Profile of Skin Infections in Elderly Patients

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Abstract

The prevalence of skin diseases in Indonesia is high due to the tropical climate and individual care, especially among the elderly. Aging involves morphological and biochemical changes in the skin structure that make the skin thin and dry, thereby disrupting immune responses and increasing the risk of infection. Complex health issues and varied causes of infection make elderly therapy challenging. Therefore, research related to skin infections in the elderly is important. Describe profile of elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021. A retrospective descriptive study using secondary data from medical records. Out of 184 patients, most were females (56.5%), aged 45-54 years (47.8%). Three predominant diagnoses were Furuncles & Carbuncles (5.9%), Dermatophytosis (38.6%), and Herpes Zoster (29.9%), in that order, representing bacterial, fungal, and viral skin infections, respectively. Common complaints were itching (65.5%) lasting <1 month (60.9%). Most common physical findings were erythematous efflorescence (76.6%). Most supporting examinations for viral infections were Tzanck test (9.14%), while for fungal infections were KOH examinations (53.3%) and Wood's lamp examination (10.15%). In conclusion, elderly patients are more susceptible to skin infections due to intrinsic aging processes, such as decreased body function, reduced resistance to pressure and temperature changes, and skin vulnerability to trauma. Additionally, extrinsic factors, such as age-related limitations in individual capabilities or awareness, contribute to skin infection risk in the elderly. Therefore, if both factors occur simultaneously, it facilitates the process of skin disease infection in the elderly.

Keywords: Skin infections, elderly, sensitive skin, human and disease

1. Introduction

According to data from the Ministry of Health of the Republic of Indonesia, the prevalence of skin diseases throughout Indonesia is quite high and ranks third among the top ten most common diseases in outpatient patients in hospitals across Indonesia in the year 2010 (Ministry of Health, 2010). In the year 2012, the prevalence was 8.46%, and it increased in the year 2013 to 9% (Research and Development Agency of the Republic of Indonesia, 2013). Indonesia itself is a tropical country, which means that skin diseases are often encountered due to the unpredictable temperature and humidity conditions. This environment is highly suitable for the development of skin diseases caused by fungi, bacteria, and parasites (Putra I, 2008). The high figures could be attributed to people's perception of skin diseases, considering them trivial and non-life-threatening. Some believe that skin diseases will disappear on their own and are better left untreated without

seeking medical attention. Others may think that skin diseases are easy to cure, leading to incorrect treatment, which can worsen the condition, especially in the geriatric population (Sayuti et al, 2006).

Geriatric, or commonly referred to as the elderly group, consists of individuals aged 60 years and above who are currently experiencing or have undergone a degenerative process leading to a decline in the function and capacity of their body systems due to aging. The physical decline can manifest as sagging skin, changes in body posture, as well as difficulties in speaking and moving extremities. In such conditions, if skin diseases in the elderly are left untreated, it can result in a decrease in the quality of life. The aging process affects the structure and function of the skin due to degenerative and metabolic processes. Several factors contribute to skin disorders in the elderly, including systemic disorders, neurological issues, hygiene status, socio-economic factors, nutrition, climate, gender, smoking habits, and more. Skin aging can be categorized into two types: intrinsic aging, which occurs naturally with age, and extrinsic aging, which is caused by environmental influences (Kabulrachman, 2009; Jafferany et al, 2012).

The primary extrinsic factor contributing to skin aging is exposure to sunlight containing ultraviolet (UV) rays, commonly known as photoaging. Indonesia, being a tropical country with continuous exposure to UV rays throughout the year, makes its population susceptible to skin aging due to prolonged exposure to ultraviolet rays. In aging skin, various phenomena occur, such as a reduction in microcirculation, vitamin D synthesis, nerve endings, elastin fibers, DNA repair capacity, and total sebaceous glands in the dermis, leading to disruptions in the skin's immune response, reducing inflammation based on cell-mediated immunity, making the skin more susceptible to microbial infections. Additionally, there is a slow turnover rate in the epidermis, a decrease in regenerative capacity after injury, disturbances in the biosynthesis of stratum corneum lipids leading to increased transepidermal water loss (TEWL), and disruptions in the skin barrier. These factors collectively impact the skin's ability to respond to irritants and allergens (Taylor, 2005; Wey et Chen, 2010).

Diagnosing and treating skin diseases in elderly patients pose a challenge because these patients often present with health issues (multipathology). Generally, various chronic diseases, declining organ functions, and reduced functional status have already occurred. The medications consumed can also pose risks to the patients' bodies due to the decline in organ functions. Additionally, signs and symptoms of skin diseases in elderly patients may differ or lack typical characteristics compared to younger patients. In a study on the elderly, Dermatomycosis was the most prevalent type of fungal skin infection, accounting for 15.8% of 418 new patients. This was followed by Furuncles & Cellulitis at 15.4%, representing bacterial skin infections, and the most common viral infection was Herpes zoster with 16 new cases. According to the Surabaya City Health Office in 2019, skin and subcutaneous tissue diseases ranked 6th out of the top 10 most prevalent diseases in Surabaya, accounting for 4.53%. The Dermatology and Venereology Clinic at Dr. Soetomo Hospital in Surabaya experienced a 4% increase in the second quarter of 2019 compared to the previous year, with visits rising from 3402 to 3545. However, in the second quarter of 2020, there was a 61% decrease from 3570 visits to 1386 visits due to the Covid-19 pandemic (Farage et al, 2006; Hidajat et al, 2017; Internal Performance Evaluation Report for the Second Quarter of Dr. Soetomo Hospital in 2019 & 2020).

