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Profile of Pediatric Patients with Acute Bacterial Skin Infections at a Tertiary Hospital in Surabaya, Indonesia

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ABSTRACT

Background: Acute bacterial infections of pediatric skin are commonly caused by Streptococcus or Staphylococcus. Indonesia has a high prevalence of bacterial skin diseases due to its tropical climate, poor hygiene, and high population density. Patients can have different symptoms depending on the clinical manifestations and severity. Poor management can lead to complications. Therefore, it is important to conduct a study on the profile of acute bacterial skin infections in pediatric patients. ***Objective:*** To describe the profile of pediatric patients with acute bacterial skin infections in the dermatovenereology outpatient unit of Dr. Soetomo General Academic Hospital Surabaya from January 2020 to December 2022. ***Methods:*** This is a retrospective descriptive study based on secondary data from the dermatovenereology outpatient unit of Dr. Soetomo General Academic Hospital in Surabaya. ***Result:*** The total number of cases of acute bacterial skin infections in pediatric patients from January 2020 to December 2022 was 49 cases. The most cases occurred in 2020 (44.9%) and the overall diagnosis was pyoderma (49%). The most age category was toddlers (51%), and most were female (53%). The most common efflorescence was pustules (59.2%), the most lesion locations on the lower extremities (63.3%), and the most frequent therapy given is a combination of topical and systemic therapy (67,3%).

Keywords: skin disease; skin infection; bacteria; acute; children.

INTRODUCTION

Acute bacterial infections are frequently caused by Streptococcus and Staphylococcus, occur rapidly over a short period of time, and are widespread on the skin, particularly in youngsters due to a weak immune system [1], [2]. Acute bacterial infections are classified into main and secondary. Bacterial invasion of healthy skin causes primary acute bacterial illnesses such as pyoderma, impetigo, folliculitis, carbuncle furuncle, erysipelas, cellulitis, ecthyma, and Staphylococcal Scalded Skin Syndrome (SSSS). Secondary pyoderma is a bacterial invasion of the skin caused by an underlying disorder or when the skin is damaged, such as in cases of scabies and dermatitis [2].

Indonesia's tropical climate elevates the risk of acute bacterial skin infections, as germs proliferate readily in warm and humid conditions. Poor personal and environmental hygiene is also one of the risk factors for acute bacterial infections on children's skin. According to a study, it was found that personal hygiene in children aged 9-12 years was still not optimal, based on the survey results, all children had long nails and dirty hands [3]. Other factors that can increase the risk of bacterial infections on a child's skin include poor nutritional status, too tight or closed clothing, direct contact with patients, and other medical comorbidities, such as anemia, diabetes mellitus, HIV, and malignancies [2], [4], [5].

Skin infections are among the most prevalent ailments in tropical countries, with an escalating incidence rate in developing countries, estimated to be around 20-80% [6]. The prevalence of incident skin infections of the skin and soft tissues in 2006 was 24.6% of 1000 individuals per year. As many as 7-10% of hospital admissions are caused by bacterial infections of the skin and soft tissues [2]. A total of 18 research studies in the general population in developing countries, reported that the incidence of skin infections is quite high, which is 21-87% and pyoderma cases in pediatric skin are 0.2-35% [7], [8].

Research in Gambia indicated that roughly 17.4% of children aged <5 years suffered from acute bacterial infections, with the most common age group being 3 - 4 years and more typically detected in girls [9]. According to studies conducted in India on 100 children aged 1 to 12 years with acute bacterial infections on the skin, impetigo was the most prevalent diagnosis, with the majority of lesions being on the extremities [10]. According to research conducted at Wonosari Regional Hospital, bacterial infections accounted for 18% of all cases in 2016. Bacterial infections discovered included impetigo, folliculitis, cellulitis, and others [11]. The incidence of primary superficial pyoderma in 2008-2010 at RSUD Dr. Soetomo Surabaya was 616 patients (9.2% of all pediatric patients in URJ). Most were found in the age group of 1-4 years, as many as 291 patients (47.24%) [12].

