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PATIENT PROFILE OF TINEA CORPORIS IN DR. SOETOMO GENERAL HOSPITAL, SURABAYA FROM 2014 TO 2015

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ABSTRAK

Background: The prevalence of dermatophytosis in Indonesia reach 52% of all fungal infections and is dominated by tinea corporis. **Purpose:** This study aimed to describe the clinical profile of tinea corporis patients in the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya. **Methods:** This study was a descriptive study with a case series method from patient medical records in the mycology division of the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya from January 1, 2014 to December 31, 2015 with 339 samples. **Results:** This study showed that tinea corporis patients were dominated by women counting for 113 patients in 2014 and 84 in 2015. Tinea corporal patients were dominated by the post-puberty age group between 40 and 50 years. Tinea cruris is the most common comorbid infection in this case. There were 85.25% of patients who showed positive results for hyphae structure, 72.57% of patients showed negative results for blastospore structure, and 64.31% of patients showed negative results for examination of Wood's lamp. There were 100 patients in 2014 and 86 patients in 2015 who received oral griseofulvin pharmacological therapy and 86.30% of these patients showed improvement in results after two weeks of treatment. **Conclusion:** Tinea corporis mostly attacks women and post-puberty age groups with tinea cruris as the most comorbid infections. The characteristic of tinea corporis could be shown as positive result for hyphae and negative for blastospore through the KOH test, and oral Griseofulvin is the most pharmacological therapy used for treatment.

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INTRODUCTION

Indonesia has been known as country with the highest number of infectious diseases. As a matter of fact, fungi is one of several causes of infectious diseases (Bongomin, Gago, Oladele, & Denning, 2017). Fungal infection or mycosis is an infection caused by certain pathogenic fungal species that can attack the entire body. Mycosis is classified into three parts based on location, namely superficial mycoses, subcutaneous mycoses, and deep mycoses or systemic mycoses. The most

prevalence of fungal infections is superficial mycoses that attack the surface of the skin, nails, and hair (Goldsmith et al., 2012).

The type of superficial fungal infection that has the highest prevalence in Indonesia is dermatophytosis, which is counting about 52% (Yossela, 2015) Dermatophytosis is a superficial fungal infection caused by a group of dermatophytes which are divided into three genera, including Epidermophyton, Trichophyton, and Microsporum (Goldsmith et al., 2012).

Tinea corporis is dermatophytosis which has the highest prevalence in Asia by approaching about 35.40% (Hayette & Sacheli, 2015). Surprisingly, the areas that are often attacked by this infection are glabrous skin. The glabrous skin is the whole body skin except the palms, soles of the feet, and folds of the thighs (Goldsmith et al., 2012). In some cases, tinea corporis can attack the face, except for the moustache and beard area, called tinea faciei (Zhuang, Ran, Fan, Dai, & Lama, 2016). The clinical manifestation of tinea corporis is a ring-shaped lesion and rough structure with the red active edge so that there appears to be elevation. In the middle of the lesion, there is a central clearing (inner healing), which is part of the lesion. This part is inactive and looks like normal skin (Goldsmith et al., 2012).

Tinea corporis is a multifactorial fungal infection. Risk factors that can facilitate the occurrence of tinea corporal infection include gender where men commonly have a greater risk of being infected, the age at which the young adult group has a greater risk of infection, employment, illness, and history consumption of immunosuppressant drugs (Qadim, Golforoushan, Azimi, & Goldust, 2013). Therapy for tinea corporis consists of two types, namely topical therapy and oral therapy. The evaluation was carried out for two weeks after the administration of the drug for the first time (Sahoo & Mahajan, 2016). At the present time, there are still many Indonesian people who have unaware of this infection. This study aims to describe the prevalence, results of routine laboratory examinations, pharmacological management, and treatment outcomes of patients with tinea corporis in 2014-2015 at the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya

