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**Case Report**

# Psoriasis vulgaris patient with psoriatic arthritis managed with interleukin-17A inhibitor: Balancing benefits and adverse effects

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## Abstract

Psoriasis vulgaris is a significant health problem and up to 30% of the patients are most likely to develop psoriatic arthritis. Secukinumab, an interleukin-17A (IL-17A) inhibitor, is used to treat patients with moderate-to-severe plaques associated with psoriatic arthritis. The aim of this case report was to highlight the efficacy of secukinumab treatment in a patient with both psoriasis vulgaris and psoriatic arthritis focusing the how to balance the benefits and adverse effects. A 36-year-old female came to Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia with chief complaint of itchy and scaly red plaques almost all over the body. The patient also experienced pain in both knees, both ankle joints and index finger as well as thumb in the right hand in the last year. The patient was diagnosed with psoriasis vulgaris and psoriatic arthritis, then treated with phototherapy and 15 mg of oral methotrexate each week for four weeks. Due to no improvement of the initial treatment, the patient received emollient and secukinumab at a dose of 300 mg/week subcutaneously for five weeks. The lesions began to disappear and the joint pain began to relieve. Secukinumab therapy was continued with a dose of 300 mg/month for six months. However, after six months, the patient complained of acnes appeared on the face. Therefore, the maintenance dose of secukinumab was decreased to 150 mg/month. After the reduced maintenance therapy was given, the patient came back with no complained of acnes. The erythematous plaques on trunk, back, arms and legs have subsided, as well as the joint pain. This case highlights that in a moderate-to-severe psoriasis associated with psoriatic arthritis, secukinumab is highly effective. However, since the potential adverse effects, education and regular follow-up are needed to analyze the success of the treatment and to be able to manage the adverse effects.

**Keywords**: Psoriasis vulgaris, psoriatic arthritis, secukinumab, IL-17 inhibitor, biologic agent

## Introduction

Psoriasis vulgaris is a persistent inflammatory skin disorder that is mediated by immunity and characterized by skin infiltrates, epidermal hyperplasia and uncontrolled keratinocyte



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proliferation. The mechanism of this disease is quite intricate, which involves genetic, immunological and environmental factor [1]. Previously, it was believed that the development of psoriasis vulgaris was strongly linked to IFN-γ and IL-12 as the primary contributing cytokines [1]. However, the insight has changed to Th17 axis as the main contributor, in which IL-17, IL-22 and IL-23 play more dominant roles in its pathophysiological process [2]. Approximately, 30% of patients who suffer from psoriasis vulgaris are most likely to develop psoriatic arthritis in their lifetime, particularly those who suffer from a moderate-to-severe psoriasis vulgaris [3]. Psoriatic arthritis is a chronic inflammatory disease that affects the musculoskeletal and the clinical manifestation include arthritis, enthesitis, spondylitis and dactylitis [3].

Psoriasis vulgaris is a skin disease that can affect anyone and its incidence is higher in Western countries [4]. In 2014, World Health Organization (WHO) declared that psoriasis vulgaris is a global problem with both significant financial and psychological burdens to the patient or society [5]. It afflicted 2% of population in the United States, 1.5% in western Europe and 0.1% in east Asia. The symptom has a bimodal peak of age, it may start earlier in individual with the age of 15–20 years old, but it could also first appear in the age of 55-60 years old. However, children have a lower prevalence than adults [6]. Based on a previous study, in 10 years of the disease course, the patients would be more likely to develop psoriatic arthritis. In 15% of cases, the clinical manifestation of both psoriasis vulgaris and psoriatic arthritis could even appear at the same time, or in a fewer cases, the symptom of psoriatic arthritis may precede the symptom of skin lesion [7, 8].