Acute bacterial skin infections can lead to serious consequences if inadequately treated. There can be complications such as acute post-streptococcal glomerulonephritis (GNAPS) and acute rheumatic fever which have a high morbidity rate [4], [13]. Another complication that can be caused by group A Streptococcus β-hemolyticus (GABHS) bacteria is sepsis [13]. Skin infections caused by bacteria are commonly treated with antibiotics. Inappropriate use of antibiotics can increase the risk of multidrug-resistant bacteria [14]. Therefore, this study aimed to assess the profile of pyoderma patients at RSUD Dr. Soetomo, with the aim of improving treatment approaches and reducing the prevalence of this disease.

METHODS

This was an observational descriptive study with a retrospective study design using secondary data. The instruments used were collected from medical records of pediatric patients with acute bacterial skin infections in the pediatric dermatology division outpatient unit at Dr. Soetomo General Academic Hospital Surabaya from 2020-2022. The variables in this study include patient characteristics such as age, gender, lesion location, efflorescence (lesion shape), and management in the Department of Dermatology and Venereology. This study used a total sampling technique by taking all subjects who met the inclusion criteria, namely complete patient medical records including name, age, domicile, duration of complaints, main complaints, lesion location, lesion efflorescence form, and therapy given. The exclusion criteria of this study were medical records that were not written in full (more than 2 data on research variables).

RESULTS AND DISCUSSION

The total number of cases of acute bacterial infections of pediatric skin in the dermatovenereology outpatient unit at Dr. Soetomo Surabaya Hospital for the period 2020-2022 was 49 cases. The diagnoses studied in this study were pyoderma, non-bullous impetigo, bullous impetigo, folliculitis, erysipelas, cellulitis, ecthyma, and furuncle and carbuncle. The most visits of pediatric patients with acute bacterial infections of the skin were in 2020, with as many as 22 patients (44.9%), followed by 2021 (32,7%), and 2022 (22,4%) from the total number of cases.

TABLE 1: Prevalence of Pediatric Patients with Acute Bacterial Skin Infections.

Year	Frequency (n)	Percentage (%)
2020	22	44,9
2021	16	32,7
2022	11	22,4
Total	**49**	**100**

Based on the data that has been collected, in the range of 2020 to 2022 the most common diagnosis of acute bacterial infections in children's skin is pyoderma as many as 24 patients (49%). In a study by Latifah at the dermatovenereology outpatient unit of Ulin Banjarmasin Hospital, it was also reported that there was a decrease in the number of cases of acute bacterial infections during 2019-2021. The total number of cases of acute bacterial infection was 75 cases with the highest number obtained in 2019 with 51 patients (68%) [15]. This was also mentioned in a previous study by Lumataw on the profile of pyoderma in children at the Skin and Gender Polyclinic of Prof. Dr. R. D. Kandou Hospital Manado from 2013 to 2015, that there was a decrease in pyoderma cases possibly because in 2014, the Indonesian Health Social Security Organizing Agency (BPJS Kesehatan Indonesia) established pyoderma as one of 155 diseases that must be treated by first-level health facilities [16]. The existence of the COVID-19 pandemic is also likely to affect the decrease in the number of cases of bacterial infections on children's skin in the URJ of Skin and Gender Health at RSUD Dr. Soetomo Surabaya. The number of patients attending the outpatient unit of the H. Abdul Manap Jambi Regional General Hospital diminished from the period prior to the COVID-19 pandemic to during the pandemic [17].

TABLE 2: Age group Distribution of Pediatric Patients with Acute Bacterial Skin Infections.

