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The Incidence and Characteristics of Dermatophytosis in Boarding School Students in Bandar Sei-Kijang, Pelalawan, Riau Province, Indonesia

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ABSTRACT

Background: Indonesia is a tropical country with high humidity and temperatures, making dermatophytosis a persistent health issue. Dermatophytoses are superficial mycoses caused by dermatophytes affecting the skin, hair, and nails. Also known as tinea infections. **Purpose:** To determine the incidence of dermatophytosis and types of dermatophytosis among boarding school students in Sei-Kijang, Pelalawan, Riau Province. It was conducted from August 2023 until October 2023. **Methods:** This research is a simple descriptive study with a cross-sectional design. The aim of the study was to detect dermatophytes in the skin lesions. Dermatophytosis examination was carried out by microscopic examination of skin scrapings with 10-20% potassium hydroxide (KOH) and fungal culture using Sabouraud's dextrose agar and then examined with a light microscope (lactophenol cotton blue staining). **Result:** In this study, there were 339 research subjects with 51% male students and 49% female students with an average age of 14.3 years. This study found that the incidence of dermatophytosis was 4.1%, with male students in the 10 to 14-year-old age group having a higher infection rate (71%) than female students. The incidence of tinea corporis was 64.3%, followed by tinea cruris, tinea pedis, and tinea faciei, depending on the type of dermatophytosis. Tinea capitis and tinea unguium were not found. **Conclusions:** This study demonstrates a high incidence of dermatophytosis, tinea corporis being the predominant type among boarding school students in Bandar Sei-Kijang.

Keywords: boarding school, dermatophytosis, incidence, tinea corporis.

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BACKGROUND

Dermatophytosis is a fungal infection caused by dermatophytes and dermatophytosis is still a health problem around the world. It is estimated that around 20 - 25% of the world's population is infected with dermatophytes.[1–4] The incidence of dermatophytosis in Indonesia also varies greatly and is still a health problem because Indonesia is a developing country with a tropical climate, hot temperatures, and humid air, which are risk factors for the development of dermatophytosis.[5,6]

The clinical features of dermatophytosis vary depending on the location of the lesion, the immune response of the affected individual, and the infecting dermatophyte species.[3,6] The symptoms of dermatophytosis are very similar to other skin diseases, which often leads to misdiagnosis.[1] Generally, the clinical symptom of this dermatophytosis is itching at the location of the affected lesion. People with infections may find it difficult to focus and be productive while they sweat, as complaints of itchiness mainly arise during this time. This fungal infection is very contagious and widespread, and if not treated, it will become chronic, which can also disrupt the aesthetics of the affected skin. Although it is not fatal, this disease can reduce the patient's quality of life.[3,6,7]

In general, dermatophytes are anthropophilic, zoophilic, and geophilic, which often cause infections

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in humans. They are grouped into the 3 genera *Microsporum, Trichophyton, and Epidermophyton.*[8–10] More than 50 species of this dermatophyte fungus have been identified.[10] This dermatophyte fungus is keratinolytic; which means, it can invade the keratin tissue of the skin, hair, and nails. [1,11]

Dermatophytosis also called tinea, can affect anyone, from children to adults. Transmission can occur through direct contact from animals to humans, humans to humans, from soil to humans, or indirectly from objects contaminated with dermatophytes, which can cause severe inflammation or just itching.[3,12] This type of dermatophytosis can be classified based on the location of infection: tinea corporis, tinea cruris, tinea manuum, tinea pedis, tinea faciei, tinea barbae, tinea unguium, and tinea capitis.[1]

This fungal infection is associated with risk factors such as poor personal hygiene, low socio-economic status, lifestyle, crowded housing, such as in a group of people living together like in a dormitory.[13,14] Based on these factors, the researchers were interested in conducting research to determine the incidence and types of dermatophytosis among boarding school students in Bandar Sei-Kijang, Pelalawan, Riau Province.