METHODS

This study is a descriptive observational study with a case series design to determine the prevalence, characteristics of routine performed-laboratory examinations, pharmacological management, and treatment results of patients with tinea corporis according to secondary data, namely hospital medical records from 2014 to 2015. This study was conducted in the division of mycology the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya. The population used in this study was the data from the division of mycology the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya. The sampling technique in this study is total sampling, which uses the entire medical record data of patients with diagnoses of tinea corporis during the 2014-2015 period, which is specifically from January 1, 2014 to December 31, 2015. The independent variables of this study are medical record data for each patient from division mycology the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya, namely gender, age, other types of current diseases, results of routine laboratory examinations, types of pharmacological management, and treatment result of patients. The dependent variable of this study was the diagnosis of tinea corporis in the division of mycology the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya. The number of samples used was 339 samples. Data were processed and analyzed using Microsoft Excel 2007.

RESULTS

Tinea Corporis Prevalency

The number of patients was 1,266 people who were registered in the medical record in the division of mycology the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya in 2014. A small proportion of patients registered were diagnosed with tinea corporis as much as 211 new cases (16.67%). There were 8 cases out of 211 new cases of tinea corporis diagnosed with tinea faciei (3.79%). In 2015, there were 939 patients enrolled in the medical record of the division of mycology the Outpatient Unit of Dermatology and Venereology, Dr. Soetomo General Hospital, Surabaya. In 2014, a small proportion of registered patients were diagnosed with tinea corporis, 128 new cases (13.63%). There were 8 cases out of 128 new cases of tinea corporis diagnosed with tinea faciei (6.25%).

The results of the calculation of the prevalence of tinea corporis are based on gender, age, and comorbidities that occur in patients with tinea corporis incident. Based on gender, most tinea corporis patients were female patients, as many as 113 patients in 2014 and 84 in 2015. Based on age, tinea corporis patients were dominated by the 50-54 year age group in 2014 and the 45-49 age group year in 2015. Based on the results, it can be concluded that the most tinea corporis patients' characteristics are the post-puberty age group. Tinea corporis is not just a single infection. The decrease in the number of tinea corporis patients occurred from 211 patients in 2014 to 128 patients in 2015 (Table 1).

Regular Laboratory Assessment of Tinea Corporis

Table 2 is the result of routine laboratory examinations of tinea corporis. KOH examination using specimens in the form of skin scrapings in the area of the lesion was dripped with 10% KOH solution and observed under a microscope, while the Wood's lamp test was an examination performed by illuminating the lesion and assessing the results of fluorescence.

Table 1
Tinea Corporis Prevalency at Unit of Dermatology and Venereology, Dr. Soetomo General Hospital

Characteristics	Case		Total	
	2014	2015	N	%
Sex				
Man	98	44	142	41,89
Women	113	84	197	58,11
Age Group (years old)				
0-4	15	7	22	6,49
5-9	11	6	17	5,01
10-14	17	10	27	7,96
15-19	17	9	26	7,67
20-24	23	5	28	8,26
25-29	7	10	17	5,01
30-34	15	6	21	6,19
35-39	11	7	18	5,31
40-44	15	15	30	8,85
45-49	18	18	36	10,62
50-54	25	9	34	10,03
55-59	9	6	15	4,42
60-64	17	6	23	6,78
65-69	10	5	15	4,42
70-74	1	3	4	1,18
75-79	0	5	5	1,47
80-84	0	1	1	0,29
Co-morbidities				
Single Infection	183	102	285	84,07
Deep Mycosis + Chromomikosis + Abses	1	0	1	0,29
Hepatitis C	1	0	1	0,29
Candidiasis	1	0	1	0,29
Pitiriasis Versicolor	1	0	1	0,29
Pitirosporum Foliculitis	1	0	1	0,29
SLE	0	1	1	0,29
Tinea Incognito	1	1	2	0,59
Tinea Cruris	22	22	44	12,98
Tinea Unguium	0	1	1	0,29
Xerosis	0	1	1	0,29
Total	211	128	339	100,00

There were 185 cases in 2014 and 104 cases in 2015 which showed positive results for hyphae structure. However, there were 136 cases in 2014 and 110 cases in 2015 which showed negative results for the structure of the blastospore. While the results on the Wood's lamp examination were dominated by negative results, which were counted about 179 cases in 2014 and 39 cases in 2015.