Age Groups	Frequency (n)	Percentage (%)
Toddlers	25	51
Children	15	30,6
Teens	9	18,4
Total	**49**	**100**

Table 2 shows the age distribution of patients with acute bacterial infections on the skin of children based on their diagnosis, with the highest number of patients being from the toddler category (0-4 years) with 25 patients (51%) and the least being the adolescent category (10-18 years) with 9 patients (18.4%). Of all the diagnoses, pyoderma, impetigo, folliculitis, and erysipelas were dominated by toddlers. Furuncles and carbuncles as well as ecthyma were dominated by children, while cellulitis occurred in teens. Previous research by Auliya in 2016-2018 stated that the highest age category for pyoderma diagnosis was the toddler category (0-5 years) with 40.7% of cases. Children under two years of age are more likely to get bullous impetigo than nonbullous impetigo and toddlers in the age range of 2-4 years are more likely to get nonbullous impetigo [2], [18]. The results in this study support previous research which states that erysipelas can affect all ages but are more common in extreme age groups, such as toddlers and the elderly [19], [20].

TABLE 3: Gender Distribution of Pediatric Patients with Acute Bacterial Skin Infections.

Gender	Frequency (n)	Percentage (%)
Female	26	53
Male	23	47
Total	**49**	**100**

Overall, the majority of patients were female, with 26 patients (53%) followed by 23 male patients (47%). Previous research at Prof. Dr. R. D. Kandou Hospital Manado in the January-December 2012 period found that female patients were more numerous than male patients [21]. Research by Rahmawati on pyoderma on children's skin at Dr. Soetomo Hospital in the 2008-2010 period stated that there were more male patients than females with an insignificant ratio, of 1: 0.9 [12]. From the results of this study and previous studies, it can be seen that acute bacterial infections on the skin of children can occur in females and males.

Primary efflorescence occurs due to bacterial invasion of intact skin, the most common being pustules in 29 patients (59.2%). Meanwhile, secondary efflorescence usually occurs due to manipulation or scratching of the skin that already has a primary lesion, the most common are crusts and erosions in as many as 23 patients (47%).

TABLE 4: Distribution of Lesion Efflorescence in Patients.

Efflorescence	Frequency (n)	Percentage (%)
Primary Efflorescence		
Erythematous Macula	24	49
Hypopigmented Macula	1	2
Hyperpigmented Macula	8	16,3
Bullae	5	10,2
Papule	14	28,6
Nodule	9	20,4
Pustule	29	59,2
Vesicle	4	8,2
Secondary Efflorescence		
Scale	13	26,5
Crust	23	47
Erosion	23	47
Excoriation	11	22,4
Ulcus	3	6,1

Note: one patient can have more than 1 efflorescence.

Acute bacterial infections can be characterized based on their clinical manifestations. Pyoderma is a bacterial skin infection characterized by pustules and inflammatory marks, which can occur in the epidermis or dermis. Crustose impetigo presents as erythematous maculopapular lesions that rapidly develop into thin vesicles that rupture easily, secrete a honey-colored secretion, and dry into crusts. Bullous impetigo is characterized by clear yellow fluid-filled bullae lesions that later become cloudy. Folliculitis is a superficial infection of the hair follicles, characterized by papules or pustules penetrated by hair. A furuncle is an acute inflammation of a single hair follicle, while a carbuncle is a more extensive infection involving multiple hair follicles and surrounding tissue. Ectima is characterized by lesions that have thick crusts with shallow ulcers underneath when removed. Erysipelas appear as erythematous lesions with bright red edema and well-defined borders, while cellulitis is a painful erythematous lesion without clear borders affecting the deeper layers of the skin [1], [2].

The most common lesion location was in the lower extremities with 31 patients (63.3%), followed by the upper extremities with 24 patients (49%). Previous research states that the lower extremities (60%) are the most commonly affected area for acute bacterial skin infections, followed by the scalp (47.5%), upper extremities (21.5%), and the whole body (12.5%) [22].

Patients with acute bacterial infections in pediatric skin more often get a combination of topical and systemic drugs compared to only getting topical or systemic drugs. Topical and systemic combination therapy was given to 33 patients (67.3%), followed by topical therapy alone to 5 patients (10.2%), and systemic therapy alone to 4 patients (8.2%). Lumataw mentioned that the most common therapy given was the combination of systemic and topical antibiotics, which was 73.68% [16].

TABLE 5: Distribution of Lesion Sites in Patients.

