

THE IDENTIFICATION OF FUNGUS AMONG MEAT SELLERS' TOES WITH *TINEA PEDIS* AT TERMINAL 42 TRADITIONAL MARKET GORONTALO CITY

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ABSTRACT

This study aims to identify the presence of fungus among meat sellers' toes with *Tinea pedis* at Terminal 42 traditional market, Gorontalo City.

The type of research used in this research is descriptive observational with a qualitative approach. The sample in this study is a total of meat sellers who work in the Terminal 42 Market of Gorontalo City, which are 15 samples. The sampling technique used is the total sampling technique. As well as using interview data collection techniques and examination of fungal culture. Data analyzed a sort of descriptive set is describing the morphology fungi dermatofita based on observations of macroscopic and microscopic and continued with both the identification of identifying with matching characteristic of fungi obtained from our observation with reference to the identification.

The results show that based on macroscopic and microscopic examination of the toes of a butcher with *Tinea pedis* at Terminal 42 traditional market, Gorontalo City. *Trichophyton rubrum* was found, which is a dermatophyte group. Moreover, *Aspergillus* sp, *Rhizopus* sp, *Candida albicans*, and *Metarhizium anisopliae* species were also found, namely non-dermatophyte fungi.

Keywords: Mushrooms, The toes, Meat Seller, *Tinea Pedis*

INTRODUCTION

Natural conditions in Indonesia which have hot temperatures and humidity generally have very good transport limits for the growth and development of microorganisms, both beneficial and unfavorable. One of the destroying microorganisms is fungus, these organisms will fill well in wet conditions. Organisms will fill certain body parts in humans and will cause diseases that cause contamination of the skin, for example water fleas (*tinea pedis*), this disease is caused by dermatophytes [12].

Dermatophytes are a collection of organisms that can process keratin, such as the skin corneum layer (epidermis), hair, nails and cause dermatophytosis [10].

In the United States the incidence of dermatophytosis increased by 10-20%, this is based on data from visits to the Arizona Regional Medical Center Hospital division of the Fungal Poly Division. Skin. The prevalence of dermatophytosis in Asia reaches 35.6 percent. Based on information from the Indonesian Health Service (Depkes RI), the prevalence of skin diseases in Indonesia in 2012 was 8.46%, then increased in 2013 by 9%. Skin disease actually has a high prevalence [2].

Reports on morbidity data at the Gorontalo City Health Service Health Center level until 2020 the prevalence of skin diseases caused by fungal infections reached 4.76% or as many as 476 cases [4].

The Identification of Fungus Among Meat Sellers' Toes with Tinea Pedis at Terminal 42 Traditional Market Gorontalo City

One of the markets in Gorontalo City is the Terminal 42 market (Wednesday-Saturday). Terminal 42 market (Wednesday-Saturday) has 15 meat sellers occupying several stalls. Based on observations made by the place selling meat at each table and in the surrounding environment, it is dirty and not kept clean.

RESEARCH METHODS

The type of research used in this research is descriptive observational, the sampling technique used is the total sampling technique. The number of samples used as many as 15 samples. Interview data collection techniques and fungal culture examination. The data obtained were analyzed descriptively, namely describing the morphological characteristics of dermatophyte fungi based on macroscopic and microscopic observations, then continued with identification activities for identifying activities by matching the characteristics of fungi obtained from observations by referring to identification books.

RESEARCH RESULT

Based on the results of the examination, 7 types of fungal isolates were identified from the skin scrapings of the butcher's feet. For more details, the identification results of the seven types of fungi can be explained as follows.

1. Mushroom Isolation 1

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 1 obtained the characteristics as shown in Table 1

Table 1. The results of macroscopic observations of Fungus Isolate 1

No	Observed Features	Observation result
1	Colony Color	Creamy White
2	Base color on medium	Creamy white

3	Reverse Color	Slightly reddish
4	Colony Nature	Soft cotton

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolates 1 obtained the characteristics as shown in Table 2

Table 2. The results of microscopic observations of Fungus Isolate 1

No	Observed features	Observation result
1	hyphae: a. Sneaky/no b. Color	parted Hialin
2	Conidiophores: a. Color b. Branched/not c. Smooth/no walls	Transparent branch Fine
3	Conidia: a. Color b. Form c. Wall	Transparent Round, Oval Smooth sticks to hyphae

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on the isolation media can be seen in Figure 1