Pharmacological Management of Tinea Corporis

Table 3 is a type of pharmacological management for tinea corporis. There are three types of pharmacological management, namely oral, topical, or a combination. Determination of the type of management is based on the degree of infection and the patient's condition. The most widely used type of drug is griseofulvin with oral dosage forms, which are as many as 100 cases in 2014 and 86 cases in 2015. Also, the use of the drug ketoconazole with oral dosage forms is widely used, as many as 98 cases in 2014 and 35 cases in 2015. Management of using drugs with topical dosage forms and combinations is rarely used. The drugs in the most widely used topical dosage forms were 2% miconazole and 2% ketoconazole, which were seven cases (2.06%) respectively. Miconazole 2% in topical dosage forms was used in three cases in 2014 and four cases in 2015. Furthermore, about 2% ketoconazole in topical dosage forms was used in six cases in 2014 and one case in 2015. Management with a combination drug between oral dosage forms and topical for each type of combination drug is only used in one case (0.30%). Management with this combination drug is only used in certain cases, such as in patients with moderate to severe infections

The Treatment of Tinea Corporis Patients

Table 4 shows that not all patients carry out this follow-up examination (control). This is influenced by several factors, one of which is the degree of infection when the diagnosis of tinea corporis is first established. In 2015, there were 122 patients out of the total (35.99%), 81 patients in 2014 and 41 patients, who carried out follow-up examinations, counted from the data of patients carrying out the first follow-up examination at two weeks after the first examination, then the number of these patients decreased in the follow-up examination to the fifth follow-up examination (10 weeks from the first examination).

The patient's data were then grouped into three groups based on the results of treatment, which were fixed, improved, and worsened. The results of the study in Table 4 show the most results were patients who showed improvement in the first follow-up examination, as many as 103 patients (84.43%), of whom there were 63 patients (86.30%) who received griseofulvin with oral dosage forms as pharmacological management.

DISCUSSION

Tinea Corporis Prevalency

Tinea corporis infects female populations counting for 58.11%. This is not in accordance with previous research. The results of previous studies showed that many tinea corporis infect the male population (Ramaraj, Vijayaraman, Rangarajan, & Kindo, 2016).

Table 2
Result of Routine Laboratory Examinations of Tinea Corporis at Unit of Dermatology and Venereology, Dr. Soetomo General Hospital

Characteristics	Results		Total	
	2014	2015	n	%
KOH Examination				
Hifa				
Positive	185	104	289	85,25
Negative	23	24	47	13,86
Undone	3	0	3	0,88
Blastospora				
Positive	72	18	90	26,55
Negative	136	110	246	72,57
Undone	3	0	3	0,88
Wood's Lamp Examination				
Positive	0	1	1	0,29
Negative	179	39	218	64,31
Undone	32	88	120	35,40

Table 3
Pharmacological Management of Tinea Corporis at Unit of Dermatology and Venereology, Dr. Soetomo General Hospital

Dosage Form and Type of Drug	Results		Total	
	2014	2015	n	%
Oral				
Griseofulvin	100	86	186	54,87
Ketoconazole	98	35	133	39,23
Topikal				
Miconazole 2%	3	4	7	2,06
Ketoconazole 2%	6	1	7	2,06
Tretinoin 0,05%	1	0	1	0,30
Fluconazole 0.5%	1	0	1	0,30
Ketoconazole 2% + Acidum Salicylicum 10%	0	1	1	0,30
Kombinasi (oral dan topikal)				
Ketoconazole (oral) + Ketoconazole 2% (topikal)	1	0	1	0,30
Griseofulvin (oral) + Urea 10% (topikal)	1	0	1	0,30
Sporacid/Itraconazole (oral) + Ketoconazole 2% (topikal)	0	1	1	0,30