METHODS

The subjects of the research were male and female students at the boarding school in Bandar Sei-Kijang, Pelalawan of Riau Province. Dermatophytosis laboratory examinations were carried out at the Parasitology and Microbiology Laboratory, Faculty of Medicine, Riau University from August to October 2023. Students who had complaints of itchy skin, nails, and hair underwent a physical examination. Then students who were diagnosed with suspected dermatophytosis had their skin, nails, and hair scraped. Next, a direct examination was carried out using 10% – 20% potassium hydroxide (KOH) microscopically with 10x and 40x magnification and cultured using Sabouraud Dextrose Agar (SDA) media. The media was planted and incubated at a temperature of 27°C – 30°C. Culture results were checked after more than 10 days. It was then examined macroscopically and microscopically using Lactophenol Cotton Blue (LPCB) with 40x magnification.[15] This study passed the ethical review by the ethical review board for medicine and health research Faculty of Medicine of Riau University (No: B/123/UN19.5.1.18 /UEPKK/ 2023).

RESULT

In this research, examinations were carried out on 339 male and female boarding school students in Bandar Sei-Kijang District, Pelalawan. Table 1 shows the characteristics of the students who are the subjects of this research.

Table 1. Characteristics of the subjects (n=339)

Characteristics	Total	Percentage
Gender		
- Male	172	51%
- Female	167	49%
Age groups		
- 10 - 14 years	200	59%
- 15 - 19 years	139	41%

Table 1 reveals that the gender of the research subject are almost equivalent (51% male and 49% female), with the average age of the research subjects being 14.3 years. Following 105 research subjects' complaints of itching, 24 research subjects were suspected of being affected by dermatophytosis. After skin scrapings from the 24 research subjects were examined, it was found that 14 students (4.1%) had dermatophytosis. Table 2 shows the distribution of students who tested positive for dermatophytosis. The incidence of dermatophytosis among boarding school students in Bandar Sei-Kijang was 14 students, or 4.1%. The incident primarily affects junior high school students, with a higher incidence rate among male students than female ones. Table 3 exhibits the type of dermatophytosis found in infected students.

Table 2. Distributions of dermatophytosis based on gender and age groups

Characteristic	Dermatophytosis	
	Positive	Negative
Gender		
- Male	10 (6%)	162 (94%)
- Female	4 (2%)	163 (98%)
Age group		
- 10 - 14 years	9 (5%)	191 (95%)
- 15 - 19 years	5 (4%)	134 (96%)

Table 3. Distributions of the type of dermatophytosis, gender of students, and fungal species

Type of Dermatophytosis	Gender		Fungal Species
	M	F	
- Tinea corporis	7	2	*Microsporum canis* (6) *Tricophyton rubrum* (3)
- Tinea cruris	3	0	*Trichopyton rubrum* (3)
- Tinea pedis	0	1	*Trichopyton rubrum* (1)
- Tinea faciei	0	1	*Microsporum gypseum*(1)

Figure 1 shows the results of the 10% KOH examination and the culture examination with SDA media. The 10% KOH yielded a positive result for hyphae septa and culture growth in the media from all 14 samples.

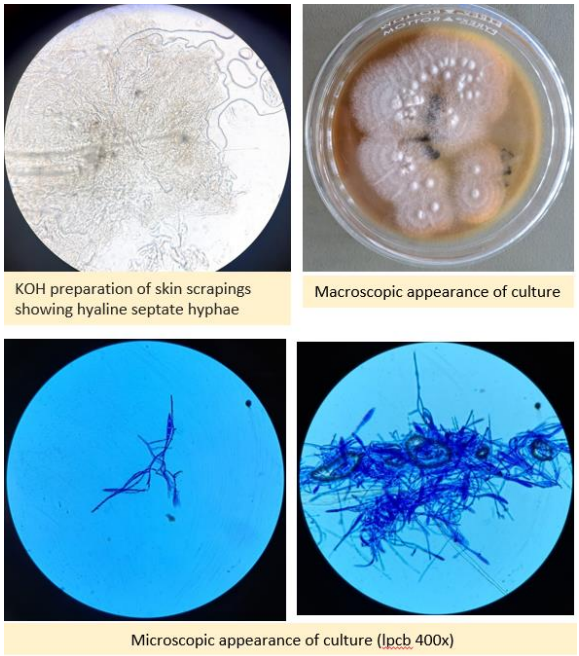

Figure 1. Macroscopic and microscopic examinations.

The culture identified two genera (*Microsporum spp*. an d *Trichophyton spp*.) and three species (*Microsporum canis*, *Trichophyton rubrum*, and *Microsporum gypseum*). In this study, there were no complaints suspected of tinea capitis (dermatophytosis of the scalp) and tinea unguium (dermatophytosis of the nails).

