IDENTIFICATION OF DERMATOPHYTA FUNGUS IN BETWEEN THE MEAT SELLER'S TOES WITH TINEA PEDIS AT TERMINAL 42 TRADITIONAL MARKET GORONTALO CITY

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ABSTRACT

This study aims to identify the presence of dermatophyte fungi between the Meat Seller's toes with tinea pedis at terminal 42 traditional market Gorontalo City.

The type of research used in this study is observational descriptive with a qualitative approach. The sample in this study is all butchers at Terminal 42 Market Gorontalo City which is about 15 samples. The sampling technique used is total sampling technique. Sources of data in this study obtained by data collection techniques, through interviews and examination of fungal culture in the laboratory. The data obtained were analyzed descriptively, which describes the morphological characteristics of dermatophyte fungi based on macroscopic and microscopic observations, and continued with identification activities. Fungal identification is done by match the characteristics of the fungus obtained from the observations with reference to the identification book.

The results of the study show based on macroscopic and microscopic examination between the toes of a meat seller with tinea pedis at Terminal 42 Traditional Market Gorontalo City, 53.3% Dermatophytes fungi were found of the samples, namely *Trichophyton rubrum*. Other than that, 46,7% Non Dermatophyte were also found, such as *Aspergillus sp, Rhizopus sp, Candida albicans* and species *of Metarhizium anisopliaea.*
Key Words: Fungus, The Toes, Meat Seller, Tinea Pedis

INTRODUCTION

Indonesia has natural conditions with hot temperatures and humidity which strongly triggers the growth of the beneficial microorganisms or harmful microorganisms. One of the destroying microorganisms is dermatophyte fungus. This organism will infect certain body parts in humans, thus causing skin diseases such as water fleas (tinea pedis) [12].

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

Based on data *Arizona Regional Medical Center Hospital* division of the Skin Fungus Poly division, in the United States dermatophytosis is increasing 10-20%, while the prevalence of dermatophytosis in Asia reaches 35,6%. Based on information from the Indonesian Health Service (Depkes RI) Skin disease actually has a high prevalence, in Indonesia in 2012 it was 8.46%, and increased in 2013 by 9%. [2].

Furthermore, the report 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].

Referring to the data above, the researcher is interested in conducting research on meat sellers at the Terminal 42 market which operates twice a week, namely every Wednesday and Saturday. This market was chosen as a place to identify dermatophyte fungi, because the market is a very easy place for fungus to grow.

Therefore, all butchers who occupy several stalls in the market were sampled in the dermatophyte fungus research. Based on observations made by researchers, the location in the environment around the meat sellers has poor sanitation, and is not kept clean.

RESEARCH METHODOLOGY

The type of research used in this study is descriptive observational, with the sampling technique that is *total sampling*. The number of samples used as many as 15 samples. The source of the data in this study was obtained by data collection techniques through interviews and examination of fungal culture in the laboratory. The data obtained were analyzed descriptively, namely describing the morphological characteristics of dermatophyte fungi based on macroscopic and microscopic observations and continued with identification activities. Identification of fungi is done by matching the characteristics of the fungus obtained from observations by referring to the identification book.

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. 53.3% Dermatophyte fungi in the sample, namely *Trichophyton rubrum*, and about 46.7% obtained Non Dermatophyte fungus such as *Aspergillus sp, Rhizopus sp, Candida albicans* and species *of Metarhizium anisopliaea*.

For more details on the identification results of the seven types of fungi, the dermatophyte and non-dermatophyte groups are described in the table as follows:.

1. Dermatophyte Fungus

a. *Trichophyton rubrum* (Fungus Isolate 1)

From macroscopic observations of fungal isolates 1 obtained the characteristics as shown in Table 1.

Table 1. The results of macroscopic observations of fungal isolates 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.

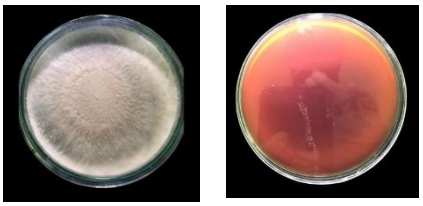
Table 2. The results of microscopic observations of fungal isolates 1

No	Ciri-ciri yang diamati	Hasil Pengamatan
1	hyphae : a. Sneaky / No b. Colour	 Sneaky Hialin
2	Conidiophores : a. Colour b. Branched/not c. Smooth walls /no	 Transparan Branched soft
3	Conidia : a. Colour b. Shape c. walls	 Transparan Round, Oval

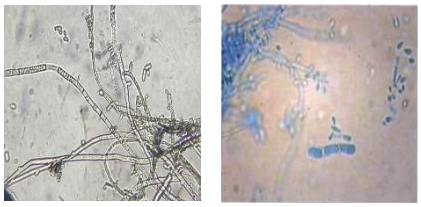
	Smooth sticks to hyphae

Source: Primary Data, 2021

For more details, macroscopic and microscopic observations on isolation media can be seen in the image below.