So far, obtaining a profile of skin infection diseases, especially in elderly patients, has been challenging. Therefore, research and analysis were conducted on the profile of skin infection diseases in elderly patients at the Dermatology and Venereology Outpatient Unit of Dr. Soetomo Hospital in Surabaya from 2020 to 2021. The aim is to use the findings as a strategy for more optimal care management in the future and to provide

additional data to help reduce the incidence of skin infections in the elderly, especially at Dr. Soetomo Hospital in Surabaya.

2. Methods

The type of research used is a retrospective descriptive study, collecting secondary data, such as medical records, including basic information, clinical manifestations, diagnostic examinations, and management of elderly patients with skin infections at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, Indonesia in the years 2020-2021. The sample comprises all elderly patients registered in medical records with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya during 2020-2021. Inclusion criteria involve patients (elderly) aged 45 years and older, following the WHO classification. Exclusion criteria include elderly patients with incomplete medical records based on the required variables. Sampling will be conducted using a total sampling by retrieving medical records data of elderly patients. Data collection includes basic information, clinical manifestations, examinations, and management of elderly patients with skin infections at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021. This process is carried out by healthcare professionals responsible for recording patient medical data during working hours. Data collection has been approved in advance by the Ethics Committee of Dr. Soetomo General Academic Hospital and is performed by researchers using data collection sheets provided. The data in this study is descriptive research data, aimed to evaluate the profile of skin infections in elderly patients at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya during 2020-2021. Ethical approval No. 1044.LOE/301.4.2/IX/2022 for this research was obtained from the Health Research Ethics Committee of Dr. Soetomo General Academic Hospital Surabaya before data collection.

3. Results

The total number of elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021 was 197 patients. However, 13 patients did not meet inclusion criteria due to incomplete variables in their medical records, resulting in a study sample of 184 patients. The basic data in this study includes the number of patients, diagnoses, gender, gender based on diagnosis, age group, age group based on diagnosis, and patient domicile.

Table 1. Total elderly patients with skin infections

Total of Patient	Year		Total (%)
	2020 (%)	2021 (%)	
Total	110 (59.78)	74 (40.22)	184 (100)

Table 1 shows the number of elderly patients meeting the criteria at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021, totaling 184 patients. The highest number of visits occurred in 2020, with 110 patients (59.78%), followed by 74 patients (40.22%) in 2021.

Table 2. Distribution of diagnoses in elderly patients with skin infections

Causes	Diagnosis	Year		Total (n=184)
		2020	2021	
Bacteria	Furuncle, Carbuncle	6	5	11 (5.98)
	Cellulitis	2	8	10 (5.43)
Viruses	Herpes Zoster	36	19	55 (29.89)
	Mollucum contangiosum	0	1	1 (0.54)
	Varicella	2	1	3 (1.63)
	Verruca vulgaris	6	7	13 (7.07)
Fungi	Cutaneous candidiasis	11	7	18 (9.78)
	Pityriasis versicolor	8	7	15 (8.15)
	Dermatophytosis (Tinea)	43	28	71 (38.6)

Note: One patient may have more than one diagnose

Table 2 displays the distribution of diagnoses for elderly patients at at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021, totaling 197 diagnoses. The most common diagnosis for skin infections is fungal infections, with Dermatophytosis (Tinea) at 71 diagnoses (38.6%) dominated by Tinea corporis and Tinea cruris. This is followed by viral infections, with Herpes zoster at 55 diagnoses (27.92%).

Table 3. Characteristic of elderly patient with skin infections based on gender and age

Characteristics		Year		Total (%)
		2020	2021	
Gender				
Man		50	30	80 (43.48)
Woman		60	44	104 (56.52)
Age				
Middle age	45-54 years old	58	30	88 (47.83)
Elderly	55-65 years old	35	28	63 (34.24)
Young elderly	66-74 years old	13	11	24 (13.04)
Old elderly	≥75 years old	4	5	9 (4.89)

Table 3 indicates that in 2020-2021, there were more female elderly patients (104 patients, 56.62%) than male patients (80 patients, 43.38%) at URJ Dermatology and Venereology Unit, RSUD Dr. Soetomo Surabaya. Based on the distribution of age, the highest number is in the middle age category (45-54 years) with 88 patients (47.83%). This is followed by the elderly category (55-65 years) with 63 patients (34.24%), the young elderly category (66-74 years) with 24 patients (13.04%), and the very elderly category (≥75 years) with 9 patients (4.89%).