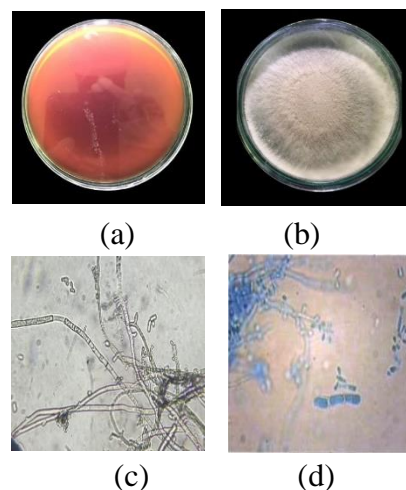


Figure 1. (a) Fungal isolate 1 top view (b) Fungal isolate 1 bottom view (c) Microscopic observation of fungal isolate 1 at 400 x magnification (d) Comparative image [17].

Based on the characteristics obtained from macroscopic and microscopic observations (Figure 1), the fungal isolate 1 had the characteristics of having creamy white colonies with a slightly reddish color on the opposite side, which was fine cotton. It has transparent (hyaline) septate hyphae, smooth-walled and colorless branched conidiophores (transparent) and there are round and oval conidia attached to the conidiophores.

Based on these characteristics, fungal isolates 1 can be classified as follows:

- Kingdom : Fungi
- phylum : Ascomycota
- Class : Eurotiomycetes
- Order : Onygelanes
- Family : Arthrodermataceae
- Genus : Trichophyton
- Species : Trichophyton rubrum [7].

2. Mushroom Isolate 2

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 2 obtained the characteristics as shown in Table 3

Table 3. The results of macroscopic observations of Fungal Isolate 2

No	Observed Features	Observation result
1	Colony Color	Yellowish White
2	Base color on medium	Yellowish White
3	Reverse Color	Yellowish White
4	Colony Nature	Soft Cotton

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolate 2, the characteristics as shown in Table 4

Table 4. The results of microscopic observations of Fungus Isolate 2

No	Observed features	Observation result
1	hyphae: a. Sneaky/no	No disagreement

2	Conidiophores: a. Color b. Branched/not c. Smooth/no walls	Transparent No branch Fine
3	Vesicles: a. Form b. Is there any or not c. color	Round There is Chocolate
4	Fialide : a. Growing on b. Color c. Form	Metulla Chocolate Round
5	Conidia: a. Color b. Form c. Wall	Transparent Round Rough

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on isolation media can be seen in Figure 2

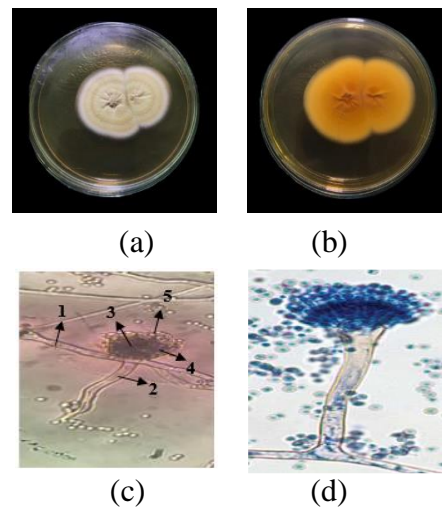


Figure 2. (a) Fungal isolate 2, top view (b) Fungus 2 isolate, bottom view (c) Microscopic observation of fungal isolate 2 at 400 x magnification (1. Hyphae, 2. Conidiophores, 3. Vesicles, 4. Fialides, 5. Conidia) (d) Comparison drawing [5].

Based on the characteristics obtained from macroscopic and microscopic

The Identification of Fungus Among Meat Sellers' Toes with Tinea Pedis at Terminal 42 Traditional Market Gorontalo City

observations (Figure 2), the fungal isolate 2 had the characteristics of white colonies with a mixture of yellow on the inside, yellowish-white reverse color with smooth colonies. Hyphae do not septate. Conidiophores are colorless (hyaline), smooth and unbranched. Fialides grow on the metula in a round shape with a brownish color. The presence of brownish spherical vesicles with transparent conidia are roughly round in shape.

Based on these characteristics, fungal isolates 2 are included in the *Aspergillus* sp species, which can be classified as follows:

- Kingdom : Fungi
- phylum : Ascomycota
- Subphylum : Pezizomykotina
- Class : Eurotiomycetes
- Order : Eurotiales
- Family : Trichocomaceae
- Genus : *Aspergillus*
- Species : *Aspergillus* sp [9].