Psoriasis vulgaris and psoriatic arthritis present in patients as a sequence of a multimorbidity disease. In that regard, it is important to determine and choose the kind of treatment that would thoroughly subdue the cause of those diseases. These diseases develop as a result of cytokine imbalance, which leads to an upsurge of inflammation and musculoskeletal impairment. One of characteristics that would be found in psoriasis vulgaris and psoriatic arthritis is the high accumulation of pro inflammatory cytokine interleukin-17A (IL-17A). IL-17A induces the inflammation in one or more entheses as well as synovial tissue and provokes proliferation and differentiation of keratinocyte in psoriatic lesions [9]. A biological therapy in a form of a human monoclonal antibody, secukinumab, works specifically to neutralize IL-17A and is the first of its kind to be approved by FDA in 2015. Secukinumab is given to patients with moderate-to-severe plaque psoriasis, active psoriatic arthritis, active ankylosing spondyloarthritis, and hypertrophic palmoplantar psoriasis. In circumstances where there's a history of past failure to systemic therapy, Secukinumab is also an appropriate choice to start a biological therapy [10].

The majority of patients with a moderate-to-severe case of psoriasis vulgaris develop psoriatic arthritis in their lifetime. Many clinical studies showed that psoriasis vulgaris patient with psoriatic arthritis needs a biological therapy, especially in a case where the previous treatments did not work. The aim of this case report was to signify a real-life experience of an interleukin-17A inhibitor treatment in patient with both psoriasis vulgaris and psoriatic arthritis.

## Case

A 36-year-old female patient came to the Dermatology and Venereology Department of Dr. Zainoel Abidin Hospital in Banda Aceh, Indonesia with chief complaint of itchy and scaly red plaques almost all over her body. The patient admitted that the first plaque appeared at the age of 30 and in the last 3 years her condition was getting worse. The patient also experienced pain in both knees, both ankle joints and index finger as well as thumb in the right hand in the last year. The patient conceded that the patient had never experienced a condition like this before, nor had any health issues previously. However, the patient remembered that her mother ever had a skin disease with lesions like hers a few years ago. Physical examination revealed mild swelling on both hands and there was restriction in active movements. Dermatological examination showed that the lesions were multiple erythematous plaques with thick rough squama on trunk, on the back, as well as both arms and legs (**Figure 1**). Based on the surface area of the involved skin, the body surface area (BSA) of the patient was 60%. Based on the intensity of the redness, thickness and scaling of the lesions, the measurement of Psoriasis Area and Severity Index (PASI)

score of this patient was 32.4%. According to the Classification Criteria for Psoriatic Arthritis (CASPAR) of this patient, the patient scored 3 points, which were current psoriasis (2 points) and family history of psoriasis (1 point). Laboratory results showed that hemoglobin 13.2 g/dL, leukocytes 8.500/mm3, erythrocytes 3.9 million/mm3, platelets 270.000/$mm_3$, urea 18 mg/dL, creatinine 0.7 mg/dL, random blood glucose 94 mg/dL, uric acid 6.2 mg/dL, total cholesterol 219 mg/dL and C-reactive protein (CRP) 16 mg/L. Histopathological examination revealed that there were hyperkeratosis, parakeratosis and Munro microabscess in the stratum corneum, as well as hypogranulosis and spongiform pustule of Kogoj (**Figure 2**).