Table 4. Distribution of complaints and duration of complaints in elderly patients with skin infections

Complaint	Skin Infections			Total (n=197)
	Bacterial (n=21)	Viral (n=72)	Fungal (n=104)	
Lumps	1 (4.76)	1 (1.39)	0 (0)	2 (1.02)
Festering	1 (4.76)	0 (0)	0 (0)	1 (0.51)
Fever	4 (19.05)	7 (9.72)	1 (0.96)	12 (6.09)
Itchy	6 (28.57)	26 (36.11)	97 (93.27)	129 (65.48)
Warm	1 (4.76)	0 (0)	0 (0)	1 (0.51)
Tingling	0 (0)	0 (0)	1 (0.96)	1 (0.51)
Dry skin	0 (0)	0 (0)	1 (0.96)	1 (0.51)
Wound	1 (4.76)	0 (0)	0 (0)	1 (0.51)
Red eye	0 (0)	2 (2.78)	0 (0)	2 (1.02)
Bother	1 (4.76)	9 (12.5)	5 (4.81)	15 (7.61)
Painful	17 (80.95)	44 (61.11)	11 (10.58)	72 (36.55)
Hot/burning	4 (19.05)	23 (31.94)	4 (3.84)	31 (15.74)
Stings	0 (0)	6 (8.33)	3 (2.88)	9 (4.57)
Duration of complaint				
<1 month	17 (80.95)	60 (83.33)	43 (41.35)	120 (60.91)
1-12 month	4 (19.05)	6 (8.33)	42 (40.38)	52 (26.4)
>12 month	0 (0)	3 (4.17)	14 (13.46)	17 (8.63)
>3 Year	0 (0)	3 (4.17)	5 (4.81)	8 (4.06)

Note: One patient may have more than one complaint.

Table 4 shows the distribution of complaints from the anamnesis in elderly patients at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021. The most common complaint is itching, with 129 diagnoses (65.48%), followed by pain with 72 diagnoses (36.55%), sensation of heat/burning with 31 diagnoses (15.74%), disturbance with 15 diagnoses (7.61%), fever with 12 diagnoses (6.09%), stinging with 9 diagnoses (4.57%), lumps and red eyes each with 2 diagnoses (1.02%), and complaints of pus, warmth, tingling, dry skin, and wounds each with 1 diagnosis (0.51%). In the bacterial group, the dominant complaint is pain with 17 diagnoses (80.95%). In the viral group, the most common complaints are pain with 44 diagnoses (61.11%), itching with 26 diagnoses (36.11%), and sensation of heat/burning with 23 diagnoses (31.94%). In contrast, in the fungal group, itching is the most common complaint with 97 diagnoses (93.27%). Table 4 also shows the distribution of the duration of complaints experienced by elderly patients at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021. The most common duration is within <1 month, with 120 diagnoses (60.91%), followed by complaints within 1-12 months with 51 diagnoses (25.89%), complaints within >12 months with 17 diagnoses (8.63%), and complaints within >3 years with 8 diagnoses (4.06%). In the bacterial, viral, and fungal groups, the most common duration is within <1 month, with 80.95%, 83.33%, and 41.35%, respectively.

Table 5. Distribution of efflorescence from physical examinations in elderly patients with skin infections

Physical examination	Bacteria		Viruses				Fungi			Total
	F&K (n=11)	S (n=10)	HZ (n=55)	V (n=3)	MK (n=1)	VV (n=13)	KK (n=18)	PV (n=15)	DT (n=71)	(n=197)
Central healing	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (5.56)	1 (6.67)	34 (47.89)	36 (18.27)
Edema	2 (18.18)	6 (60)	0 (0)	0 (0)	0 (0)	0 (0)	1 (5.56)	0 (0)	0 (0)	9 (4.57)
Erythema	9 (81.82)	7 (70)	52 (94.55)	3 (100)	1 (100)	1 (7.69)	17 (94.44)	5 (33.33)	56 (78.87)	151 (76.65)
Erosions	2 (18.18)	6 (60)	16 (29.09)	3 (100)	0 (0)	2 (15.38)	6 (33.33)	1 (6.67)	14 (19.72)	50 (25.38)
Hyperpig-mentation	2 (18.18)	2 (20)	5 (9.09)	0 (0)	0 (0)	7 (53.85)	3 (16.67)	4 (26.67)	38 (53.52)	61 (30.96)
Hypopig-mentation	0 (0)	0 (0)	1 (1.82)	0 (0)	0 (0)	0 (0)	2 (11.11)	11 (73.33)	4 (5.63)	18 (9.14)
Crusts	2 (18.18)	5 (50)	20 (36.36)	2 (66.67)	0 (0)	0 (0)	0 (0)	0 (0)	3 (4.23)	32 (16.24)
Macules	6 (54.55)	8 (80)	27 (49.09)	2 (66.67)	1 (100)	2 (15.38)	15 (83.33)	15 (100)	68 (95.77)	144 (73.1)
Papules	1 (9.09)	0 (0)	7 (12.73)	0 (0)	1 (100)	8 (61.54)	9 (50)	2 (13.33)	13 (18.31)	41 (20.81)
Scales	1 (9.09)	0 (0)	4 (7.27)	0 (0)	0 (0)	0 (0)	12 (66.67)	14 (93.33)	59 (83.1)	90 (45.69)

Verrucous	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (69.23)	0 (0)	0 (0)	0 (0)	9 (4.57)
Vesicles	1 (9.09)	0 (0)	31 (56.36)	2 (66.67)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	34 (17.26)
Other efflorescence	6 (54.55)	4 (40)	10 (18.2)	0 (0)	0 (0)	7 (53.85)	9 (50)	5 (33.33)	22 (31.02)	63 (31.98)

Note: One patient may have more than one efflorescence from physical examination.

