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THE EFFECT OF PROPIONIBACTERIUM ACNES ON PATIENTS WITH OVERSTEROID SYNDROME AT THE ACNE INSTITUTE CLINIC

Angelica Aji Wardani[1], Lailatus Sa'diyah[2*]
[1,2]*Akademi Farmasi Surabaya (Indonesia)*

**Corresponding author:lailatuss@akfarsurabaya.ac.id*

Abstract

Overuse topical corticosteroids can disrupt the skin microbiome, and lead to increasing Propionibacterium acnes colonization and worsening inflammation. This study aims to analyze the impact of Propionibacterium acnes on patients with oversteroid syndrome. This cross-sectional study was conducted at Acne Institute Clinic over two weeks, involving 21 patients with a history of prolonged steroid use. The Meicet Pro-A skin analyzer was used to assess bacterial colonization and skin condition. The study found that 71.42% of patients had moderate Propionibacterium acnes colonization, 23.8% had mild colonization, and 4.76% had severe colonization. Increased bacterial presence was associated with higher porphyrin fluorescence, excess sebum production, and clogged pores, leading to acneiform eruptions. Overuse of topical corticosteroids significantly increases Propionibacterium acnes colonization, aggravating inflammatory skin conditions. Proper regulation and awareness of steroid use are crucial to prevent oversteroid syndrome.

Keywords: Acne, Oversteroids, Propionibacterium acnes

1. INTRODUCTION

Acne (Acne vulgaris) is one of the most common dermatological problems, especially in adolescents and young adults. The use of corticosteroids can cause an imbalance in skin bacteria, which can increase the growth of Propionibacterium acnes, worsen inflammation, and lead to increased acne (1).

Oversteroid syndrome is a condition that causes skin thinning, dilation of blood vessels, and other disorders that may occur as side effects of corticosteroid use, especially when used long-term and in excessive amounts. This condition is generally caused by various factors, including increased sebum production, clogged pores, and inflammation mediated by Propionibacterium acnes (now known as Cutibacterium acnes). However, this condition may worsen with the use of corticosteroids in acne treatment (2).

Excessive use of topical steroids can cause steroid-induced acne, characterized by the appearance of monomorphic papulopustular lesions, especially on the face, chest, and back. Propionibacterium acnes plays a major role in the pathogenesis of acneiform eruptions by increasing follicular colonization due to suppression of the immune response by steroids, stimulating inflammation through the release of lipase enzymes that break down sebum into pro-inflammatory free fatty acids, and increasing biofilm production, which protects bacteria from the immune system and antibiotic therapy (3).

Propionibacterium acnes is a natural bacteria found on the surface of human skin and plays a role in the pathogenesis of acne (4). This bacterium collaborates with other factors, such as hormonal changes and skin barrier damage, and worsen acne conditions (5). Excessive use of corticosteroids without medical supervision has triggered increasing in acne cases. Acne Institute Clinic identified that patients experienced this condition possibly due to the imbalance of the skin microbiota and increased growth of Propionibacterium acnes.

The research method used was an analytical observational method with cross-sectional data, observing the skin condition of patients during their first visit within a specific timeframe. Therefore, this study result obtained the most recent data from 21 patients with a history of using topical steroid medications and experiencing symptoms of oversteroid syndrome, diagnosed by a doctor and recorded in their medical records.

Data were collected through skin examination using the Meicet Pro-A device, which detects Propionibacterium acnes colonization using UV light based on red or orange fluorescent spots. The variables studied were the number of Propionibacterium acnes colonization sites, the area of infection (A), the percentage of infection (%) and the severity.

This study aims to examine the effect of Propionibacterium acnes on patients with oversteroid syndrome at Acne Institute Clinic. The data of this experiment will be analyzed descriptive and qualitatively.

