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Clinical Manifestations and Distribution of Treatment for Pyoderma at a Tertiary Hospital in Surabaya, Indonesia

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ABSTRACT

Background: Pyoderma is a skin disease caused by infection with Gram-positive bacteria. In Indonesia, this disease has a high prevalence due to inadequate sanitation, climate condition, humidity, and high population density. Patients with pyoderma present in diverse range of symptoms, in the form of clinical manifestation or systemic symptoms. Inadequate management of pyoderma can lead to an escalation in morbidity rates. Therefore, it is important to conducting comprehensive research about clinical profile of pyoderma patients. **Purpose:** To describe the profile of pyoderma patients in Dermatology and Venereology Outpatient Unit of Dr. Soetomo General Acdemic Hospital Surabaya in January 2016 to December 2018. **Methods:** This study is a retrospective descriptive analysis using secondary data derived from medical records at Dermatology and Venereology Outpatient Unit of Dr. Soetomo General Academic Hospital Surabaya. **Result:** The analysis of pyoderma patient at Dermatology and Venereology Outpatient Unit of Dr. Soetomo General Academic Hospital Surabaya in January 2016 to December 2018 reveals a total of 407 patients, predominantly male and the most age category were toddlers. Most clinical diagnosis were furuncles and carbuncles. Among the clinical manifestations, macula was the most frequent primary skin lesion, while erosion predominated among secondary lesions. The most commonly administered therapies were systemic and topical antibiotics. **Conclusion:** In the period from January 2016 to December 2018, clinical manifestations of pyoderma patients at the Dermatology and Venereology Outpatient Unit of Dr. Soetomo General Academic Hospital Surabaya were dominated by macula and erosions. Antibiotics, both topical and oral, representing the most prevalent treatment modalities.

Keywords: Pyoderma, Skin infection, Skin lesion, Gram-positive bacteria, Good Health and Wellbeing.

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BACKGROUND

Pyoderma is a skin lesion caused by bacterial infection such as Staphylococcus aureus and Streptococcus pyogenes.[1,19] Differences in bacteria composition depend on the physiology of the skin site includes moisture, lipids, and temperature of the skin.[23] Pyoderma is categorized according to skin condition, disease progression, and the presence of necrosis, with primary and secondary infections as distinct classifications. Bacterial invasion on the intact skin can lead to primary infections such as impetigo, folliculitis, furuncles, carbuncles, and erysipelas. Conversely, secondary infections occur in skin with compromised integrity due to prior infections, such as tropical ulcers, infected dermatitis, scabies, and other bacterial-infected diseases.[2]

According to WHO data in 2005, from ten developing countries in sub-Saharan Africa, the prevalence of skin diseases is moderately high. Among

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children, pyoderma had a prevalence ranging from 0.2% to 35%, tinea capitis from 1% to 19.7%, scabies from 0.2% to 24%, molluscum contagiosum reached 0.4% to 9%, pediculosis capitis ranged from 0% to 57%, dermatitis from 0% to 5%, and insect bite reactions from 0% to 7.2%. Skin conditions accounted for 6% to 23.7% of health center visits.[3] In Indonesia, from Indonesian Health Profile in 2020 revealed that skin and subcutaneous tissue diseases ranked third among outpatient disease.[4] In Surabaya, infectious and parasitic diseases ranked fourth, while skin and subcutaneous tissue diseases ranked sixth.[5] A study at Dr. Soetomo General Academic Hospital Surabaya in 2012 found a prevalence of 616 cases of primary superficial pyoderma in children under 14, with 47.24% of cases occurring in children aged 1-4.[6]

At Karitas Hospital in Sumber Barat Daya, the five most prevalent diseases include pyoderma, scabies, chronic dermatitis, atopic dermatitis, and miliaria. This high incidence of skin infections is primarily attributed to poor sanitation resulting from limited access to clean water.[7] Notably, a study conducted at Sanglah Hospital Denpasar in 2020 reported a substantial 58.5% prevalence of pyoderma among patients aged more than 4 years. The predominant pyoderma type identified was bullous impetigo, followed by crusted impetigo and folliculitis in second and third place.