Table 5 shows the efflorescence observed during the physical examination of elderly patients at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021. The most common efflorescence is erythema, with 151 diagnoses (76.65%), followed by macules with 144 diagnoses (73.1%), scales with 90 diagnoses (45.69%), hyperpigmentation with 61 diagnoses (30.96%), erosions with 50 diagnoses (25.38%), papules with 41 diagnoses (20.81%), and and other efflorescence such as fissures, lifenfications, nodules, plaques, pustules, etc with total 63 diagnoses (31.98%). In the bacterial infection group, Furuncle & Carbuncle diagnosis is dominated by erythema with 9 diagnoses (81.82%) and followed by macules with 6 diagnoses (54.55%). In addition, Cellulitis diagnosis is dominated by macules with 8 diagnoses (80%), erythema with 7 diagnoses (70%), as well as edema and erosions each with 6 diagnoses (60%).

The viral infection group with Herpes Zoster diagnosis is dominated by erythema with 52 diagnoses (94.55%), followed by vesicles with 31 diagnoses (56.36%), macules with 27 diagnoses (49.09%), and crusts with 20 diagnoses (36.36%). Varicella diagnosis is dominated by erythema and erosions, each with 3 diagnoses (100%), followed by crusts, macules, and vesicles, each with 2 diagnoses (66.67%). Molluscum Contagiosum diagnosis is dominated by erythema, macules, and papules, each with 1 diagnosis (100%). Common Wart diagnosis is dominated by verrucous with 9 diagnoses (69.23%), followed by papules with 8 diagnoses (61.54%), and hyperpigmentation with 7 diagnoses (53.85%).

The fungal infection group with Candidiasis diagnosis is dominated by erythema with 17 diagnoses (94.44%), followed by macules with 15 diagnoses (83.33%), scales with 12 diagnoses (66.67%), and papules with 9 diagnoses (50%). Pityriasis Versicolor diagnosis is dominated by macules with 15 diagnoses (100%), followed by scales with 14 diagnoses (93.33%), and hypopigmentation with 11 diagnoses (73.33%). Dermatophytosis (Tinea) diagnosis is dominated by macules with 68 diagnoses (95.77%), followed by scales with 59 diagnoses (83.1%), erythema with 56 diagnoses (78.87%), hyperpigmentation with 38 diagnoses (53.32%), and central healing with 34 diagnoses (47.89%).

Table 6. Distribution of laboratory examinations in elderly patients with skin infections

Supporting Examinations	Causes			Total (n=197)
	Bacteria (n=21)	Viruses (n=72)	Fungi (n=104)	
Gram	2 (9.52)	4 (5.56)	1 (0.96)	7 (3.55)
KOH	3 (14.29)	2 (2.78)	100 (96.15)	105 (53.30)
Tzank	0 (0)	18 (25)	0 (0)	18 (9.14)

Woodlamp	0 (0)	0 (0)	20 (19.23)	20 (10.15)
Other examination	0 (0)	4 (5.56)	2 (1.92)	6 (3.04)

Note: One patient may have more than one result from supporting examinations.

Table 6 shows the supporting examinations conducted on elderly patients at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021. The most common is the KOH examination with 105 diagnoses (53.30%), followed by Wood's lamp examination with 20 diagnoses (10.15%), Tzanck test with 18 diagnoses (9.14%), Gram staining with 7 diagnoses (3.55%), and other examination including FNAB, Dermoscopy, and Vaginal swab with 6 diagnoses (3.04%).

The bacterial group is dominated by KOH examination with 3 diagnoses (14.29%) and Gram staining with 2 diagnoses (9.52%). In contrast, the viral group, it is dominated by Tzanck test with 18 diagnoses (25%). In the fungal group has a significant number in the KOH examination with 100 diagnoses (96.15%), followed by Wood's lamp examination with 20 diagnoses (19.23%).

4. Discussion

Number of Elderly Patients with Skin Infections

In this study, the sample comprises all elderly patients classified according to the Indonesian Ministry of Health with skin infections. The total number of elderly patients with skin infections extracted from the medical records of Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021 is 197 patient records. However, 13 patient records were excluded because they lacked essential variables needed for the study. Therefore, the sample size used in this research is 184 patients. The highest number of elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021 occurred in 2020, with 110 patients (59.78%). The number of elderly patients with skin infections decreased in the following year, 2021, to 74 patients (40.22%). The decrease in the number of elderly patients with skin infections from 2020 to 2021 is attributed to the COVID-19 pandemic, which entered Indonesia in early 2020 and continued into 2021, with an increasing number of COVID-19 cases. A similar decline in the number of patients was observed in a hospital in Surakarta, experiencing a decrease in both outpatient and inpatient visits during the COVID-19 pandemic. This decline is compounded by fear and anxiety resulting from various news and stories during the pandemic, impacting patients' psychological well-being and discouraging hospital visits (Setyono et al., 2021; Prabowo et al., 2021). Elderly individuals are particularly vulnerable to COVID-19 due to a weakened immune system associated with aging. As age increases, various age-related declines occur, affecting organ function, mobility, and immunity, which differs significantly from a younger age group. Furthermore, the presence of chronic diseases increases the risk factors, both for contracting the coronavirus and for experiencing more severe complications that can lead to death (Syarifah and Sugiharto, 2021).