3. mushroom isolate 3

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 3, the characteristics shown in Table below:

Table 5. The results of macroscopic observations of Fungus Isolate 3

No	Observed Features	Observation result
1	Colony Color	Green, yellowish white
2	Base color on medium	Green, yellowish white
3	Reverse Color	Yellowish white
4	Colony Nature	Coarse powder

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolates 3 obtained the characteristics as shown in Table 6

Table 6. The results of microscopic observations of Fungus Isolate 3

No	Observed features	Observation result
1	Conidiophores:	

a. Color	Transparent
b. Branched/not branch	branch
c. Smooth/no walls	Fine
2 Conidia:	
a. Color	Transparent
b. Form	Oval
c. Wall	Fine

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on the isolation media can be seen in Figure 3 below:

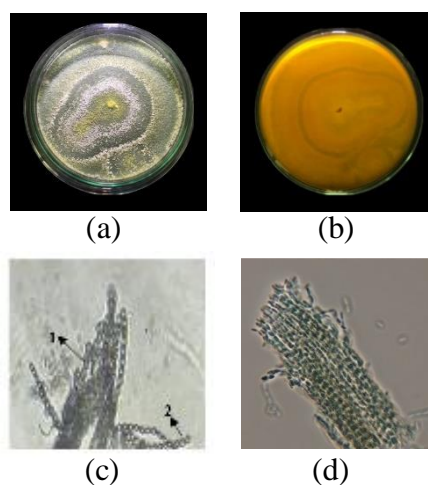


Figure 3. (a) Fungal isolate 3, top view (b) Fungus 3 isolate, bottom view (c) Microscopic observation of Fungus 3 isolate at 400 x magnification (1. Conidiophores, 2. Conidia) (d) Comparative image [18].

Based on the characteristics obtained on macroscopic and microscopic observations (Figure 3), the fungal isolate 3 had the characteristics of having green colonies with a mixture of yellowish-white colors, the reverse color was yellowish white with colonies that resembled a rather coarse powder. Conidiophores grow upright, spores are cylindrical or oval, single-celled, conidia are oval. Some of these branches enlarge upward to form conidiophores that are short, branched, close together, and wrapped around each other.

Based on these characteristics, fungal isolates 3 can be classified as follows:

Kingdom : Fungi
Division : Eumycota
Class : Deuteromycetes
Order : Moniliales
Family : Moniliaceae
Genus : Metarhizium
Species : Metarhizium anisopliae [8].

4. Mushroom Isolation 4

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 4, the characteristics shown in Table 7

Table 7. The results of macroscopic observations of Mushroom Isolate 4

No	Observed Features	Observation result
1	Colony Color	Black
2	Base color on medium	Black
3	Reverse Color	Yellowish white
4	Colony Nature	Fine

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolates 4, the characteristics as shown in Table 8

Table 8. The results of microscopic observations of Fungal Isolate 4

No	Characteristics that observed	Observation result
1	hyphae: a. Sneaky/no	No disagreement
2	Conidiophores: a. Color b. Branched/not c. Smooth/no walls	Hialin No branch Fine
3	Vesicles: a. Form b. Is there any or not c. color	Round There is Chocolate
4	Conidia: a. Color b. Form c. Wall	Dark chocolate Round Rough

5	Fialide:	
	a. It grows on	Metulla
	b. Color	Chocolate
	c. Form	Round

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on isolation media can be seen in Figure 4

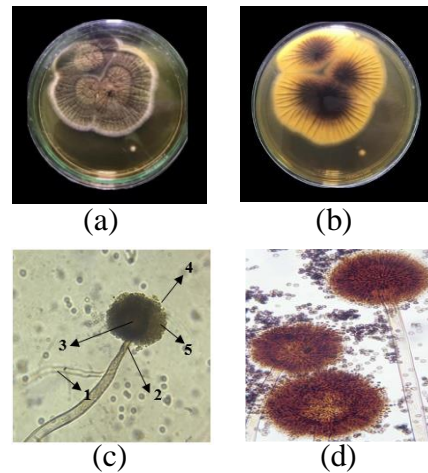


Figure 4. (a) Fungal isolate 4, top view (b) Fungal isolate 4, bottom view (c) Microscopic observation of fungal isolate 4 at 400 x magnification (1. Hyphae, 2. Conidiophores, 3. Vesicles, 4. Fialides, 5. Conidia) (d) Comparison drawing [5].