2. METHODOLOGY

This research was an analytical observational study with cross-sectional data collection involving patients experiencing oversteroid syndrome over a two-week period from February 10 to February 24, 2025. The samples used in this study were 21 patients experiencing oversteroid syndrome due to the use of topical corticosteroids at Acne Institute Clinic. Data were obtained from facial examinations of each oversteroid syndrome patient using the Meicet Pro-A device. The stages of data collection were as follows:

2.1 Patients Identification and documentation

For the first step, patient's identification are including: (1) Recording the duration and history of topical steroid use for each patient, (2) Clinical photographs were taken to document skin conditions before sample collection, and (3) Examination using a UV lamp or porphyrin analysis device (Meicet Pro-A) to dentify the level of *Propionibacterium acnes* colonization.

2.2 Patient preparation

Cleaning the entire facial area using sterile water.Instructing patients not to touch their face before the procedure

2.3 Meicet Pro-A device setup

Turn on the Meicet Pro-A device and ensure the system is in optimal condition. Adjust the camera position to capture three facial angles of the patient: 0° (frontal/straight), 45° left, 45° right. Adjust the lighting and filters to be used according to analysis requirements.

2.4 Skin sample acquisition using Meicet Pro-A

Use UV Mode on Meicet Pro-A device (Porphyrin & Bacterial Fluorescence) to detect the presence of Propionibacterium acnes based on red or orange fluorescence.

2.5 Analisa Data

The data analysis technique in this study involved analyzing patients with symptoms and acne score from Acne Institute Clinic patients with oversteroid syndrome, followed by recording the number of Propionibacterium acnes. Data analysis in this study was carried out descriptively and analytically by grouping data in table form based on the number of Propionibacterium acnes. The main parameters analyzed were: a) Number and distribution of sensitive areas (mild, moderate, severe). b) Quantity and area of Propionibacterium acnes

colonization based on UV porphyrin detection. c) Percentage of inflammation and skin barrier condition. d) The Meicet Pro-A system provides a score of 0–100 to assess skin health level; the higher the score, the better the patient's skin condition. Thus, conclusions can be drawn regarding the effect of Propionibacterium acnes on oversteroid syndrome patients at Acne Institute Clinic.

3. RESULTS

During the research period, a total of 21 patients with a history of oversteroid syndrome at Acne Institute Clinic were observed over two weeks from 10 to 24 February 2025. Each sample was assessed based on the amount of Propionibacterium acnes colonization, infected area size, percentage of infection relative to total skin area, and severity level of Propionibacterium acnes colonization. Table 4.1 shows that the majority of Acne Institute Clinic patients were in the Moderate category with 15 patients (71.42%), followed by the Mild category with 5 patients (23.8%), while only 1 patient (4.76%) was in the Severe category.

Table 1. The effect of oversteroid on *Propionibacterium acnes* colonization

Patient	Duration of topical steroid use	*P. acnes* colonization number	Infected area size (cm^2)	Percentage of infection (%)	Severity level
SP1	5 years	2109	88.17cm^2	2.46%	Severe
SP2	4 years	2793	74.85cm^2	1.94%	Moderate
SP3	4 years	3865	63.97cm^2	1.72%	Moderate
SP4	3 years	3325	65.44cm^2	1.73%	Moderate
SP5	2 years	1.360	30.98cm^2	0.83%	Moderate
SP6	2 years	2536	59.81cm^2	1.47%	Moderate
SP7	2 years	3005	55.27cm^2	1.31%	Moderate
SP8	2 years	2092	34.88cm^2	1.07%	Moderate
SP9	2 years	2480	48.59cm^2	1.21%	Moderate
SP10	2 years	1746	47.36cm^2	1.32%	Moderate
SP11	2 years	971	38.40cm^2	1.03%	Moderate
SP12	2 years	2989	42.18cm^2	1.10%	Moderate
SP13	1 year	1048	32.72cm^2	0.86%	Moderate
SP14	1 year	923	27.97cm^2	0.70%	Moderate
SP15	1 year	1013	23.58cm^2	0.61%	Moderate
SP16	1 year	947	22.70cm^2	0.66%	Moderate
SP17	6 months	896	15.92cm^2	0.43%	Mild
SP18	2 months	218	3.30cm^2	0.09%	Mild
SP19	1 month	88	1.24cm^2	0.03%	Mild
SP20	1 month	179	1.04cm^2	0.03%	Mild
SP21	1 month	75	0.67cm^2	0.02%	Mild