Diagnosis of Elderly Patients with Skin Infections

Skin infections in this study are classified into three agent groups: bacteria, viruses, and fungi, totaling 197 diagnoses, indicating that some patients have more than one diagnosis. Based on the distribution of diagnoses in elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021, the majority were in the fungal group with 104 patients, followed by the viral group with 72 patients, and the bacterial group with 21 patients. In the bacterial group (pyoderma), two diagnoses were identified, with Furuncle and Carbuncle being the most common, accounting

for 11 diagnoses (5.58%), followed by Cellulitis with 10 diagnoses (5.08%). In the viral group, a total of 4 diagnoses were found, with Herpes Zoster being the most common with 55 diagnoses (27.92%), followed by Common Warts with 13 diagnoses (6.6%), Varicella 3 diagnoses (1.52%), and Molluscum Contagiosum 1 diagnosis (0.51%). Meanwhile, in the fungal group, a total of 7 diagnoses were identified, dominated by Dermatophytosis (Tinea) at 71 diagnoses (38.6%) with Tinea Corporis being the most common with 39 diagnoses (19.8%), followed by Tinea Cruris with 29 diagnoses (14.72%), Tinea Facialis, Tinea Incognito, and Tinea Pedis each with 1 diagnosis (0.51%). Furthermore, other diagnoses such as Cutaneous Candidiasis with 18 diagnoses (9.14%) and Pityriasis Versicolor with 15 diagnoses (7.61%).

In the years 2012-2015, the elderly group also constituted the majority of patients in a pyoderma study conducted by Fahriah, Gama, and colleagues at RSUP Prof. Dr. R. D. Kandou Manado. There were 31 elderly patients (70.5%) in 2012 and 96 elderly patients (58.5%) in 2013-2015 who were found to have pyoderma. This may be due to the immobility of the elderly, leading to changes in the integumentary system, such as epidermal atrophy, sweat gland changes, and hair follicle changes, resulting in thinning of the skin, follicles, and subcutaneous fat, reducing skin padding and, consequently, resistance to pressure and temperature changes, leading to susceptibility to decubitus, hypothermia, or hyperthermia. Skin thinning makes the skin more prone to trauma/wounds, and the elderly skin's ability to heal wounds is prolonged, making infection more likely (Fahriah et al., 2015; Gama, 2016).

Herpes Zoster is the most common diagnosis in the viral group in this study, with a significant difference. This disease is accompanied by severe pain at various stages, with a long duration that can reduce a person's quality of life, especially in the elderly, both in acute and chronic conditions. A study conducted by Pusponegoro and colleagues on the incidence of Herpes Zoster in 2011-2013 from 13 teaching hospitals in Indonesia found that the elderly were the group most often affected by Herpes Zoster, with 851 cases (37.95% of cases). This is related to the decreased immune response mediated by cells that can occur in immunocompromised patients. However, immunocompetent patients also have a significant incidence rate (García-González and Rosas-Carrasco, 2017).

Tinea Corporis and Tinea Cruris are also the most common diagnoses in a study conducted by Marsaoly and colleagues on elderly patients with superficial fungal skin infections, or Dermatomycosis Superficialis, at RSUP Sanglah Denpasar, Bali, from 2010-2014. Each had 16 diagnoses (27.1%), followed by Cutaneous Candidiasis with 7 diagnoses (11.8%), Pityriasis Versicolor with 5 diagnoses (8.4%), Tinea Facialis, and Tinea Incognito each with 1 diagnosis (1.7%). A similar situation occurred at RSUD Provinsi Nusa Tenggara Barat from 2012-2014, with 16 patients (24.2%) diagnosed with Tinea Cruris and 15 patients (22.7%) with Tinea Corporis as the most common fungal infections in the elderly, possibly due to the tropical climate in Indonesia, which is hot and humid. Both diagnoses are often found in tropical climates with high air humidity, as mentioned in an article on Superficial Dermatomycosis by Siswati and Ervianti. This is compounded by factors commonly experienced by the elderly, such as aging, which occurs simultaneously with a decrease in body immunity (Siswanti and Ervianti, 2013; Marsaoly et al., 2014; Hidajat et al., 2017).

In this study, there were 184 patients, but a total of 197 diagnoses were found, meaning that some patients experienced a double diagnosis of skin infections. Some patients had two diagnoses, both of which were dominated by fungal infections. This could be due to Indonesia's tropical climate with high temperatures and humidity, creating conditions conducive to the growth of various fungal species on the skin, especially in the elderly whose protective functions have decreased. In addition, some fungal skin infections, such as Dermatophytosis (Tinea) and Candida groups, have contagious properties due to contact of infected skin with other skin and the shared use of tools and facilities, so there is a possibility that fungal infections in these patients will spread to others or even spread to themselves on body parts that have not been infected. For

example, there is a patient with a diagnosis of Tinea Facialis who cannot resist itching on the face and also has a habit of touching other body parts such as the back, potentially causing transmission and the emergence of a diagnosis of Tinea Corporis. There are also patients who have two diagnoses with different infectious agents, such as fungal and viral infections at different times. This may occur because patients experience diseases alternately; for example, initially experiencing Herpes Zoster first until it heals, and Tinea Cruris appears several months later (Baumgardner, 2017).