DISCUSSION

In this study, there were 339 students as subjects, of whom 51% were male. According WHO,[16] the frequency of the 10 - 14 years age group (59%) was higher than the 15 – 19 years age group (41%). The research study's minimum and maximum ages were 12 and 18, respectively, with an average age of 14.3 with a median of 14. In this school the number of junior high school students is greater than high school students. The study found that 14 people or 4.1% of students, were positive for dermatophytosis. In a study in Brazil reported in 2013, 13% of patients were positive for dermatophytosis.[17] Research in Jatinangor, West Java, reported that in 2016, cases of dermatophytosis in elementary school children were 0.5%.[18] The incidence of dermatophytosis varies according to the research subject and location. A group of people living together, such as in a dormitory, has a higher risk of dermatophytosis.[12]

Based on gender, male students (71%) are more likely than female students to be infected with dermatophytosis. This is consistent with studies from Iran in 2019 that revealed that 66% of male students had the disease.[10] Ethiopian research published in 2021 also revealed that boys were more likely than girls to be affected.[7] But these results are different from those obtained from research in Brazil which found that 61% of research participants who tested positive for dermatophytosis were female.[16] Observations of the student dormitory environment found that male dormitories were less clean than female dormitories. The living environment and personal hygiene play major roles in dermatophyte infection. Humans, soil, and animals can all harbour the dermatophytes that cause dermatophytosis.[9,19]

Based on the type of dermatophytosis found this study, the most common was tinea corporis (64.3%). Tinea corporis, also known as ringworm, is a superficial fungal infection caused by dermatophytes on the skin other than the hands, feet, scalp, nails, beard area, groin, and face.[12] Tinea corporis is the most common type of dermatophytosis; although it can occur throughout the world, it is most often found in tropical areas. Adolescents and young adults are the age groups most susceptible to dermatophytes infection.[12,14] The risk factor for tinea corporis in students may be due to the habit of bathing only once a day and wearing the same clothes the next day, which is the habit of students who live in dormitories. High temperatures and humidity also increase the risk of dermatophytosis.[20,21]

This study discovered that tinea cruris was most common in male students. The incidence of tinea cruris is lower than that of tinea corporis; usually the incidence of tinea cruris increases with age. Not changing underwear once a day can increase the risk of dermatophyte infection.[1,22] This study found that tinea pedis and tinea faciei affected one student each, and both were female students. The prevalence of tinea pedis and tinea faciei in children is usually lower than that of tinea corporis and tinea cruris.[12,23]

Transmission of dermatophytosis can occur from infected people, from animals that carry the fungus and from the soil, either directly or indirectly through objects such as clothes, hats, towels and other personal items.[3,11] The research is situated at the edge of town at the boarding school. There are many pets around the school such as cats, and there is a large yard for playing and a forest behind the school. This study discovered the genera *Microsporum sp.* and *Trichophyton sp.* as well as three species of *Microsporum canis*, *Trichophyton rubrum*, and *Microsporum gypseum*, suggesting that animals and soil may be the sources of transmission.

Microsporum canis, which is zoophilic,[24] is the cause of tinea corporis with pets, such as cats, potentially serving as source of transmission. In this study, the antrophilic *Trycophyton rubrum* caused tinea corporis, tinea cruris, and tinea pedis, while the geophilic *Microsporum gypseum* caused tinea faciei. Hot temperatures are a risk for developing dermatophytosis. In 2023, temperatures in Pelalawan district ranged from 26.2 to 34.2°C.[25]

This study found no dermatophytosis types of tinea capitis, tinea manuum, and tinea unguium. In several developing countries, such as Nigeria, the most common dermatophytosis in children is tinea capitis,[26] and in several countries in Africa, the incidence of tinea capitis in children is high.[27] Given that many cases of scabies were discovered during skin examination, the incidence of dermatophyte fungal infections in this study was not high; however, it is still important to treat this condition to prevent it from worsening and becoming chronic.

In this study, it can be concluded that the incidence of dermatophytosis among boarding school students in Bandar Sei-Kijang was 4.1%. Male students are more inclined than female students to suffer from dermatophytosis, especially in the 10 to 14 years age group.

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