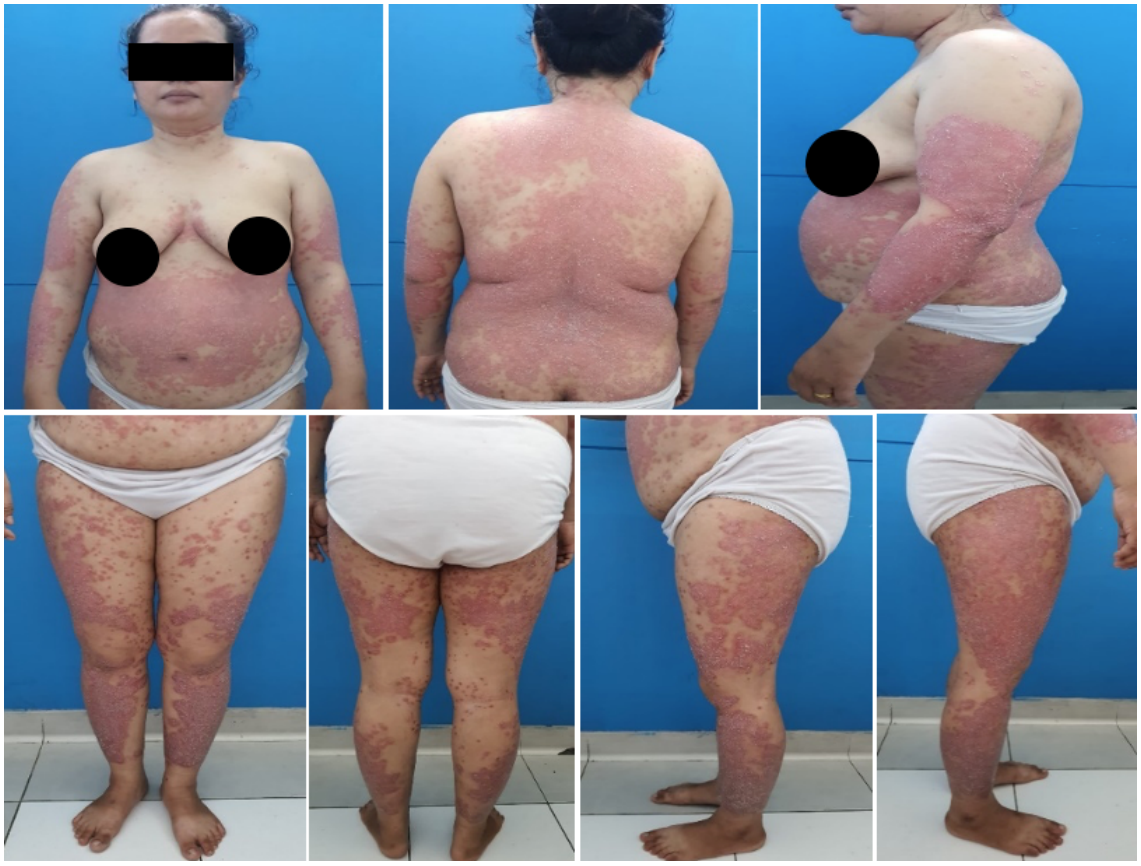

Figure 1. Multiple erythematous plaques with thick rough squama on trunk, back, both arms and legs of the patient.

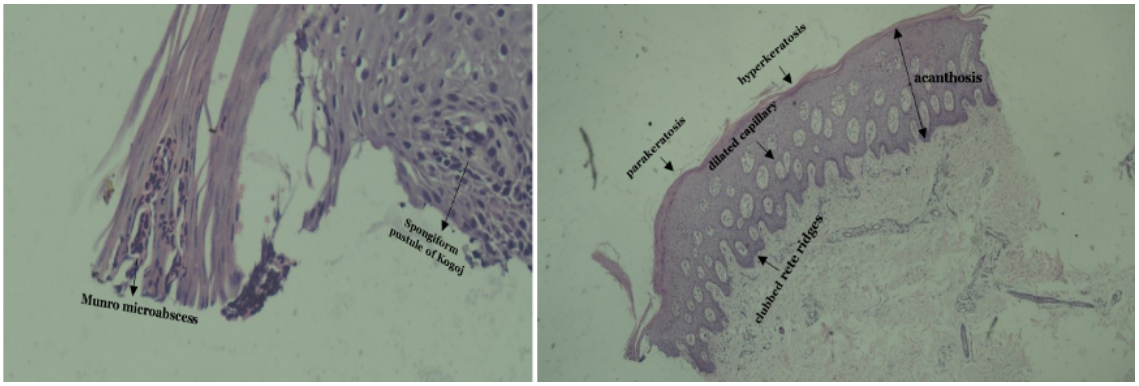


Figure 2. Psoriasiform lesion showing clubbed-shaped of the rete ridges, parakeratosis, hyperkeratosis, acanthosis, dilated capillary and infiltration of neutrophils into stratum corneum (Munro microabscess) and stratum spinosum (spongiform pustule of Kogoj) (hematoxylin-eosin staining, 100 x magnification).