Gender of Elderly Patients with Skin Infections

This study indicates that the gender distribution among elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021 was dominated by females, accounting for 104 patients (56.62%), compared to males with 80 patients (43.38%). This contrasts with a previous study at RSUPN dr. Cipto Mangkunkusumo Jakarta from 2008-2013, where males were the majority, comprising 139 patients with skin infections, compared to females with 107 patients. Similar gender distribution patterns were observed at RSUD Provinsi NTB from 2012-2014, with 60 male patients and 57 female patients. This might be related to differences in hygiene and occupational types between males and females (Harlim, 2019). However, some studies state that women's skin is at a much higher risk of skin diseases than men, attributed to differences in the number of hair follicles, sweat glands, and hormones. Androgens, a hormone quite dominant in male skin, cause increased sweating and hair growth, while female skin is thinner, produces less oil, which is crucial for skin protection and moisture retention. Consequently, women constitute the majority in this study, possibly due to their heightened awareness of skin conditions compared to men. They are more likely to promptly address any skin-related concerns, utilizing beauty products or seeking medical attention from dermatologists or venereologists (Suga, 2015). This leads to a higher risk of experiencing dry skin due to the frequent use of irritating substances, coupled with hormonal factors after menopause, leading to a decrease in estrogen and collagen in the dermis. Aging exacerbates this effect by reducing blood supply and nutrition to the skin, accompanied by a decline in natural skin oil production (Aini, 2022; Gumelar et al., 2020; Tricaesario et Widayati, 2016).

Age Distribution of Elderly Patients with Skin Infections

This research reveals that the age group of elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya, in 2020-2021 was dominated by the middle-aged group (45-54 years old), comprising 88 patients (47.83%). This was followed by the elderly group (55-65 years old) with 63 patients (34.24%), the young elderly group (66-74 years old) with 24 patients (13.04%), and the old elderly group (≥75 years old) with 9 patients (4.89%). The age distribution pattern in this study aligns with a previous investigation on skin diseases at RSCM Jakarta from 2008-2013, where the youngest age group (60-65 years old) had the highest number of patients, reaching 1243 patients (53.1%). This pattern continued in older age groups, albeit with fewer patients but with a similar distribution. The largest group, the middle-aged category (45-54 years old), consists of the youngest age group, indicating that these patients have not yet experienced a decline in body function and quality of life compared to older age groups. There is a geriatric syndrome due to aging known as the 14-I, comprising Immobility, Instability, Incontinence, Intellectual Impairment, Infection, Impairment of vision and hearing, Irritable colon, Isolation (depression), Inanition (malnutrition), Impoverishment (poverty), Iatrogenesis, Insomnia, Immune deficiency, and Impotence. This is also related to the ability or even the concern of the elderly regarding their health; younger age groups may better understand health information than older ones. This is supported by previous research showing that age is an important factor influencing one's experience in dealing with health problems/diseases and decision-making. Moreover, the COVID-19 pandemic increased the fear of older age groups, making them more vulnerable to COVID-19 complications (Islam et al., 2022).

Complaints of Elderly Patients with Skin Infections

This study indicates that complaints experienced by elderly patients with skin infections at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021 were predominantly itching, accounting for 129 diagnoses (65.48%). This was followed by pain with 72 diagnoses, warmth/burning with 31 diagnoses (15.74%), disturbance with 15 diagnoses (7.61%), fever with 12 diagnoses (6.09%), stinging with 9 diagnoses (4.57%), lumps, and red eyes each with 2 diagnoses (1.02%), and complaints of pus, warmth, tingling, dry skin, and wounds each with 1 diagnosis (0.51%). The bacterial diagnosis group was dominated by the complaint of pain, with 17 diagnoses (80.95%). Two types of diagnoses were identified: first, from the Superficial Pyoderma group, namely Furuncles/Carbuncles. As per the PERDOSKI Clinical Practice Guidelines in 2021, lesions typically appear as erythematous nodules with tenderness, while Carbuncles occur when the infection involves several hair follicles, resulting in a broader and deeper infection with increased pain. The second diagnosis is Cellulitis, a group of Deep Pyodermas characterized by constitutional symptoms and pain. In the virus group, complaints were also dominated by pain with 44 diagnoses (61.11%), itching with 26 diagnoses (36.11%), and warmth/burning with 23 diagnoses (31.94%). There are four distinct diagnoses with significant differences in numbers. For instance, Herpes Zoster is usually preceded by pain, followed by varied paresthesia symptoms such as itching, warmth, stinging pain, tenderness, and then skin eruptions accompanied by constitutional symptoms.

Slightly different in the fungal group, itching was the most common complaint with 97 diagnoses (93.27%), followed by pain with 72 diagnoses (36.55%), and warmth/burning with 31 diagnoses (15.74%). There were numerous diagnoses in the fungal group, predominantly Dermatophytosis (Tinea), a superficial fungal infection distinguished by the location of the infection. Tinea corporis and Tinea cruris were the most common diagnoses in this group, usually accompanied by itchy rashes but in different locations. Tinea corporis affects the body and extremities, while Tinea cruris occurs in the inguinal, pubic, and even buttock areas, often accompanied by pain. Similarly, Pityriasis versicolor causes itching, especially when sweating, though it may be mild or even unnoticed. Moreover, it is usually accompanied by various spots ranging from white to reddish-brown (PERDOSKI, 2021).