Based on the characteristics obtained from macroscopic and microscopic observations (Figure 4), the fungal isolate code 4 has characteristics, namely black colonies with white colonies, yellowish white reverse color with smooth colonies. Hyphae do not septate. Conidiophores are colorless (hyaline), smooth and unbranched. The presence of brownish round vesicles with dark brown conidia, rough round shape.

Based on these characteristics, fungal isolates 4 can be classified as follows:

Kingdom : Fungi
phylum : Ascomycota
Subphylum: Pezizomykotina
Class : Eurotiomycetes

The Identification of Fungus Among Meat Sellers' Toes with Tinea Pedis at Terminal 42 Traditional Market Gorontalo City

Order : Eurotiales
 Family : Trichocomaceae
 Genus : Aspergillus
 Species : Aspergillus niger [9].

5. Mushroom isolate 5

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 5, the characteristics shown in Table 9

Table 9. The results of macroscopic observations of Fungal Isolate 5

No	Observed Features	Observation result
1	Colony Color	Yellowish White
2	Base color on medium	Yellowish White
3	Reverse Color	Yellow
4	Colony Form	Round

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolates 5, the characteristics as shown in Table 10

Table 10. The results of microscopic observations of Fungal Isolate 5

No	Observed features	Observation result
1	Blastospores: a. Form: b. Color:	Round, Oval Transparent

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on isolation media can be seen in Figure 5

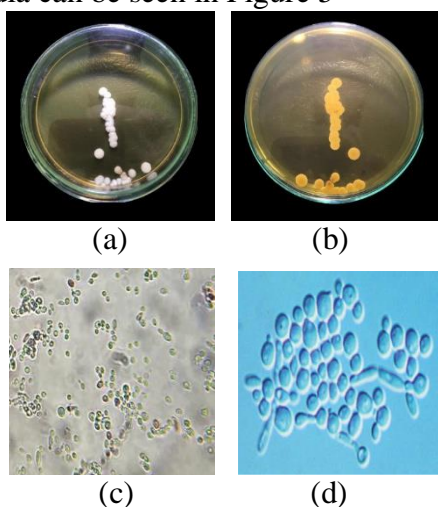


Figure 5. (a) Fungal isolate 5, top view (b) Fungus 5 isolate, bottom view (c) Microscopic observation of fungal 5 at a magnification of 400 x (1. Blastospores) (d) Comparative image [5].

Based on the characteristics obtained from macroscopic and microscopic observations (Figure 5), the fungal isolate 5 had characteristics, namely, round, oval, oval-shaped. Blastospores are round or oval in shape. Colony surface smooth, smooth, slightly convex, slightly wet, shiny round shape, and yellowish white with a yellow color on the reverse.

Based on these characteristics, fungal isolates 5 can be classified as follows:

Kingdom : Fungi
 Phylum : Ascomycota
 Subphylum : Saccharomycotina
 Class : Saccharomycetes
 Order : Saccharomycetales
 Family : Saccharomycetaceae
 Genus : Candida
 Species : Candida albicans [5].

6. Mushroom isolate 6

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 6 obtained the characteristics as shown in Table 11

Table 11. The results of macroscopic observations of Fungal Isolate 6

No	Observed Features	Observation result
1	Colony Color	Bright Brownish Green
2	Base color on medium	Bright Brownish Green
3	Reverse Color	Yellowish White
4	Colony Nature	Soft cotton

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolates 6, the characteristics as shown in Table 12

Table 12. The results of microscopic observations of Fungal Isolate 6

No	Characteristic features observed	Observation result
1	hyphae: a. Sneaky/no	No disagreement
2	Conidiophores: a. Color b. Branched/not c. Smooth/no walls	Hialin No forked Fine
3	Vesicles: a. Form b. Is there any or not c. color	Round There is Chocolate
4	Conidia: a. Color b. Form c. Wall	Dark chocolate Round Rough

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on the isolation media can be seen in Figure 6

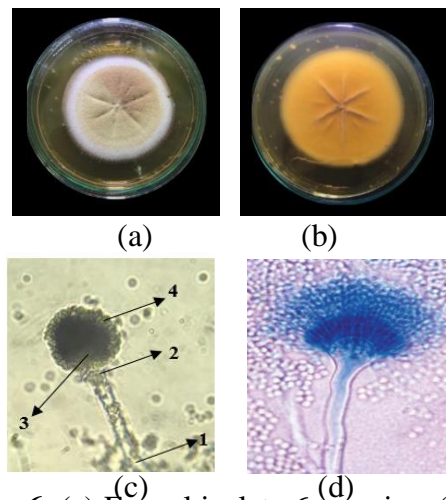


Figure 6. (a) Fungal isolate 6 top view (b) Fungus 6 isolate bottom view (c) Microscopic observation of fungal 6 isolate at 400 x magnification (1. Hyphae, 2. Conidiophores, 3. Vesicles, 4. Conidia) (d) Figure comparison[5].