The patient was diagnosed with psoriasis vulgaris and psoriatic arthritis. The initial treatment of this patient was the combination of phototherapy and 15 mg of oral methotrexate

per week, but there was no improvement after about a month. Henceforth, the patient received emollient and secukinumab as a therapy at a dose of 300 mg/week given subcutaneously for 5 weeks. The lesions then began to disappear and the joint pain symptoms began to decrease (**Figure 3**). Secukinumab therapy was continued with a dose of 300 mg/month for 6 months. However, after six months of secukinumab therapy, the patient came to the hospital and complained of acnes that appeared on her face. Due to the complained, the maintenance dose of secukinumab was decreased to 150 mg/month. The acnes began to disappear afterward. Six months later after the reduced maintenance therapy of secukinumab was given, the patient came back with no complained of acnes. The erythematous plaques with thick rough squama on trunk, back, arms and legs have subsided, as well as the joint pain.

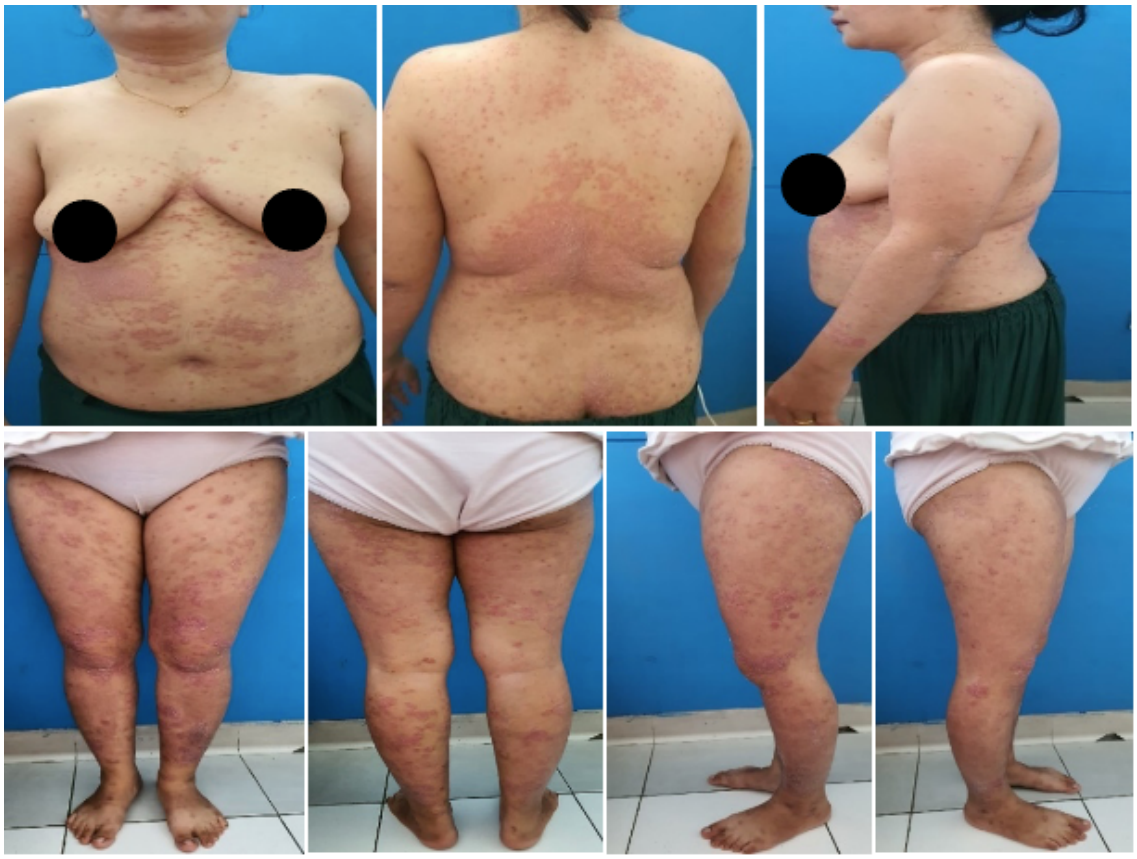

Figure 3. Follow up of the lesions after 5 weeks of secukinumab administration. Multiple plaques with squama on trunk, back, arms and legs of the patient. The erythematous plaques have decreased. There were improvements of the patient's condition.

