

THE IDENTIFICATION OF FUNGI CAUSES TINEA PEDIS ON RICE FARMERS IN JATIMULYA VILLAGE, BOALEMO REGENCY, GORONTALO

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ABSTRACT

Tinea Pedis is a dermatomycosis of the feet that often occurs between the fingers and soles of the feet. Generally, tinea pedis occurs in people who are often in humid places such as rice farmers. This study aims to identify the fungus that causes Tinea Pedis in rice farmers in Jatimulya Village, Boalemo Regency, Gorontalo Province.

This research method is qualitative research and the data is analyzed descriptively. The sampling technique used purposive sampling method with a total sample of 8 people. Samples of skin scrapings near the lesion were taken aseptically and then cultured on Sabouraud Dextrose Agar media at room temperature for 12 days. Observations were made macroscopically and microscopically.

The results showed that from skin scraping samples from Tinea pedis patients, 62.5% of dermatophytes were identified, namely the genus Trichophyton. In addition, non-dermatophyte fungi were also found, namely the genus Aspergillus and Metarhizium.

Keyword: Identification, Tinea Pedis, Farmer, Fungi

INTRODUCTION

Dermatophytosis is a disease caused by dermatophyte fungal colonization that attacks keratin-containing tissues such as hair, nails and the stratum corneum of the skin in humans [1]. Dermatophytosis is spread throughout the world with different prevalence in each country and Indonesia ranks second. Indonesia's hot and humid climate is an ideal environment for various tropical microorganisms including fungi. There are three genera of fungi that cause dermatophytosis, namely Epidermophyton, Microsporum, and Trichophyton [2].

The prevalence of skin disease in Gorontalo Province is 3,442 people (2.41%) and the highest ranking is in

Gorontalo Regency and the lowest ranking is in Pohuwato Regency [3]. Meanwhile, in Boalemo Regency, the prevalence of skin disease is still in the top ten most diseases at the puskesmas. Based on data obtained at the Wonosari Health Center, 28 people were diagnosed with skin diseases in 2020, while in 2021 there was an increase of 36 people. The results of the initial observation of the study found 8 people affected by Tinea Pedis.

Tinea pedis or athlete's foot or jungle rot is a dermatomycosis of the feet. Tinea pedis most often occurs between the toes and the soles of the feet. Symptoms and signs of tinea pedis is a scaly rash that causes itching, stinging and burning. This disease is caused by dermatophyte fungi [4].

This is supported by the results of Firmansyah's research (2016), that from 38 farmers whose skin scraping specimens were taken, 55.26% of skin scrapings were infected with dermatophyte fungi [5]. The dermatophyte species found in the colony were *Trichophyton rubrum* (69.23%), *Trichophyton mentagrophytes* (30.77%). The clinical diagnosis of dermatophyte infection can be confirmed by microscopic and macroscopic examination through culture on Sabouraud Dextrose Agar media [5]. Identification of the fungus that causes tinea pedis needs to be done to determine the fungal species so that it can provide treatment recommendations.

METHOD

1. Location and time of research

This research was conducted in Jatimulya Village, Wonosari District, Boalemo Regency, Gorontalo Province. Furthermore, the examination was carried out at the microbiology laboratory of the University of Bina Mandiri, Gorontalo. Research time for 3 months from sampling to preparation of the final report.

2. Tools and Materials

The tools used in this research are Autoclave, Bunsen, Petri dish, Erlenmeyer, glassware, Incubator, Laminar Air Flow Cabinet (LAFB), Microscope, Analytical Balance, Oven, Ose, plastic bag, sterile handskun and camera. while the materials used were skin scraping samples from tinea pedis patients, Sabouraud Dextrose Agar (SDA), distilled water, 70% alcohol, NaCl sterile 0.9%, and spirits

3. Research Procedure

a. Sampling Technique

The skin scraped at the edge of the active lesion and covered with scales. The skin is slowly scraped using a scalpel, then the skin scrapings are accommodated in a petri dish, and taken to the

laboratory for further examination.

b. Fungus Isolation

The skin scraping sample was diluted with Physiological NaCl then taken as much as 1 ml and leveled on the surface of the SDA media, then incubated at room temperature for 12 days. After the incubation period, the culture was examined macroscopically and microscopically [6].

c. Pure Isolate

The fungi that had grown on the SDA isolation medium were gradually purified one by one. Morphological observations were carried out again after incubation for 7 days.

d. Identification of Fungi

Identification was carried out macroscopically by observing the characteristics of the colony and microscopically by observing the fungal structure consisting of hyphae and spores. The characteristics obtained were then identified through identification books and mycology atlases.