Duration of Complaints in Elderly Patients with Skin Infections

This research shows that the duration of complaints experienced by elderly patients with skin infections at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021 was predominantly within <1 month, with 120 diagnoses (60.91%), followed by 1-12 months with 51 diagnoses (25.89%), >12 months with 17 diagnoses (8.64%), and >3 years with 8 diagnoses (4.06%). The varied duration of these complaints is caused by several factors. The high number of complaints within <1 month is evidence that many elderly individuals are concerned and understand the importance of bodily health. They may think that if one ailment arises, it could lead to other conditions worsening, prompting them to seek immediate medical attention.

A study conducted by Firman and Anna on the understanding and concern of the elderly regarding health protocols found that 51.2% of the elderly understood health protocols during the COVID-19 pandemic. This indicates that many elderly individuals still do not fully grasp the importance of their health, leading to complaints lasting for a considerable duration. This is likely due to the declining conditions experienced by the elderly, such as reduced memory, making it challenging for them to remember and obtain information, affecting their decision-making regarding health issues. However, skin diseases experienced by patients may be challenging to manage or may have reached a chronic stage, leading to a prolonged duration of complaints. The prolonged effect of chronic complaints can also result in a reduced quality of life, increased stress levels, and decreased physical function in the elderly (Andesty et Syahrul, 2018).

Elderly Patients' Lesion Efflorescence with Skin Infections

In this study, the physical examination results of elderly patients with skin infections at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021 revealed that efflorescence was predominantly characterized by erythema in 151 diagnoses (76.65%), followed by macules in 144 diagnoses (73.1%), scales in 90 diagnoses (45.69%), hyperpigmentation in 61 diagnoses (30.96%), erosions in 50 diagnoses (25.38%), and papules in 41 diagnoses (20.81%). In the bacterial infection group, Furuncles & Carbuncles diagnoses were dominated by erythema in 9 diagnoses (81.82%), macules in 6 diagnoses (54.55%), and ulcers in 3 diagnoses (27.27%). According to the PERDOSKI guidelines in 2021, Furuncles, classified as superficial pyoderma, present as erythematous nodules initially hard and painful, which later rupture, releasing pus along with necrotic tissue. In contrast, Carbuncles appear when hair follicles are affected by larger and deeper lesions, causing the skin to become red and multiple pustules to emerge. Additionally, Cellulitis diagnoses were dominated by erythema in 7 diagnoses (70%), with edema and macules each in 6 diagnoses (60%). Unlike Furuncles & Carbuncles, Cellulitis appears as a dark erythematous macule with no clearly defined borders between the lesion and normal skin, it is associated with erythematous infiltrate (Hidayati et al, 2019).

Moving on to the virus group, Herpes Zoster diagnoses were dominated by erythema in 52 diagnoses (94.55%), vesicles in 31 diagnoses (56.36%), macules in 27 diagnoses (49.09%), and crusts in 20 diagnoses (36.36%). Herpes Zoster initiates with maculopapular erythematous lesions that evolve into clustered vesicles with an erythematous base and even edema, transforming into pustules and crusts within 7 days. Varicella diagnoses were dominated by erythema and erosions in 3 diagnoses each (100%), and crusts, macules, and vesicles in 2 diagnoses each (66.67%). Similar to HZ, Varicella exhibits vesicles with a "dewdrop on rose petal appearance." Molluscum contagiosum diagnoses were dominated by erythema, macules, and papules in 1 diagnosis each (100%). Molluscum presents small papules of skin-colored and shaped like domes/flat-topped/opalescent lesions with central umbilication that releases white, rice-like masses upon compression. Common Warts (Veruca Vulgaris) diagnoses were dominated by verrucous in 9 diagnoses (69.23%), papules in 8 diagnoses (61.54%), and hyperpigmentation in 7 diagnoses (53.85%). Veruca Vulgaris, classified as cutaneous warts, exhibits single or grouped papular verrucous lesions with a rough and jagged surface (Hidayati, 2020).

In the fungal group, Cutaneous Candidiasis diagnoses were dominated by erythema in 17 diagnoses (94.44%), macules in 15 diagnoses (83.33%), scales in 12 diagnoses (66.67%), and papules in 9 diagnoses (50%). Cutaneous Candidiasis manifests as red macules or plaques with satellite papules and pustules at the periphery. Pityriasis Versicolor diagnoses were dominated by macules in 15 diagnoses (100%), scales in 14 diagnoses (93.33%), and hypopigmentation in 11 diagnoses (73.33%). Pityriasis Versicolor presents macular lesions, sometimes erythematous, with fine scales of varying colors, including hypopigmented or even brownish (hyperpigmentation). Dermatophytosis (Tinea) diagnoses were dominated by macules in 68 diagnoses (95.77%), scales in 59 diagnoses (83.1%), erythema in 56 diagnoses (78.87%), hyperpigmentation in 38 diagnoses (53.32%), and central healing in 34 diagnoses (47.89%). Tinea Corporis, the predominant type in the Dermatophytosis group, exhibits round, actively marginated lesions with a polymorphic edge, consisting of erythema, scales, and sometimes vesicles and papules with a normal or central clearing. Accompanied by Tinea Cruris, which presents as an annular rash with a raised border containing papules, vesicles, or even pustules and scales similar to Tinea Corporis (PERDOSKI, 2021).