Table 4
The Treatment of Tinea Corporis Patients at Unit of Dermatology and Venereology, Dr. Soetomo General Hospital

The Result and Timeline of Follow Up Examination	Results		Total	
	2014	2015	n	Visit
1st Control				
Fixed	5	13	18	122
Improved	76	27	103	
Worsened	0	1	1	
2nd Control				
Fixed	4	8	12	53
Improved	23	6	29	
Worsened	9	3	12	
3rd Control				
Fixed	1	1	2	12
Improved	5	1	6	
Worsened	3	1	4	
4th Control				
Fixed	0	0	0	1
Improved	0	0	0	
Worsened	1	0	1	
5th Control				
Fixed	0	0	0	1
Improved	1	0	1	
Worsened	0	0	0	

This is due to the protective effects of androgenic hormones in women, namely the progesterone and estradiol, where the two hormones have higher levels in women compared to the men. These hormones can inhibit fungal growth in the skin (Heidrich et al., 2015). This shows that women have more protective factors against dermatophytes than men, so men have a high possibility to experience dermatophytosis, one of them is tinea corporis. There are other factors that also affect the high risk of infection with tinea corporis, such as high temperature and humidity, cleanliness and physical activity.

The prevalence of tinea corporis is dominated by the age group 45-49 years, that is as much as 10.62% and the age group 50-54 years, which is as much as 10.03%. Based on the data, the individuals in the post-puberty age group have a

higher risk of being infected with tinea corporis, especially in the fourth and fifth decade age groups. These results are not in accordance with the previous studies. Other studies showed that the age group of 0-10 years have high risk infected by tinea corporis (Elmegeed, Ouf, Moussa, & Eltahlawi, 2015). This is due to the age range, androgenic hormones are still not active, where androgenic hormones can act as a protective factor against tinea corporal infection. This can also apply to the post-puberty age group because in that age range androgenic hormone levels begin to decline, especially in the female population due to menopausal factors.

The results showed that there were 54 patients (15.93%) who suffered from other diseases besides tinea corporis, of which 12.98% of them were patients infected with tinea cruris. These results are not in accordance with the research that has been done before. Other fungal infections that become comorbid from tinea corporis are tinea cruris, tinea pedis, and other types of dermatophytosis caused by the same infectious agent (Rajagopalan et al., 2018). Other studies also revealed that tinea corporis has a relationship with ichthyosis and keratin abnormalities, instead of tinea capitis and unguium (Freitas, Fontana, Hammerschmidt, Mulinari-Brenner, & Gentili, 2013).

The factor that causes tinea kruris to become the most common concomitant infection of tinea corporis is the transmission pathway and fungus that causes infection. There are two types of transmission lines, namely direct or indirect transmission. Direct transmission can occur through skin contact or direct contact with fungi infected-animals that usually cause dermatophytosis in humans. Skin contact can occur in patients with direct contact or autoinfection. Autoinfection is the fungi spreading phenomenon that occurs in other areas of the body of the same sufferer. One symptom of corporal tinea is itching. Therefore, many Indonesian people have the habit of scratching the location of the infection. When scratched, the infectious agent will stick to the hand. Because the main location of tinea corporis and tinea kruris are close each other, so it is possible that the fungus that causes the infection can spread easily and cause other infections. Also, there are similarities between the causative agents of tinea corporis and tinea cruris. Both infections belong to the group of dermatophytosis so that the causative agent also comes from the same genus, especially the genus Trichophyton (Brigida & Muthiah, 2017) Therefore, these two types of dermatophytosis have a fairly close relationship

Regular Laboratory Assessment of Tinea Corporis

In this present study, there are two types of routine laboratory tests, namely KOH examination and Wood's lamp examination. KOH examination was used to determine the structure of the fungus and was observed under a microscope. The Wood's lamp examination is useful for finding out the fluorescence that results from lesions irradiated with ultraviolet light.