## Discussion

Psoriasis vulgaris is a recurrent chronic illness that needs a long-term treatment. Its treatment is influenced by the severity of the disease, comorbidities, and health-care availability. Based on the extent of severity of the lesions and the percentage of the body that are affected, psoriasis vulgaris patients are generally classified into two groups: mild and moderate-to-severe psoriasis vulgaris. A variety of scores can be applied to grade the severity of a clinical condition and its response to medication. In clinical research, particularly those involving biologic drug development, the Psoriasis Area and Severity Index (PASI score) has been frequently used. Glucocorticoids, vitamin D analogues, and phototherapy can be used topically to treat mild psoriasis vulgaris. For moderate-to-severe psoriasis, systemic therapy is typically required [11].

As stated previously, moderate-to-severe psoriasis vulgaris is usually would be followed by any comorbidities, one of which is psoriatic arthritis. Psoriatic arthritis is a complex, inflammatory musculoskeletal condition that's strongly related with psoriasis. The organ systems that could be impacted by this disease comprises of skin, nail, enthesis and joint. In addition to the musculoskeletal symptoms, psoriatic arthritis patients are also associated with any other

diseases such as uveitis, cardiovascular disease, osteoporosis, and metabolic disease. Due to this heterogeneity, psoriatic arthritis is quite arduous to diagnose. Nevertheless, Classification Criteria for Psoriatic Arthritis (CASPAR) could be used as a method to assess and identify psoriatic arthritis [12]. A systematic study that's conducted by Alinaghi et al. in 2019 shows that the prevalence of psoriatic arthritis in psoriasis vulgaris patients is relatively diverse in disparate region; which are about 22.7% in Europe, 19.5% in North America, and 14.0% in Asia [13].

It is pivotal to diagnose the psoriatic arthritis as early as possible in order to prevent the severe joint deformity as well as disability [14]. In this case, the patient had admitted that the first lesion appeared when the patient was 30 years old. It was such a small red lesion on the right arm, the patient didn't really mind of it and thought that it was just some sort of allergic reaction. However, as the time went by, the lesion started to appear on the other region of the body as well, such as the trunk and the lower extremities. The symptoms got worse when the patient felt the pain in both of her knees, both of her ankle joints, her index finger and thumb in right hand. Then, the histopathological examination was conducted.

The result of histopathological examination of this patient revealed that there were hyperkeratosis with parakeratosis and Munro microabscess in the stratum corneum, along with hypogranulosis, and spongiform pustule of Kogoj. Hyperkeratosis indicates the increased thickness of the outermost layer of epidermis, while parakeratosis represents the existence of a nucleus within a keratinocyte. Both hyperkeratosis and parakeratosis occur due to the uncontrollable proliferation of keratinocyte as well as its altered differentiation [15]. At the same time, on account of the inflammatory reaction, there's an infiltration of neutrophils into stratum corneum (Munro microabscess) and even to the stratum spinosum (spongiform pustule of Kogoj). The presence of these two features in histopathological finding are the most prominent hallmark of psoriasis vulgaris, because they wouldn't be found in any other diseases. Another distinctive histopathological characteristic of psoriasis vulgaris is the hypogranulosis, that happens due to the dysregulated cytokine production [16]. Based on the thorough anamnesis, physical examination and histopathological test, this patient is diagnosed with psoriasis vulgaris and psoriatic arthritis.