Table 2. Percentage of severity level of *Propionibacterium acnes* colonization

Severity level	Patient number	Percentage (%)
Severe	1	4,76
Moderate	15	71,42
Mild	5	23,8
Total	**21**	**100**

Based on observations, this study shows that overuse of steroids can increase Propionibacterium acnes colonization, which contributes to skin inflammation and acne. Corticosteroids suppress the skin immune system, causing skin barrier disruption and microbiota imbalance, thereby creating an environment that supports the growth of these bacteria (2). The study results revealed that patients with oversteroid syndrome experienced an increase in

Propionibacterium acnes levels, associated with: Higher porphyrin production, contributing to inflammation. Increased sebum production, creating an ideal environment for Propionibacterium acnes growth. More clogged pores, triggering pustular acne and papules (6). The majority of patients experienced moderate colonization levels (71.42%), indicating that Propionibacterium acnes growth significantly increased in patients with oversteroid syndrome. One patient categorized as Severe had a colonization amount of (2.109 CFU/〖cm〗^2), an infected area of 88.17〖cm〗^2, and an infection percentage of 2.46%, showing the most severe impact due to bacterial colonization because the algorithm used in this analysis tool considers not only the number of Propionibacterium acnes spots but also distribution, density, and spread patterns. If Propionibacterium acnes is more evenly distributed and widespread, the impact on the skin is worse compared to a large amount concentrated in one small area. This indicates that bacterial growth significantly increases in oversteroid syndrome conditions, although not all patients experience extreme severity. The Meicet Pro-A device plays an important role in detecting Propionibacterium acnes colonization by: Using UV fluorescence imaging to detect porphyrins produced by Propionibacterium acnes.

Identifying the infected area size and percentage of skin infection caused by these bacteria, providing quantitative results that help determine patient treatment strategies (7). Data obtained from this device indicate that the wider the infected area and the more evenly distributed the spread, the higher the severity level of the skin condition, even though the number of Propionibacterium acnes bacteria is not always the highest. This is because if bacteria spread to various facial areas with high density, the risk of inflammation and skin damage is greater compared to a high bacterial count localized at only one specific point. Therefore, evenly distributed and widespread infection is more difficult to manage than infection concentrated in one small area. The results of this study are aligned with previous studies stating that long-term corticosteroid use can trigger Propionibacterium acnes growth and worsen acne. A study by Heng & Chew (2020) showed that skin microbiota imbalance due to excessive steroid use contributes to increased Propionibacterium acnes colonization, consistent with the results of this study (1). In addition, research by Dreno et al stated that Propionibacterium acnes can cause skin inflammation due to increased porphyrin production, which was also found in this study (1).

Porphyrins are natural pigments that can be bound to proteins such as cytochromes and hemoglobin and are found in a huge variety of organisms (9). P. acnes bacteria normally live in hair follicles and sebaceous glands of the skin. Under certain conditions, the bacteria increase in number and produce porphyrins, particularly coproporphyrin III and protoporphyrin IX (10). The impact of porphyrins on acne are as follows:

Produce reactive oxygen species (ROS). When exposed to light and oxygen, porphyrins are excited and produce ROS, which trigger oxidative stress and skin inflammation (11). Exacerbate acne lesions. ROS-induced inflammation contributes to the formation of papules, pustules, and redness in acne vulgaris (12).

4. CONCLUSIONS

Based on the result, 71,42% patient with oversteroid syndrome shows a wide colonization of Propionibacterium acnes. The colonization of Propionibacterium acnes determined by the presence of red or orange fluorescence colour on Meicet Pro-A device.

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