RESULTS

Based on the results of research conducted at the Microbiology laboratory of Bina Mandiri University, Gorontalo, from 8 samples of skin scrapings from tinea pedis patients, 5 types of fungi were obtained. The results of the identification of the fungus that causes tinea pedis are as follows:

1. Isolate fungi 1

Based on the results of the identification of fungal isolates 1 macroscopically and microscopically, macroscopic characteristics were obtained; Colonies are white, the basic color on the

medium is white, the reverse color is yellowish white and the nature of the cotton colonies is fine. while microscopically, it looks like septate hyphae, transparent conidiophores, branched and smooth walls, transparent conidia and oval in shape with smooth walls. (Figure 1)



(a) (b) (c)

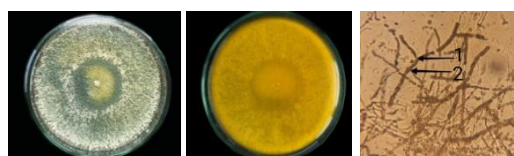
Figure 1 (a) fungal isolate top view; (b) fungal isolates below view; (c) microscopic structure of fungal isolates at 400 X magnification (1, hyphae, 2 conidiophores, 3 conidia)

From the characteristics of the macroscopic and microscopic examination, fungal isolates 1 can be classified as follows:

Kingdom : Fungi
 Division : Ascomycota
 Class : Eurotiomycetes
 Order : Onygelanes
 Family : Arthrodermataceae
 Genus : Trichophyton
 Species : *Trichophyton rubrum*

2. Isolate fungi 2

The pure isolates obtained were identified macroscopically and microscopically. From macroscopic observations of fungal isolates 2, the following characteristics were obtained; the color of the colony is green, the basic color on the medium is green, the reverse color is yellowish green and the nature of the colony is coarse powder. while myctoscopically, the conidiophores are transparent, branched and smooth-walled. (Figure 2)



(a) (b) (c)

Figure 2. (a) fungal isolate top view; (b) fungal isolates below view; (c) microscopic structure of the fungus at 400x magnification. (1 Conidiophores, 2 Conidia)

Based the characteristics of the macroscopic and microscopic examination, fungal isolates 1 can be classified as follows:

Kingdom : Fungi
 Division : Eumycota
 Class : Deuteromycetes
 Order : Moniliales
 Family : Moniliaceae
 Genus : *Metarhizium*
 Species : *Metarhizium anisopliae*

3. Isolate fungi 3

Based on the results of the identification of fungal isolates 2 macroscopically and microscopically, macroscopic characteristics were obtained; The colony is yellow, the basic color is yellow on the medium, the reverse color is yellow and the colony is rough. while microscopically, the hyphae were non-septate, conidiophores were transparent, unbranched and smooth walls, round brown vesicles, conidia were transparent and round in shape with rough walls (figure 3).



(a) (b) (c)

Figure 3 (a) fungal isolate top view; (b) fungal isolates below view; (c) Microscopic structure of fungal isolate at

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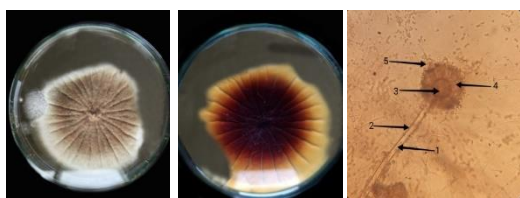
400 X magnification (1 hyphae, 2 conidiophores, 3 vesicles, 4 phialides, 5 conidia)

From the characteristics of the macroscopic and microscopic examination, fungal isolates 3 can be classified as follows:

Kingdom : Fungi
 Division : Amastigomycota
 Class : Eurotiomycetes
 Order : Eurotiales
 Family : Trichomaceae
 Genus : Aspergillus
 Species : *Aspergillus flavus*

4. Isolate Fungi 4

Based on the results of the identification of fungal isolates 4 macroscopically and microscopically, macroscopic characteristics were obtained; Colonies are grayish brown, the basic color on the medium is grayish brown, the reverse color is reddish brown and the nature of the colonies is fine powder. while microscopically, hyphae were not septate, conidiophores were transparent, unbranched and smooth walls, round brown vesicles, conidia were transparent and round in shape with rough walls. (figure 4)



(a) (b) (c)

Figure 4 (a) fungal isolate 5 top view; (b) fungal isolate 5 bottom view; (c) Microscopic observation of fungal isolate 4 at 400 X magnification. Arrow 1 shows hyphae, 2 conidiophores, 3 vesicles, 4 Fiallida, 5 conidia.

