
- Type of systemic onset: body temperature $>39^{\circ}\text{C}$, signs of arthritis, usually accompanied by other systemic disorders such as rheumatoid rash and visceral disorders (hepatosplenomegaly, serositis, lymphadenopathy).

On laboratory examination, leukocytosis was 12,800 cells/ μL , and mild thrombocytosis was 507,000 cells/ μL . In acute JRA patients, peripheral blood examination showed mild/moderate anemia, Hb 7-10g/dl, leukocytosis with a predominance of neutrophils and thrombocytosis in severe systemic types or frequent polyarthritis. Used as a sign of JRA reactivation. Markers of disease activity include ESR and CRP, which usually increase according to disease activity. However, the ESR and CRP were not examined when this patient was treated at Wisma Atlet Hospital. Rheumatoid factor is rarely found in JRA, but when positive, it is usually associated with JRA of the polyarthritis type, older children, subcutaneous nodules, bone erosion or worse functional condition. Positive ANA examination, especially in the oligoarthritis type complicated by uveitis, is more often in girls.

On radiological examination, no abnormalities were found in the patient's extremities and genu. Imaging is done to check for joint damage that has occurred. Radiological abnormalities of the joint: swelling of the soft tissue around the joint, widening of the joint space, osteoporosis, and sometimes periosteal new bone formation may be found. At a more advanced stage (over 2 years), you can see the joints' erosion and the cartilage area's narrowing. Ankylosis can be found mainly around the carpal and tarsal joints. Bone abnormalities can also be detected by scintigraphy and radio imaging.

Immunosuppressed patients are thought to be the main risk factor for COVID-19. Patients with rheumatoid arthritis (RA) are more likely to contract the COVID-19 virus than healthy individuals. Immune system dysfunction causes RA, and immunosuppressive medications increase the risk of viral infections in RA patients.³³ Pain, inflammation, dryness, and reduced joint function are symptoms experienced by RA patients due to white blood cell migration to the synovium.³⁴ However, some factors, including genetic factors, environmental factors, such as viral and bacterial infections (especially in genetically susceptible individuals), and hormonal factors, play a role in causing an impaired immune response. Scientists have not yet identified the cause of the immune system dysfunction in RA.^{35,36} Genetic predisposition is responsible for 60% of RA events.³⁴ Angiotensin II, a potent peptide linked to vascular biology and inflammation, is transformed into angiotensin-1-7 by the body's angiotensinogen converting enzyme (ACE) 2.³⁷ The Ras/Raf/MAPK signaling pathway is activated by angiotensin II through the usage of janus kinase (JAK).³⁸ Angiotensin II increases prostaglandin and vascular endothelial cell growth factor (VEGF) synthesis when there is inflammation, which leads to an inflammatory reaction and increased vascular permeability.³⁹ The nuclear transcription factor factor- κB (NF- κB) is activated by these inflammatory mediators, which also causes an increase in the infiltration of inflammatory cells into injured tissues.⁴⁰ In endothelial cells, macrophages, and cardiac fibroblasts, angiotensin II stimulates TNF- α and IL-6 gene expression and raises CRP.^{41,42} Angiotensin II levels are higher in patients with viral influenza.⁴³ Recombinant ACE 2 usage may be beneficial in avoiding lung damage brought on by SARS-COV 2.^{44,45} By suppressing the expression of ACE 2, SARS-COV 2 increases the generation of angiotensin II, reduces vascular permeability, and worsens lung injury. In ARDS patients, decreased ACE 2 and persistent angiotensin II increase the risk of additional lung injury, while ACE2 inhibitor treatment may exacerbate COVID-19 clinical conditions in RA patients. ACE inhibitors in these

patients can improve vascular endothelial function due to the lack of angiotensin II production. The mechanism of inflammation in synovial RA patients can involve endothelial cells and the formation of atherosclerotic lesions.^{42,46,47} Further genetic research on these two crucial inflammatory mediators may shed additional light on their biological function in the pathogenesis of COVID-19, given the relevance of ACE 2 and ACE in the pathogenesis of RA and COVID-19.

The patient received methylprednisolone therapy at a dose of 4 mg/day. The patient has been taking methylprednisolone regularly for the last 1 year at this dose. The strongest anti-inflammatory activity is present in this class of medications. Due to its numerous negative effects and ineffective prevention of joint degeneration, its usage is restricted. Patients with oligoarticular juvenile idiopathic arthritis (JIA) have shown that intra-articular treatment of (methylprednisolone acetate and triamcinolone hexacetonide) is beneficial in achieving remission, even with a single injection.⁴³ Systemic symptoms can be reduced in people with the systemic form of the disease using oral or parenteral steroids. Joint pain, edema, sensitivity, related heart, hepatitis, lung, or fever symptoms respond significantly to steroid therapy. However, administration in modest doses or on alternate days is advised for patients who have achieved illness control due to various side effects. Up to 1 mg/kg/day of steroids are frequently used. For patients with cardiac insufficiency or tamponade brought on by carditis or pericarditis, the dosage may be raised by 1-2 mg/kg/day. Patients with a significant clinical manifestation of systemic JIA should get three days of high-dose steroid therapy (30 mg/kg/day).^{41,43}

JRA patients are more prone to infections, especially while the illness is active. The most frequent side effect connected with biological treatments is a serious infection, and anti-arthritic medications may exacerbate this susceptibility.⁴⁸ Increased infection rates were found in JIA patients treated with prednisone over 10 mg/day. On the one hand, corticosteroids (CS) decrease the host inflammatory response, which in the

case of viral infections of the respiratory tract is the main cause of lung damage and the onset of the disease, while on the other hand, they block the immune response and delay clearance of pathogens.⁴⁹ Therefore, it is important to encourage RA patients to continue receiving medication despite the COVID-19 outbreak. This plan is appropriate, in our opinion, since it attempts to prevent disease flare-ups that can raise the burden on patients, cause them to become disabled, have a lower quality of life, and use more healthcare resources.⁵⁰ In addition, stopping a current course of treatment could necessitate using CS as a bridge therapy, which could raise the risk of viral infection further and be inappropriate for treating SARS-CoV2 interstitial pneumonia.