Based on the characteristics obtained on macroscopic and microscopic observations (Figure 6), the code 6 fungus has the characteristics of bright green, slightly brownish colonies, yellowish white reverse color with smooth colonies. Hyphae do not septate. Conidiophores are colorless (hyaline), smooth and unbranched. The presence of brownish round vesicles with dark brown conidia, rough round shape.

Based on these characteristics, fungal isolates 6 can be classified as follows:

Kingdom : Fungi
phylum : Ascomycota
Subphylum : Pezizomykotina
Class : Eurotiomycetes
Order : Eurotiales
Family : Trichocomaceae
Genus : Aspergillus
Species : Aspergillus terreus [9].

7. Mushroom isolate 7

Pure isolates obtained, identified and observed macroscopically and microscopically. From macroscopic observations of fungal isolates 7 obtained the characteristics as shown in Table 13

Table 13. The results of macroscopic observations of Fungal Isolate 7

No	Observed Features	Observation result
1	Colony Color	White gray
2	Base color on medium	White gray
3	Reverse Color	Brownish white
4	Colony Nature	Cotton

Source: Primary Data, 2021

Based on microscopic observations made on fungal isolates 7 obtained the characteristics as shown in Table 14

Table 14. The results of microscopic observations of Fungal Isolate 7

No	Observed features	Observation result
1	hyphae: a. Sneaky/no	No Parting

The Identification of Fungus Among Meat Sellers' Toes with Tinea Pedis at Terminal 42 Traditional Market Gorontalo City

2	Stolon:	
	a. Color	Chocolate
	b. Smooth/no walls	Fine
3	Rhizoid:	
	a. Form	branch
	b. color	Chocolate
4	Sporangiphores:	
	a. Color	Chocolate
5	Sporangia:	
	a. Color	Dark
	b. Form	chocolate
	c. Wall	Round Fine

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on the isolation media can be seen in Figure 7

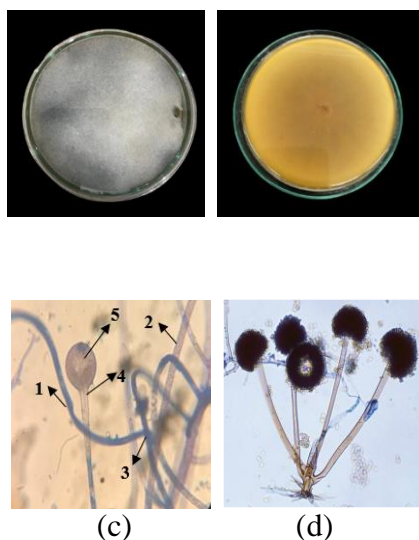


Figure 7. (a) Fungal isolate 7, top view (b) Fungus 7 isolate, bottom view (c) Microscopic observation of fungal 7 isolate at 400 x magnification (1. Hyphae, 2. Stolon, 3. Rhizoid, 4. Sporangiphores, 5. Sporangium (d) Comparison image [5].

Based on the characteristics obtained on macroscopic and microscopic observations (Figure 7), the fungal isolate 7 had the characteristics of having white to gray colonies and the opposite color to be brownish white, the nature of the

colonies was in the form of cotton. Has hyphae that form rhizoids to attach to the substrate, has coenocytic hyphae that are not septate or insulated, stolons spread over the substrate, sporangiophores grow upward and contain many spores and large dark brown sporangium with smooth walls.

Based on these characteristics, fungal isolates 7 are included in the *Rhizopus* sp species, which can be classified as follows:

Kingdom : Fungi
 Division : Zygomycota
 Class : Mucromycotina
 Order : Mucorales
 Family : Mucoraceae
 Genus : *Rhizopus*
 Species : *Rhizopus* sp [8].

DISCUSSION

Based on the results of the examination of skin scrapings from meat sellers at the Terminal 42 market (Wednesday-Saturday) of Gorontalo City, which was carried out using the culture or culturing method on Saboraud Dextrose Agar (SDA) media, it was found that there were dermatophyte fungi, namely *Trichophyton rubrum* and non-dermatophytes, namely *Aspergillus* sp., *Rhizopus* sp, *Candida albicans* and species *Metarhizium anisopliaea*.