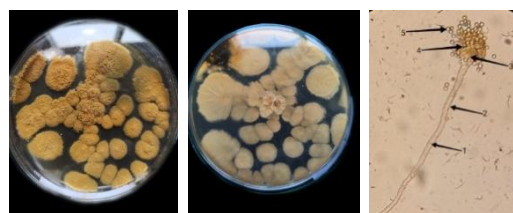
From the characteristics of the macroscopic and microscopic

examination, fungal isolates 4 can be classified as follows:

Kingdom : Fungi
 Division : Amastigomycota
 Class : Eurotiomycetes
 Order : Eurotiales
 Family : Trichomaceae
 Genus : Aspergillus
 Species : *Aspergillus niger*

5. Isolate Fungi 5

Based on the results of the identification of fungal isolates 5 macroscopically and microscopically, macroscopic characteristics were obtained; The colony is brownish yellow, the basic color is brownish yellow on the medium, the reverse color is yellow-brown and the colony is finely powdered. Meanwhile, microscopically, hyphae were not septate, conidiophores were transparent, unbranched and smooth walls, round brown vesicles, conidia were transparent and round in shape with rough walls. (figure 5)



(a) (b) (c)

Figure 5. (a) fungal isolate top view; (b) fungal isolate 7 bottom view; (c) Microscopic structure of fungal isolate 5 at 400 X magnification (1 hyphae, 2 conidiophores, 3 vesicles, 4 phialides, 5 conidia.

From the characteristics of the macroscopic and microscopic examination, fungal isolates 5 can be classified as follows:

Kingdom : Fungi
 Division : Amastigomycota

Class : Eurotiomycetes
Order : Eurotiales
Family : Trichomaceae
Genus : Aspergillus
Species : *Aspergillus fumigatus*

DISCUSSION

Tinea pedis is a skin disease caused by a group of dermatophyte fungi. Dermatophytes use creatinine as a source of nutrition and also colonize the dead skin layer. This fungus also triggers the destruction of living cells by activating the immune system. Although the fungi involved in cutaneous and subcutaneous infections live in the soil, the disease they cause is not the same as other superficial fungal infections because the infection requires lesions in the deeper layers of the skin [7].

Based on the results of the study that identified dermatophyte fungi, namely the genus *Trichophyton*, 62.5% of the farmers' feet were identified. One of the fungi that infects is *Trichophyton rubrum*. This fungus attacks the soles of the feet and between the fingers. Dermatophyte fungi have enzymes such as keratinolytic proteases, lipases and others that act as virulence factors for invasion of skin, hair, nails, and also utilize keratin as a source of nutrients for survival. An important phase in dermatophyte infection is the binding of dermatophytes to keratinized tissue followed by invasion and growth of mycelial elements. The release of proinflammatory mediators as a consequence of keratin degradation makes the host body respond with the onset of inflammatory symptoms [8].

The mode of transmission of fungi can be direct and indirect. Direct transmission can be through fomites, epithelium, and hairs containing fungi, either from humans or from animals.

Indirect transmission can be through plants, wood that is infested with fungi, goods or clothing, dust, or water [7].

The growth of this fungus is increasing due to the condition of the soles of the feet and between the fingers being moist due to a dirty environment and not always cleaning the feet after working in the fields. This is in line with research conducted by Hartati, 2017 that found as many as (40%) types of fungus *Trichophyton rubrum* on farmers' feet [9]. Another study by Anis (2015) found that 58% of the *Trichophyton rubrum* fungus was found on the skin of the feet of patients with tinea pedis [10].

In addition to dermatophyte fungi, the samples also contained non-dermatophyte fungi, namely *Aspergillus niger*, *Aspergillus flavus* and *Aspergillus fumigatus* which are opportunistic pathogenic microfungi, namely non-pathogenic organisms that can cause infection in hosts with debility or hosts with predisposition [11]. Opportunistic fungi attack people with other infectious diseases, whose immune systems are no longer functioning normally. In this case, the opportunistic fungus found in the patient was caused by a decreased immune system.

Besides *Aspergillus*, another non-dermatophyte fungus was also found, namely *Metarhizium anisopliae*. *Metarhizium anisopliae* is one of the endopathogenic fungi that grows in soil and has the potential for pest control, which can reduce pest populations in an agricultural area than other organisms [12].

The possibility of finding the fungus *Metarhizium anisopliae* on the farmer's feet was due to contamination by soil fungi. because at the time of sampling, respondents were planting rice, and after that they did not wash their feet properly and properly. Besides that, the farmers also did not use footwear when working.

CONCLUSION

Based on the results of macroscopic and microscopic examination of skin scraping samples from farmers' feet in the rice fields of Jatimulya village, a dermatophyte fungus, namely *Trichophyton rubrum* was found. In addition, non-dermatophyte fungi, namely *Aspergillus* sp. and *Metarhizium anisopliaea* were also found.

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