(a) (b)



(c) (d)

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]

Macroscopic and microscopic observations (Figure 1) showed that 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
Filum : Ascomycota
Kelas : Eurotiomicetes
Ordo : Onygelanes
Family : Arthrodermataceae
Genus : Trichophyton
Spesies :*Trichophyton rubrum*[7].

2. Non Dermatophyte Fungus

a. *Aspergillus sp* (Fungus Isolate 2)

Macroscopically against fungal isolate 2 obtained the characteristics as shown in Table 3

Table 3. The results of macroscopic observations of fungal isolates 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

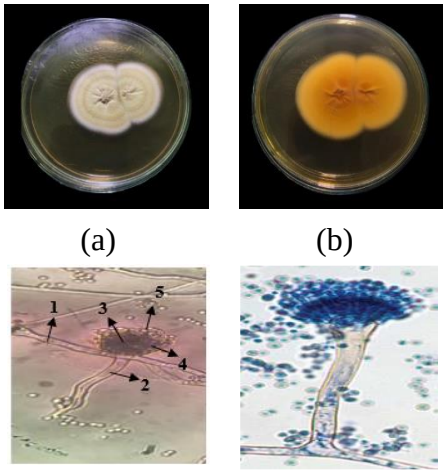
Based on microscopic observations made on fungal isolates 2 obtained the characteristics as shown in Table 4.

Table 4. Microscopic observations of Fungal Isolate 2

No.	Observed features	Observation result
1.	*Hyphae :*	
	a. Sneaky/ No	*No*
2.	*Conidiophores :*	
	a. Colour	*Transparan*
	b. Branched/No	*No*
	c. Smooth walls/Not	*Soft*
3.	*Vesicel :*	
	a. Shape	*Round*
	b. Is there any or not	*there is*
	c. Colour	*Brown*
4.	*Fialida :*	
	a. It grows on	*Metula*
	b. Colour	*Brown*
	c. Shape	*Round*
5.	*Conidia :*	
	a. Colour	*Transparan*
	b. Shape	*Round*
	c. Walls	*Rough*

Source: Primary Data, 2021

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



(a) (b) (c) (d)

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) Comparative image [5].

Macroscopic and microscopic observations (Figure 2), the fungal isolate 2 has the characteristics of white colonies with a mixture of yellow on the inside, yellowish white reverse color with smooth colonies. Hyphae do not septate. Colorless (hyaline) conidiophores, 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 of rough round shape.

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

Kingdom : Fungi
Filum : Ascomycota
Subfilum : Pezizomykotina
Kelas : Eurotiomycetes
Ordo : Eurotiales
Famili : Trichocomaceae
Genus : Aspergillus
Spesies : *Aspergillus sp* [9].

b. *Metarhizium anisopliae* (Fungus Isolate 3)

Macroscopic observations of fungal isolates 3 obtained the characteristics as shown in Table 5.

Table 5. 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. Microscopic observations of Fungal Isolate 3

No	Observed Features	Observation result
1	*Conidiphores :*	
	a. Colour	*Transparan*
	b. Branched/No	*Branched*
	c. Smooth Wall/No	*Soft*
2	*Conidia :*	
	a. Colour	*Transparan*
	b. Shape	*Oval*
	c. Wall	*Soft*

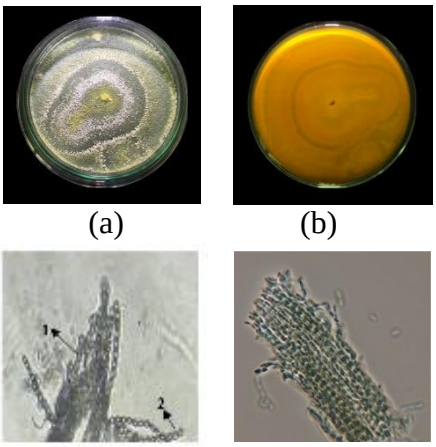
Source: Primary Data, 2021

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

Macroscopic and microscopic observations (Figure 3), the fungal isolate 3 has the characteristics of having green colonies with a mixture of yellowish white, the opposite color is yellowish white with a colony shape resembling a rather coarse powder. Conidiophores grow upright, spores are cylindrical or oval, one-celled, conidia are oval. Some of these branches enlarge upwards to form short, branched, close conidiophores, and coil around each other.