The initial treatment for this patient was a combination of phototherapy and methotrexate with the dose of 15 mg/week, but no improvement was seen afterwards. According to a study, Methotrexate still remains as the first line of therapy in psoriasis vulgaris and psoriatic arthritis [17]. However, in a recent narrative review, it was found that Methotrexate was superior to placebo in order to decrease the psoriatic plaque in the body surface area, but it did not show a significant difference or an improvement in the aspect of reducing the arthritis problem, such as swollen joint, pain in the extremities or morning stiffness [18] Methotrexate shows to be more effective in people with psoriasis vulgaris who do not have psoriatic arthritis than in those who have both psoriasis vulgaris and psoriatic arthritis.

Secukinumab is a biological therapy in a form of a human antibody that works to neutralize IL-17A. IL-17A has an imperative role in the development of psoriasis vulgaris as well as psoriatic arthritis. It's produced by T-helper 17 (Th-17), neutrophil, mast cell and natural killer cell [19, 20]. Basically, IL-17 cytokine family encompasses IL-17A through IL-17F. They would bind to their transmembrane receptor (IL-17R), which consists of five subunit (IL-17RA to IL-17RE). IL-17A and IL-17F associate with the same receptor subunit, which are IL-17RA and IL-17RC. Despite that, due to the different affinity of their ligand-receptor interaction, IL-17A is generally 10 to 30 fold more potent than IL-17F to activate the gene expression. In addition to that, IL-17A receptors are also present on the top of the keratinocyte, making it the major quarry of the development of psoriasis and psoriatic arthritis [10, 19]. IL-17A can activate the keratinocyte proliferation to the point it becomes uncontrollable. It would also trigger the other immune cells to release cytokines along with chemokines, culminate in the chronic inflammation process [20].

Secukinumab plays its role by binding to the circulating IL-17A, so that IL-17A wouldn't bind to its receptor. This mechanism of action undisputedly would impede the release of the cytokines [21]. Secukinumab can be injected subcutaneously (SC) at a low (75 mg), medium (150 mg) or high dose (300 mg) or intravenously (IV) at a dose of 10 mg/kg. The recommended dose for psoriasis vulgaris via subcutaneous route is 300 mg as a loading dose for the first 4 weeks, followed by 300 mg once a month as a maintenance dose. While the recommended dose for

psoriatic arthritis patient is 150 mg via subcutaneous injection as a loading dose for the first 4 weeks, followed by 150 mg once a month for maintenance [22]. Nonetheless, recommended dose of secukinumab for both moderate-to-severe psoriasis vulgaris and psoriatic arthritis patient is 300 mg injected at weeks 0, 1, 2, 3 and 4, then given as a maintenance dose of 300 mg once a month [23]. In this case report, the patient got emollient and secukinumab as a therapy at a dose of 300 mg/week given subcutaneously for 5 weeks and continued with a dose of 300 mg/month. There were actually improvement after 2 months of therapy, by which the lesions started to vanish gradually and the symptoms of joints pain were actually decreased. However, when the patient came to the hospital in the next visit for a follow up, the patient complained about acnes that appeared on her face. Due to the complaint, the maintenance dose of secukinumab was decreased to 150 mg/month. Afterwards, in the next month of follow up, the patient admitted that the acnes disappear and there was no complaint regarding the disease.

In accordance with the guidelines of Joint American Academy of Dermatology–National Psoriasis Foundation (AAD-NPF), secukinumab could be an appropriate treatment choice for patients with moderate-to-severe plaque psoriasis associated with psoriatic arthritis [24]. On the other side of things, secukinumab also has adverse effects, such as superficial skin bacterial infection, nasopharyngitis, urticaria, dermatitis, and acne [25].

## Conclusion

In a case of moderate-to-severe psoriasis vulgaris associated with psoriatic arthritis, secukinumab is a highly effective biologic agent to be used as a treatment. Yet, because of the potential adverse effects that may appear and is varied from patient to patient, education and regular follow-up are needed to analyze the success of the treatment.

### Ethics approval

The patient provided written informed consent to be published as a case report.

### Competing interests

The authors declare that there is no conflict of interest.

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### Underlying data

All data underlying the results are available as part of the article and no additional source data are required.

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