Diagnostic Tests for Elderly Patients with Skin Infections

This study indicates that diagnostic tests for elderly patients with skin infections at the Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021 were predominantly Potassium Hydroxide (KOH) tests in 105 diagnoses (53.30%), followed by Wood's lamp

examination in 20 diagnoses (10.15%), Tzanck test in 18 diagnoses (9.14%), Gram staining in 7 diagnoses (3.55%), dermoscopy in 3 diagnoses (1.53%), and Fine Needle Aspiration Biopsy (FNAB), Vaginal swab, and other examinations each in 1 diagnosis (0.51%). The bacterial group was dominated by KOH tests in 3 diagnoses (14.29%), and Gram staining in 2 diagnoses (9.52%). In the virus group, Tzanck tests were predominant in 18 diagnoses (25%). In contrast, the fungal group had a significant number of KOH tests in 100 diagnoses (96.15%) and Wood's lamp examinations in 20 diagnoses (19.23%). This data aligns with previous studies on diagnostic methods for skin infection diseases, but differs slightly in the bacterial group. The KOH examination was found to be the most common test in the bacterial group, serving to screen various specific diagnoses, particularly fungal infections. A study conducted at Sanglah General Hospital Denpasar from June 2015 to June 2016 on pyoderma, utilizing Gram-positive Cocci examinations, with 28 patients (52.8%) testing positive and 13 patients (24.6%) having no recorded or conducted tests. Another study on the diagnostic methods of viruses found that out of 29 patients, Tzanck Smear tests were conducted in 4 patients (13.79%) at Dr. Soetomo General Academic Hospital from 2016-2017. In 2013 at Dr. Soetomo General Academic Hospital, a study on fungal infection (Dermatophytosis) used two methods: 10% KOH + Parker Ink and Wood's lamp. KOH examination results showed 16 patients positive for blasto (4.35%), 181 positive for hyphae (49.18%), 100 positive for both blasto and hyphae (27.17%), and 71 negative, not examined, or not recorded (19.29%). Wood's lamp results showed 10 positive (2.72%) and 358 negative, not examined, or not recorded (97.28%).

Gram staining is a differential staining method that identifies whether bacteria are Gram-positive or Gram-negative using crystal violet or methylene blue stains. Gram-positive bacteria, such as those causing Pyoderma (Staphylococcus, Streptococcus, or both), retain the crystal violet color, while Gram-negative bacteria turn reddish after adding safranin. The Tzanck test is a rapid diagnostic test for various skin diseases, including viral infections, autoimmune bullous diseases, spongiotic dermatitis, skin tumors, and genodermatoses. For viral infection cases, the specimen used must be from fresh, intact vesicles, not infected, and not crusts, as infected cells are taken in sufficient quantity. Varicella, Herpes Zoster, and Herpes Simplex are diseases caused by Varicella Zoster Virus (VZV) and Herpes Simplex Virus (HSV), with the characteristic feature of herpetic infections being the presence of acantholytic cells and multinucleated giant cells. Molluscum contagiosum shows Henderson–Patterson Bodies. Sensitivity and specificity studies on herpes infection cytological findings show rates of 84.7% and 100%, respectively (Lusiana et al., 2019).

The use of Potassium Hydroxide (KOH) solution is for diagnosing fungal elements on body parts by identifying fungal structures in keratinized cells. KOH is inexpensive, readily available, and quick but lacks color contrast. Apart from KOH testing, Wood's lamp, a fluorescence detection tool for skin and hair, is used to detect fungi in skin infections, indicating lesions that might not be obvious. This examination emits light on the suspected skin area; certain bacteria or fungi cause color changes in the affected skin area. Normal skin appears blue with white spots in thick skin and yellow in oily areas. In fungal infection cases, Pityriasis versicolor gives an orange impression, and Tinea capitis shows Microsporum species with a blue-green hue. Therefore, expertise is required to interpret the results under a microscope or in such lighting conditions (Al Dhafiri et al., 2022; Al Aboud DM et al., 2022).

Based on the most common complaints and efflorescence in this study, such as itching and erythema, it suggests a focus on diagnosing Tinea Corporis and Tinea Cruris, which are also the most common diagnoses in this study. This aligns with the PERDOSKI 2021 guidelines, stating that Tinea Corporis presents with an itchy rash on the body and extremities that does not spread to the palms and soles. Lesions are round or oval (ringworm) with well-defined borders, polymorphic active edges consisting of erythema, scales, vesicles, and papules, and a central area that appears normal (central healing). Tinea Cruris manifests as an itchy rash in the inguinal, thigh folds, pubic, perianal, buttock, and lower abdominal areas with erythematous plaque lesions

that are annular, sharply bordered, with raised edges and scales resembling those in Tinea Corporis. Papules, vesicles, or pustules may occur at the edges, causing pain if there is secondary infection. The high number of KOH tests, the most common diagnostic test in this study, is necessary to determine the accurate diagnosis or etiology of the infection for appropriate management, aiming to achieve optimal results for patients.

5. Conclusion

Based on the study results, it can be concluded that elderly patients with skin infections at Dermatology and Venereology Outpatient Unit Dr. Soetomo General Academic Hospital Surabaya in 2020-2021 were mostly females in their mid-40s to mid-50s. The most common bacterial, viral, and fungal infections were Furuncles & Carbuncles, Herpes Zoster, and Dermatophytosis respectively. Itching was the prevalent symptom lasting less than a month. The most common physical finding was erythematous efflorescence, and KOH examination was frequently performed.

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