The patient also received calcium lactate therapy once daily for the last 1 year. The objectives of therapy should be multifaceted: to manage systemic problems, to promote normal physical and psychosocial development, to induce illness remission, and to maintain range of motion, muscle strength, and muscle function. Every three months, the length of treatment should be changed in order to reach therapeutic objectives.⁵¹

A multivitamin from Becafort was also given to the patient. Ascorbic acid, a water-soluble vitamin, is thought to benefit individuals with serious and life-threatening illnesses. It has anti-inflammatory qualities, affects cellular immunity and vascular integrity, and is a cofactor in producing endogenous catecholamine. It is an antioxidant and free radical scavenger.^{52,53} Vitamin C supplementation has been studied in several illnesses, including severe infections and sepsis, because people may need more vitamin C in oxidative stress conditions. Because severe COVID-19 can result in sepsis and acute respiratory distress syndrome (ARDS), research is being done to determine the potential benefit of high-dose vitamin C in reducing inflammation and vascular damage in COVID-19 patients.⁵⁴

Mental Health in JRA Patients

Screening for psychological or behavioral problems can help identify children with JRA who are at risk for developing

psychopathology in the future. Most studies using validated screening for depressive symptoms report a clinically significant prevalence of symptoms in children with JIA in the 7-36% range. According to a review of prior research, depression and anxiety symptoms are common in children with juvenile arthritis. This research also revealed the connections between parents' mental health and children in JRA-affected families. Furthermore, numerous studies have demonstrated that juvenile mood disorders indicate an increased chance of continuing to have recurrent depressive episodes and psychosocial morbidity as adults. This disparity can affect their ability to think, act, and operate socially. Therefore, in addition to the medical aspects of a chronic sickness like JRA, consideration must be given to the psychological aspects of the illness.

Pathophysiology of Mental Health In JIA

According to some research, the ratio of a few neurotransmitters may signal an increase in the activity of the enzymes involved in the dopamine and serotonin pathways. This may clarify the relationship between the signs of sadness, anxiety, exhaustion, and possibly cognitive impairment in JIA patients with active inflammation.⁴⁹ Additionally, it was discovered that the pattern of cerebral perfusion abnormalities in JIA patients matched the pattern of perfusion seen in patients diagnosed with anxiety or depression. When compared to children without JIA, a previous study using single-photon emission computed tomography (SPECT) imaging found that children with JIA had significantly lower perfusion in the right frontal and parietal lobes and significantly higher perfusion in the left parietal and left occipital lobes. This part of the brain affects anxiety, attention span, and mood control.

Screening for emotional and behavioral problems in JRA children

The Pediatric Symptom Checklist 17 (PSC-17) is a quick screening form with 17 questions that aid in identifying and evaluating changes in children's emotional and behavioral issues. PSC-17 can support treatment assessment, research, and administration in various clinical,

educational, or public health contexts. In this case, the value of the internalization subscale is <5, and the externalization subscale is <7. The number of attention subscale values is <7, meaning no behavioral, emotional, or psychosocial disturbances exist.

Impact on Quality of Life

The lower overall quality of life is reliably correlated with depressive symptoms. The examined literature suggests that anxiety and quality of life are connected. Higher anxiety scores were found in JIA children with negative self-perceptions of their lives.³⁴ However, one study discovered that the link between anxiety and quality of life decreased if disease, pain, and demographic characteristics were considered.

Numerous studies have explicitly examined sleep quality and academic performance as quality-of-life indicators. According to a study, nocturnal awakenings and parasomnias were substantially connected with depressive and anxious symptoms in 80% of children with JIA who reported sleep abnormalities. The patient's mood modulated the association between pain and poor sleep quality.⁴⁵ In adolescents with JIA, higher depression scores were closely linked to poorer academic performance and school absences. 88% of JIA patients with substantial depression missed school, and 69% performed poorly.

Impact on Parents and Families

Parents of kids with JIA go through a cycle of good and bad mixed emotions that change over time. The main feelings include increased anxiety, dread, and bewilderment between the commencement of the illness and the diagnosis. There was skepticism and anxiety about the illness soon after the diagnosis. Throughout the illness, parents feel an underlying anxiety and helplessness. Previous studies have shown that parental impressions of a child's vulnerability are correlated with the child's depressive symptoms and that anxiousness is also more common among children who are viewed as being more sensitive. Daily parental stress also indicated higher depression levels. To better support parents and aid in

improving JIA outcomes, healthcare professionals who provide for children with JIA must be aware of these complex emotional experiences.

CONCLUSION

In pediatric patients diagnosed with COVID-19 and JRA, it is important to continue corticosteroid treatment with an adjusted dose. Even though this treatment has the possibility of causing immunosuppression which can complicate the healing process of COVID-19, we need to prevent the recurrence of JRA in patients. Several factors can help the process of healing COVID-19 for a child, such as trained immunity, lung development, and maturing immunity, and most children do not have comorbidities that can make it difficult such as Diabetes Mellitus and hypertension. In addition, psychosocial factors and the role of the family in childcare also impact the process of healing and controlling the patient's illness.

PATIENT'S INFORMED CONSENT

The patient's parents have signed a written informed consent regarding the publication of this case.

AUTHOR CONTRIBUTION

The author examined and followed the patient and wrote this case report with the co-author. The author also works with a co-author in preparing, reviewing, and editing this manuscript.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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