Of the 15 samples of foot skin scrapings examined macroscopically and microscopically at the meat seller at the Terminal 42 market, Gorontalo City, there was only 1 type of dermatophyte fungus, namely *Trichophyton rubrum*, but this type of fungus *Trichophyton rubrum* after being identified was found in 8 samples of leg skin scrapings of butchers in Terminal 42 market in Gorontalo city. Dermatophyte fungi are a group of fungi that attack parts of the body that contain keratin such as skin, hair and nails. The fungus *Trichophyton rubrum* is also the

most common cause of dermatophytes [10].

The growth factor of *Trichophyton rubrum* fungus is influenced by undisciplined use of personal protective equipment at work such as the use of shoes, from 15 respondents who were interviewed, 12 respondents often did not use shoes, only used sandals and 3 of them only occasionally used shoes.

This is in line with research conducted by Sinaga in 2020 which found 71% of the fungus *Trichophyton rubrum* in fish sellers in the market. Khusnul et al's research in 2018 Identification of Fungus on Between the toes of janitors in Tasikmalaya showed that as many as 8 janitors were infected with Dermatophyte fungi, consisting of *Trichophyton rubrum* as much as 15%.

In addition to dermatophyte fungi, the samples also contained non-dermatophyte fungi, *Aspergillus* sp, namely *Aspergillus niger* and *Aspergillus terreus*, where *Aspergillus* sp. is a contaminant fungus that lives freely and is everywhere [14]. The fungus *Aspergillus* sp can contaminate in unfavorable environmental conditions such as a humid environment and the spread of this fungus is through the air. *Aspergillus* sp is dangerous because it can cause infections in the human body such as allergies and also cause infections in the human lungs [15]. The possibility of this fungus can grow because at the time of inoculation of the sample or at the time of planting the sample on the spore media contained in the air attached to the sample of Sabouraud Dextrose Agar media. So this is what allows the growth of the fungus *Aspergillus* sp.

The results of the culture of skin scraping samples also found fungi in the genus *Rhizopus* sp in the leg skin scraping samples, the fungus *Rhizopus* sp is one of the pathogenic fungi that can cause infection or inflammation in the human

body. The possibility of finding the fungus *Rhizopus* sp in the sample is influenced by humidity. Humidity is one of the most important factors for fungal growth, namely the fungus *Rhizopus* sp. requires a low-level environment with a humidity level of 90% [3]. In addition, the fungus *Rhizopus* sp is also spread through direct contact with the dermatophytosis group or has small wounds on the skin [6].

In addition, researchers also found the fungus *Candida albicans*. *Candida albicans* is a type of fungus that infects the skin. *Candida albicans* is a type of fungus that lives in warm and humid conditions. The possibility of the growth of *Candida albicans* fungus can occur due to predisposing factors such as the cleanliness of the skin of the feet, the habit of soaking the feet in water for too long, causing maceration making it easier for *Candida albicans* to grow, and the hot climate and humidity causing increased perspiration [16]. Inilah which allows the presence of the fungus *Candida albicans* in the foot skin scraping samples.

In addition, researchers also found the fungus *Metarhizium anisopliae*, *Metarhizium anisopliae* is one of the endopathogenic fungi that has the potential for pest control, which can reduce pest populations in an agricultural area than other organisms [11]. The possibility of finding the fungus *Metarhizium anisopliae* in the skin scraping sample of the butcher's feet was because before the sampling was carried out, the respondent was taking animal feed in the plantation area. The fungus *Metarhizium anisopliae* usually grows on plants such as corn, rice, sugar cane and also usually grows on soil [13].

This research is also supported by the results of interviews with meat sellers at Terminal 42 Market, Gorontalo city who complain of itching in the area between the toes and dampness. According to Wolff and Johnson in 2012 the occurrence

The Identification of Fungus Among Meat Sellers' Toes with Tinea Pedis at Terminal 42 Traditional Market Gorontalo City

of tinea pedis on the feet is caused by the condition of the feet being moist and hot and time of day. use of footwear. This can trigger the growth of fungus in between the toes which can cause tinea pedis disease.

CONCLUSION

Based on the results of macroscopic and microscopic examinations between the toes of a butcher with tinea pedis at Terminal 42 Market, Gorontalo City, *Trichophyton rubrum* was found, which is a dermatophyte fungus, and *Aspergillus* sp., *Rhizopus* sp., *Candida albicans* and *Metarhizium anisopliaea* species were also found, namely fungi belonging to the non dermatophytes.

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