Common oral antibiotic treatments for pyoderma patients, often caused by Staphylococcus aureus infections, include macrolides, flucoxacillin, cephalosporins, amoxicillin, and synergistin. Additionally, topical antibiotics are also used to for small and limited lesion on the skin.[3] At Dr. Soetomo General Academic Hospital Surabaya, erythromycin (56.8%), mupirocin (46.8%), and fusidic acid (28.8%) are the prevalent topical treatments administered for pyoderma patients.[9]

The susceptibility of Indonesian individuals to bacterial skin infections persists, primarily attributable to prevalent risk factors including poor hygiene and compromised skin integrity, high population density, and limited educational access.[16] Also, higher level of humidity in Indonesia can inhibit the ability to sweat. The increase prevalence of pyoderma, with the potential for severe complications if it left untreated. As such, this research aimed to assess the demographic profile of pyoderma patients at the Dermatology and Venereology Outpatient Unit of Dr. Soetomo General Academic Hospital, with the objective of enhancing treatment approaches and diminishing its prevalence.

METHODS

This was an observational descriptive study with retrospective study design using medical record data of pyoderma patients in the Outpatient Unit of Dermatology and Venereology at Dr. Soetomo General Academic Hospital Surabaya from January 2016 to December 2018. The data is taken in that time range before COVID-19 pandemic. This study had received ethical clearance from the Ethics Committee at Dr. Soetomo General Academic Hospital Surabaya (No.1053/LOE/301.4.2/IX/2022).

RESULT

A retrospective cohort of patients diagnosed with pyoderma was retrieved from medical records from the Outpatient Unit of Dermatology and Venereology at Dr. Soetomo General Academic Hospital Surabaya from January 2016 to December 2018. Initial retrieval yielded 679 patients. After thorough screening, a total of 272 patients were excluded from the sample due to more than two incomplete clinical data. Most incomplete variable was patient's nutritional status, such as weight and height. The total of 407 patients were included in the final analysis. The diagnoses studied in this study were impetigo, folliculitis, erysipelas, cellulitis, furuncle and carbuncle. Table 1 shows the number of pyoderma patients in the Outpatient Unit of Dermatology and Venereology at Dr. Soetomo General Academic Hospital Surabaya from January 2016 to December 2018. The most visits were obtained in 2016, which was 208 patients (51.1%), followed by 2018 (29%) and 2017 (19.9%) from the total number of patients. Based on table 2, it shows that the domination of pyoderma patients were mostly male 204 patients (50.1%) while the other patients (49.9%) were female. Table 3 shows distribution of pyoderma patients by age group dominated with toddler (24.1%) and the least age group was early teens (5.9%).

Table 1. Prevalence of pyoderma patients based on clinical diagnosis

Year	Diagnosis					N
	Impe-tigo (%)	Folli-culitis (%)	Erysip elas (%)	Cellu-litis (%)	Furuncle Carbuncle (%)	(%)
2016	15 (7.2)	67 (32.2)	11 (5.3)	17 (8.2)	98 (47.1)	208 (51.1)
2017	13 (16)	16 (19.7)	4 (4.9)	9 (11.1)	39 (48.1)	81 (19.9)
2018	50 (42.4)	2 (1.7)	1 (0.8)	18 (15.3)	47 (39.8)	118 (29)
N (%)	78 (19.2)	85 (20.9)	16 (3.9)	44 (10.8)	184 (45.2)	407 (100)

Table 2. Distribution of pyoderma patients based on gender

Gender	Diagnosis					N
	Impe-tigo (%)	Follicu-litis (%)	Erysi-pelas (%)	Cellu-litis (%)	Furun cle carbu ncle (%)	(%)
Female	49 (62.8)	42 (49.4)	10 (62.5)	21 (47.7)	81 (44.1)	203 (49.9)
Male	29 (37.2)	43 (50.6)	6 (37.5)	23 (52.3)	103 (55.9)	204 (50.1)
N	78 (100)	85 (100)	16 (100)	44 (100)	184 (100)	407 (100)