The KOH examination results showed that there were 85.25% of specimens of patients who had hyphae structure and as many as 72.57% of specimens of patients who did not have a blastospore structure. This result is in accordance with the results of previous studies. The hallmark of dermatophytosis is marked with the presence of hyphae structures on two sides of dead skin cells or called as the sandwich sign when observed under a microscope through KOH examination (Park et al., 2014). Blastospore is a type of structure obtained from candidiasis-diagnosed patients (Nasution, 2013). The blastospore is also a typical structure for infections caused by the species Malassezia (Rodoplu, 2015).

Tinea corporis will show negative results on the Wood's lamp. Types of skin disease that show positive results on this examination include pityriasis Versicolor, pityrosporum folliculitis, tinea capitis, pigmentation disorders (hypopigmentation, hyperpigmentation, and melasma), bacterial infections, and porphyria (Goldsmith et al., 2012). Therefore, the results of this examination are dominated by negative results in tinea corporis patients (64.31%).

Pharmacological Management of Tinea Corporis

The main factors that are considered in order to choose the type of drug are the location of fungal infections, the dosage form and route of administration of the drug, and how the drug works. Most patients received griseofulvin treatment with oral dosage forms (54.87%) and the rest received ketoconazole treatment with oral dosage forms (39.23%). Griseofulvin is a fungistatic antifungal drug, which inhibits fungal growth by influencing fungal DNA synthesis. Griseofulvin is a first-line drug for tinea corporis (Dias et al., 2013).

Ketoconazole is an azole antifungal drug that works by inhibiting cytochrome P450, which

interferes the synthesis of ergosterol, the structure of the fungal cell membrane. Ketoconazole is a broad-spectrum antifungal drug that is easy to use for suspected cases of being a fungal infection but has not been fully proven, especially regarding the cause of fungal species (Dias et al., 2013). Recently, ketoconazole with oral dosage forms is no longer used as a treatment (FDA, 2016). This is because of some dangerous side effects, such as hemolytic anaemia, impotence, gynecomastia resulting from anti-androgenic effects on the adrenal glands and testicles, and liver damage (Dias et al., 2013). This is different from what is applied in Indonesia where ketoconazole with oral dosage forms is still allowed to circulate and is widely used. However, the use of this medication followed with strict supervision, such as not taking it for more than one month and not giving it to patients over 60 years old because they can increase the risk of these side effects (National Agency of Drug and Food Control Republic of Indonesia RI, 2015).

The drugs with the most topical dosage forms given to patients were miconazole and fluconazole creams, each of which was 2.06%. The drug is given to patients for several reasons, such as the presence of other fungal infections as indicated by the drug that accompanies tinea corporis (Dias et al., 2013).

Pharmacological management in combination is given for certain indications so that its use is very limited, which is as much as 0.3% for each type of drug. Drugs used as combinations are generally symptomatic. The drug used as a combination in the pharmacological management of tinea corporis, including tretinoin, acidum salicylicum, urea, and sporacid (itraconazole). Tretinoin is a vitamin A derivative. The way it works is to reduce the keratinization process in skin cells (Goldsmith et al., 2012) Salicylicum acidum or salicylic acid serves to inhibit the secretion of sweat glands and sebaceous glands, has a mild antimicrobial effect and can also function as a keratolytic (Arif, 2015). Urea has the benefit of being keratolytic so that it can maximize penetration of the given antifungal drugs (Goldsmith et al., 2012). The three types of drugs have the same function, namely as keratolytic which has the benefit of reducing the symptoms of hyperkeratosis in tinea corporis. Whereas sporacid is a trademark of the itraconazole antifungal drug. Itraconazole is a triazole derivative and is fungistatic. The way it works is the same as ketoconazole, miconazole and fluconazole (Dias et al., 2013).