Locations	Frequency (n)	Percentage (%)
Face	12	24,5
Upper Extremity	24	49
Lower Extremity	31	63,3
Neck	6	12,2
Chest	4	8,2
Abdomen	2	4
Back	6	12,2
Armpit	3	6,1
Buttocks	3	6,1
Scalp	7	14,3

Note: one patient can have more than 1 lesion site.

TABLE 6: Distribution of Therapy Given to Patients.

Therapy	Frequency (n)	Percentage (%)
Topical	5	10,2
Systemic	4	8,2
Topical + Systemic	33	67,3
No Data	7	14,3
Total	**49**	**100**

TABLE 7: Distribution of Topical and Systemic Therapy Given to Patients.

Therapy	Frequency (n)	Percentage (%)
Topical Therapy		
Topical Antibiotic	33	67,3
Topical Steroid	5	10,2
Moisturizer	8	16,3
NaCl Compress	20	40,8
Salicyl Talc	2	4,1
Systemic Therapy		
Systemic Antibiotic	31	63,3
Oral Anti-histamine	25	51
Oral Steroid	1	2
Oral Non-steroid	1	2

Note: one patient can have more than one therapy.

The first line of treatment for patients with bacterial skin infections is antibiotics. Overall, the most common topical therapy given to patients with bacterial skin infections was 2% sodium fusidate cream in 31 patients (63.3%). The PERDOSKI clinical practice guidelines state that sodium fusidate ointment/cream or mupirocin 2% can be given to patients with acute bacterial infections whose wounds are not covered with pus or crusts 2-3 times a day for 7-10 days [23]. This is also consistent with prior research at Bethesda Hospital in 2018, which found that sodium fusidate was the most commonly administered topical antibiotic by up to 52.2% [24]. Another topical therapy that was given to many patients were 0.9% NaCl compress for as many as 20 patients (40.8%). NaCl 0.9% is a crystalloid liquid that is physiological for the body so it does not cause hypersensitivity reactions [25]. NaCl 0.9% compress can be given to patients with lesions covered with crusts or pus to be easily released to facilitate the process of skin regeneration and maximize the action of topical antibiotics [23], [26].

The most systemic antibiotic therapy given to patients with acute bacterial infections in children's skin is the macrolide group, erythromycin, for as many as 20 patients (40.8%). The data in this study are in line with previous research at Prof. Dr. R. D. Kandou Manado Hospital in 2012 which states that the most systemic antibiotic given to patients is erythromycin as many as 28 patients (62.2%) [21]. The most common chief complaint of pediatric patients with acute bacterial skin infection was itching (53%), therefore antihistamine drugs were prescribed. The most common antihistamine therapy given was cetirizine (49%). Patients with acute bacterial infections on the skin of children are mostly given a combination of topical drugs such as sodium fusidate, systemic drugs such as erythromycin and cetirizine, as well as other topical therapy in the form of 0.9% NaCl compresses. This treatment is following the PERDOSKI clinical practice guidelines in 2021, that patients with lesions with a lot of pus or crusts can be given open compresses with potassium permanganate 1/5000, salicylic acid 0.1%, rivanol 1‰, and 1% povidone-iodine solution, if not covered with pus or crusts, 2% sodium fusidate ointment/cream, 2% mupirocin, and given a second line for systemic antibiotics in the form of erythromycin [23].

The advantage of this study is that the variables studied were numerous and detailed from each diagnosis. However, this study has some limitations due to incomplete medical record data. In addition, there was no diagnosis of Staphylococcal Scalded Skin Syndrome (SSSS) in ICD-10 in the medical record data at the Outpatient Unit of the Department of Skin and Skin and Gender Health Sciences at Dr. Soetomo Surabaya Regional General Hospital, so the data from the diagnosis could not be included in this study.

CONCLUSIONS

Acute bacterial skin infections are common in children aged 0-4 years and females. The most common diagnosis was pyoderma, multiple pustules, and often found on the lower extremities. The patient was treated using a combination of topical and systemic therapy.

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