Table 3. Distribution of pyoderma patients based on thei age group

Age group (Year)	Diagnosis					N
	Impe-tigo (%)	Follicu -litis (%)	Erysi-pelas (%)	Cellu-litis (%)	Furuncl e Carbun cle (%)	(%)
Toddler (0−5)	47 (60.2)	16 (20.5)	2 (12.5)	1 (2.3)	32 (17.4)	98 (24.1)
Children (5−11)	21 (26.9)	6 (7.7)	0 (0)	1 (2.3)	12 (6.5)	40 (9.8)
Early teens (12−16)	4 (5.1)	4 (5.1)	0 (0)	1 (2.3)	15 (8.1)	24 (5.9)
Late teens (17−25)	1 (1.3)	14 (16.5)	0 (0)	5 (7.9)	32 (17.4)	52 (12.8)
Early adult (26−35)	2 (2.6)	13 (15.3)	2 (12.5)	3 (6.9)	24 (13)	44 (10.8)
Late adult (35−45)	1 (1.3)	12 (14.1)	1 (6.2)	6 (13.6)	25 (13.6)	45 (11)
Middle age (46−55)	1 (1.3)	8 (9.4)	3 (18.6)	8 (18.2)	27 (14.7)	47 (11.5)
Early elderly (56−65)	1 (1.3)	7 (8.2)	6 (37.2)	9 (20.4)	8 (4.3)	31 (7.6)
Late elderly (>65)	0 (0)	5 (5.9)	2 (12.5)	10 (22.7)	9 (4.9)	26 (6.4)
N	78 (100)	85 (100)	16 (100)	44 (100)	184 (100)	407 (100)

Table 4 shows the distribution of primary lesions examination results, the most common primary lesion was macula in 233 patients (57.2%). Meanwhile the distribution of secondary lesions shown in table 5 and the most common secondary lesion was erosion (30.5%). The variety of clinical manifestations are different based on patient's diagnosis. Impetigo was dominated with macula and crust, folliculitis was dominated with papule and erosion, erysipelas was dominated with macula and erosion, cellulitis was dominated with macula and erosion, furuncle and carbuncle were dominated with nodule and erosion.

Table 4. Distribution of pyoderma patients based their primary and secondary lesions

Lesion	Diagnosis					
	Impe-tigo *(n=78)*	Follicu-litis *(n=85)*	Erysi-pelas *(n=16)*	Cellu-litis *(n=44)*	Furuncle Carbuncle *(n=184)*	N *(n=407)*
Primary lesion						
Macula	46 (48.7)	59 (58.8)	18 (87.5)	37 (63.6)	90 (39.1)	233 (57.2)
Papule	9 (11.5)	60 (70.6)	1 (6.25)	0 (0)	43 (23.7)	113 (27.8)
Nodule	0 (0)	11 (12.9)	1 (6.25)	1 (2.3)	92 (50)	105 (25.8)
Pustule	19 (24.3)	41 (48.2)	1 (6.25)	1 (2.3)	72 (39.1)	134 (33)
Vesicle	4 (5.1)	3 (3.5)	0 (0)	2 (4.6)	1 (0.5)	10 (2.4)
Bulae	10 (12.8)	0 (0)	2 (12.5)	5 (11.5)	0 (0)	17 (4.2)
Secondary lesion						
Scale	13 (16.7)	8 (9.4)	1 (6.25)	5 (11.4)	10 (5.4)	37 (9.1)
Crust	40 (51.2)	10 (11.8)	1 (6.25)	8 (18.2)	20 (10.9)	79 (19.4)
Erosion	54 (69.2)	26 (30.5)	6 (37.5)	9 (20.4)	29 (15.8)	124 (30.5)
Excoria-tion	0 (0)	1 (1.2)	0 (0)	1 (2.3)	1 (0.5)	3 (0.7)
Ulcers	1 (1.3)	0 (0)	0 (0)	4 (9.1)	7 (3.8)	12 (2.9)
Lichen	1 (1. 3)	1 (1.2)	0 (0)	0 (0)	0 (0)	2 (0.5)

Note: one patient can have more than one secondary lesion

Table 5. Distribution of pyoderma patients based on their therapy

Therapy	Diagnosis					
	Impe-tigo *(n=78)*	Follicu-litis *(n=85)*	Erysi-pelas *(n=16)*	Cellu-litis *(n=44)*	Furuncle Carbuncle *(n=184)*	N *(n=407)*
Topical						
Topical antibiotic	30 (38.5)	42 (49.4)	11 (68.7)	9 (20.4)	72 (39.1)	164 (40.3)
Topical steroid	2 (2.6)	6 (7)	1 (6.2)	0 (0)	13 (7.1)	22 (5.4)
Moistu-rizer	3 (3.8)	6 (7)	2 (12.5)	2 (4.5)	9 (4.9)	22 (5.4)
Anti-fungal	0 (0)	1 (1.2)	1 (6.2)	0 (0)	2 (1.1)	4 (0.2)
Others	36 (46.1)	7 (8.2)	7 (43.7)	13 (29.5)	38 (20.6)	101 (24.8)
Systemic						
Systemic antibiotic	60 (76.9)	39 (50)	7 (4.4)	20 (45.4)	128 (69.5)	265 (65.1)
Anti histamin	31 (39.7)	35 (41.2)	2 (12.5)	4 (9.1)	36 (19.6)	108 (26.5)
Oral non-Steroid	7 (9)	19 (22.3)	10 (62.5)	31 (70.4)	77 (41.8)	144 (35.4)
Oral Steroid	0 (0)	0 (0)	1 (6.25)	0 (0)	1 (0.5)	2 (0.5)
Others	0 (0)	1 (1.2)	0 (0)	0 (0)	4 (2.2)	5 (1.2)