The choice of the drug with the route of oral administration is the most chosen because the method of administration is safe and convenient for everyone so that oral preparations become first-line treatment in each case of dermatophytosis (Majid, Sheikh, Kanth, & Hakak, 2016). The reasons for consideration in administering drugs with oral dosage forms are location, the extent of lesions that are difficult to reach and have experienced invasion, and chronic infections. Consideration of the administration of drugs with oral dosage forms is also based on the age of the patient, which is widely given to adolescents to adulthood (Sahoo & Mahajan, 2016).

Drugs with topical dosage forms are given at local infections whose location and extent can be easily reached. Also, drugs with topical dosage forms are usually intended for infants to children. This type of preparation does not provide a systemic effect, the most common side effects are local irritation and sensitivity reactions (Sahoo & Mahajan, 2016).

The Treatment of Tinea Corporis Patients

The results show that not all tinea corporis patients who have received pharmacological management will show improvement after the first treatment, so it is recommended to carry out a follow-up examination (control) at a predetermined time. If the treatment is well-done and there are no risk factors that can worsen the condition, tinea corporis can improve in a period of two to four weeks (El-Gohary et al., 2014). The period specified for the re-examination is two weeks after the first examination. After two weeks, the patient's condition will be evaluated whether it remains, improves, or worsens and what action will be taken for the next.

There are two criteria used to determine the improvement of the patient's condition, namely based on clinical examination and laboratory examination. Patients who show melioration will show improvement in clinical examination, such as reduced symptoms and improvement in the shape of the lesion. Further, on laboratory examination, the indicator used was hyphae structure on KOH examination (Goldsmith et al., 2012).

The results showed that almost all patients experienced improvement in the first follow-up examination (84.43%) of which 86.30% of patients received griseofulvin with oral dosage forms as its pharmacological management. If the patient's condition remains or improves, treatment with the previous medication will continue until the patient shows improvement until healed. In patients who

show a worsening condition after being given treatment, the medication given at the first examination will be increased in dose or replaced with other types of drugs according to the conditions that occur in these patients. The difference in the time to improve the condition until the recovery phase in each patient is different. This is influenced by several main factors that are different in each that causes differences in the body's response to drug reactions that can affect the length of the process of improving the condition and healing in each patient. These factors include pharmacokinetics, pharmacodynamics, and individual characteristics (Bryant & Knights, 2014).

The pharmacokinetic process consists of four factors, including administration, bioavailability, cleaning and distribution. The administration is influenced by adherents and route of drug administration. Bioavailability is influenced by drug absorption and the first pathway metabolism. Cleansing is influenced by metabolism and excretion. While distribution is influenced by transport and diffusion (Doogue & Polasek, 2013). Other individual factors include age and gender, genetics, liver and kidney function, body composition, diet, habits, pregnancy, and hypermotility of the digestive tract (Bryant & Knights, 2014).

Pharmacodynamics is the process by which the drug will function as its role in which can provide therapeutic effects as well as side effects. In general, each individual has the same function to carry out this process, except for certain individuals who have different receptor structures and cell components. However, there are still several factors that influence this process, including desensitization, tachyphylaxis, and tolerance (Bryant & Knights, 2014).

There are several individual characteristics that play a role in the length of the process of improving the condition and healing, including compliance, drug interactions, polypharmacy, and placebo effects. Patient compliance in carrying out doctor's advice on the treatment process is very influential on improving the situation. Doctors play a role in providing explanations about drug use instructions, explanations about certain types of foods that should be avoided and doctors also ensure the presence/ absence of other drugs that can affect the effectiveness of the drugs given (Bryant & Knights, 2014).

CONCLUSION

There was a decline in the number of patients infected with tinea corporis in 2015 with counted about 39.34%. There are three important risk factors for tinea corporis, including gender, post-puberty age, and the presence of other skin infections, namely tinea cruris. Tinea corporis has special characteristics on laboratory tests that are used as a benchmark in making a diagnosis. The agent that causes tinea corporis has a hyphae structure that can be observed under a microscope via KOH examination. Pharmacological management which becomes the first line for tinea corporis is griseofulvin tablets under certain conditions, the antifungal drug can be replaced with ketoconazole tablets with close supervision from the doctor

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