Note: one patient can get more than one therapy

Table 6 presents the distribution of the types of systemic and topical therapy given to pyoderma patients at the Outpatient Unit of Dermatology and Venereology at Dr. Soetomo General Academic Hospital Surabaya from January 2016 to December 2018. The first line therapy were systemic antibiotics (65.1%) and topical antibiotics (40.3%).

DISCUSSION

This study evaluated pyoderma patient with data from the medical records of the Dermatology and Venereology Outpatient Unit at Dr. Soetomo General Academic Hospital Surabaya between January 2016 and December 2018. The highest number of pyoderma patients was observed in 2016, followed by a decrease in 2017 and a slight increase in 2018. These findings indicate that 2016 had the highest patient count, while 2017 had the lowest. In 2016, a similar decrease in pyoderma was reported by Lumataw in a retrospective study conducted at Prof. Dr. R. D. Kandou Hospital Manado, with 346 patients in 2013, 232 patients in 2014, and 188 patients in 2015.[10] Similarly, a study at Sanglah Hospital from 2006 to 2008 revealed a downward trend in pyoderma cases, with 287 patients in 2006, 267 in 2007, and 175 in 2008.[11] The decrease in pyoderma cases may be associated with the tiered referral health system implemented by the Social Security Agency on Health, allowing some patients to

referral health system implemented by the Social Security Agency on Health, allowing some patients to receive treatment at first-level health facilities like public health centers, clinics, and general practitioners. Notably, a predominance of male patients was observed, align with WHO's 2005 research that indicates a higher prevalence of pyoderma in men, potentially due to increased outdoor activities that leads to a higher risk of minor trauma.[3,12]

From the overall data, this study indicates that the highest number of the patient was toddler age category and the least number is late elderly category. Based on their diagnosis, impetigo, folliculitis, furuncle and carbuncle were dominated with toddler, meanwhile erysipelas and cellulitis dominated with older age group such as early and late elderly. It can be seen that children under five are more susceptible to bacterial infections on the skin. Toddler age group is one of the predisposing factors that can affect an infection, because children tend to be interested in exploring their surroundings, playing in groups, and paying less attention to their sanitation, and makes it easier for bacteria to infect.[13] Meanwhile in elderly, the body's immunity experiences immunosensing or immune aging, so their immunity does not function optimally to prevent infections and other pathogens.[13] One of the predisposing factors of cellulitis infection is increasing age[22]

This study's comprehensive analysis reveals that the highest patient numbers were in the toddler age category, while the late elderly category had the fewest cases. Among the diagnoses, impetigo, folliculitis, furuncle, and carbuncle were predominant in toddlers, whereas erysipelas and cellulitis were more prevalent in the older age groups, particularly the early and late elderly. This underscores the increased susceptibility of children under five to bacterial skin infections, partly attributed to their exploratory nature, group play, and comparatively lower emphasis on sanitation.[13] In contrast, older individuals experience immune aging, diminishing the effectiveness of their immunity in preventing infections and other pathogens.[14]

Clinical manifestations of pyoderma can vary, affected by several factors such as type of bacteria, the area of skin infected, and patient's immune status.[15] According to the Clinical Practice Guidelines issued by the Indonesian Society of Dermatology and Venereology (PERDOSKI) in 2021, most pyoderma cases are characterized by clinical presentations in the form of papules or pustules. In impetigo, an initial reddish pustule emerges, gradually filling with pus before forming a crust upon rupture. Meanwhile, folliculitis typically presents as multiple suppurating pustules in the patient's hair follicles.[16] Furuncles and carbuncles typically manifest as solid, reddish pustules that release pus when they burst. A furuncle pustule that enlarges and penetrates deeper skin layers becomes a carbuncle. Notably, erysipelas and cellulitis categorized as profunda pyoderma and it has different clinical manifestations compared to other pyoderma diagnoses, because the infections occurring at deeper skin layers.[16]

An integral aspect of establishing a clinical diagnosis for skin infections is the analysis of lesion efflorescence. According to these medical records, the predominant efflorescence observed in patients is macula, characterized by flat, reddish-colored manifestations resulting from capillary dilation.[17] This lesion appeared because of dilation of blood vessels that accompanied by increased blood flow permeability, exudates, plasma proteins, and leukocytes, leads into an inflammation. Macula usually appears in early and chronic lesions. The second most common primary lesion is pustule, recognized by its well-defined, elevated, pustule-shaped appearance filled with pus. Pustules are frequently associated with bacterial infections due to leukocyte accumulation with bacteria.[17] In many cases, a diagnosis of skin infections can be established by analyzing the primary lesion alone. However, in specific scenarios, an examiner may need to assess the evolution and progression of the lesions to gauge the diagnosis's severity.[17]

In this study, the most prevalent secondary lesion is erosion, characterized by the loss of the healthy epidermal layer, resulting in a wet wound with distinct edges. If erosion extends to deeper layers, the lesion may ultimately form a scar as it heals. The second most common secondary lesion is crust, formed from dried exudate such as blood, fluid, or pus, along with remnants of damaged epidermis. Crusts can be vary in thickness and may be attached to the epidermis.[17] Most pyoderma patients have compromised skin integrity, this can be a potential port of entry for pathogens.[19]

Supported examination plays a role as one of the considerations in making a diagnosis. Some of the supporting examinations recommended for diagnosing pyoderma are gram staining or culture and resistance examination of lesion specimens if they are not responsive to empirical treatment. Therapy approaches for pyoderma patients at the Outpatient Unit of Dermatology and Venereology at Dr. Soetomo General Academic Hospital Surabaya between January 2016 and December 2018 involve both topical and systemic

treatments, with some patients receiving a combination of both. The most prevalent therapy administered to pyoderma patients includes antibiotics, such as topical fusidic acid and oral penicillin. According to the 2021 Clinical Practice Guidelines by the Indonesian Society of Dermatology and Venereology (PERDOSKI), the application of 2% fusidic acid ointment 2-3 times a day is recommended for wounds without pus or crusts.[16] Fusidic acid is effective for primary or secondary infections caused by Streptococcus or Staphylococcus bacteria due to its capacity to inhibit bacterial protein synthesis.[15] This aligns with a study on pyoderma profile at Sanglah Denpasar Hospital in 2016-2017, which also identified fusidic acid as the most commonly used topical therapy.[8] The data in this study also align with therapy recommendations outlined in the Clinical Practice Guidelines of the Dermatology and Venereology Department at Dr. Soetomo General Academic Hospital Surabaya in 2013, that indicates penicillin group antibiotics as the first-line treatment for pyoderma, along with 0.9% NaCl compresses for wet lesions and fusidic acid ointment for dry lesions.[20] Other treatment might be surgical interventions, such as incision and drainage for folliculitis and boils[21.] In addition to medication, non-medicamentous therapies are often recommended for pyoderma patients. According to the Clinical Practice Guidelines by the Indonesian Society of Dermatology and Venereology (PERDOSKI), non-medication therapies for patients with bacterial skin infections include improving personal hygiene, maintaining daily body hygiene through twice-daily bathing with soap, identifying risk factors and comorbidities, avoiding shared personal items, and minimizing disease transmission. Some of pyodermas usually self limiting and resolves within a few days.[20]

Based on the results, highest pyoderma patient was in 2016, while 2017 had the lowest. Predominantly, patients were diagnosed with furuncles and carbuncles. The patient demographic profile indicated a male predominance with the most common age group was toddler. Clinical manifestation that occurred the most were macula and erosion.

Furthermore, this study concluded that therapy given to patients involve both topical and systemic treatments, with some patients receiving a combination of both. Antibiotics, both topical and oral, representing the most prevalent treatment modalities.

The strength of this study was the variables studied were many and detailed from each diagnosis. However, this study had some limitation due to incomplete medical record data. In addition, there was no diagnosis of ectima in ICD-10 in the medical record data at Outpatient Unit of Dermatology and Venereology at Dr. Soetomo General Academic Hospital Surabaya, so the data from the diagnosis could not be included in this study.

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