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

Kingdom : Fungi
Divisi : Eumycota
Kelas : Deuteromycetes
Ordo : Moniliales
Family : Moniliaceae
Genus : Metarhizium
Spesies : *Metarhizium anisopliae* [8]



(a) (b)

(c) (d)

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

c. *Aspergillus niger* (Fungus Isolate 4)

Macroscopic observations of fungal isolates 4 obtained the characteristics as shown in Table 7.

Table 7. Macroscopic observations of fungal isolates 4

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

Source: Primary Data, 2021

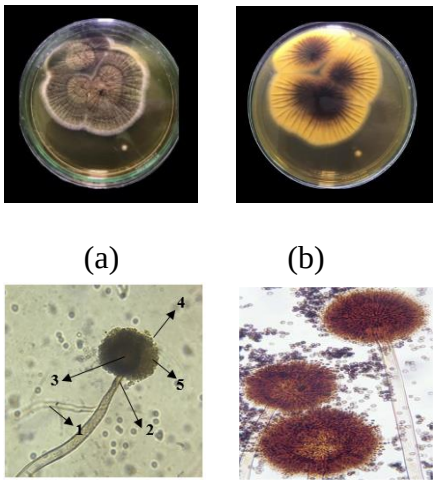
Based on microscopic observations made on fungal isolates 4, the characteristics as shown in Table 8.

Table 8. Microscopic observations of fungal isolates 4

No	Observed Features	Observation result
1	*Hyphae :*	
	a. Snaeky/No	*No*
2.	*Conidiophores :*	
	a. Colour	*Hialin*
	b. Branched/No	*No*
	c. Smooth Wall/No	*Soft*
3.	*Vesicel :*	
	a. Shape	*Round*
	b. Is there any or not	*There is*
	c. Colour	*Brown*
4.	*Conidia :*	
	a. Colour	*Dark chocolate*
	b. Shape	*Round*
	c. Wall	*Rough*
5.	*Fialida :*	
	a. It grows on	*Metula*
	b. Colour	*Brown*
	c. Shape	*Round*

Source: Primary Data, 2021

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



(a) (b)

(c) (d)

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) Comparative image [5].

Macroscopic and microscopic observations (Figure 4), the fungal isolate code 4 has the characteristics of black colonies with white colony edges, yellowish white reverse color with smooth colonies. Hyphae do not septate. Colorless (hyaline) conidiophores, 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
Filum : Ascomycota
Subfilum : Pezizomykotina
Kelas : Eurotiomycetes
Ordo : Eurotiales
Famili : Trichocomaceae
Genus : Aspergillus
Spesies : *Aspergillus niger* [9].

d. *Candida albicans* (Fungus Isolate 5)

Macroscopic observations of fungal isolates 5 obtained the characteristics as shown in Table 9.

Table 9. Results of macroscopic observations of fungal isolates 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

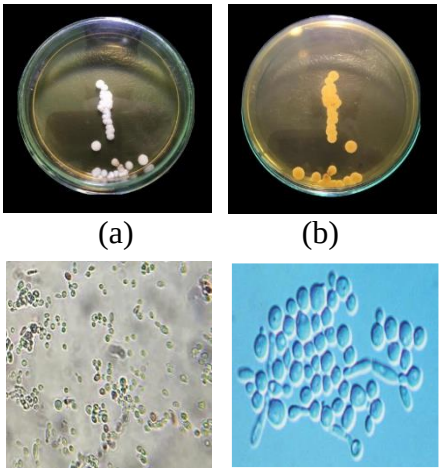
Based on microscopic observations made on fungal isolates 5, the characteristics as shown in Table 10.

Table 10. Microscopic observations of fungal isolates 5

No	Observed Features	Observation result
1	*Blastosphores :*	
	a. Shape :	*Round, Oval*
	b. Colour :	*Transparan*

Source: Primary Data, 2021

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



(a) (b) (c) (d)

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

Macroscopic and microscopic observations (Figure 5), the fungal isolate 5 has characteristics, namely, round, oval. Blastospores are round or oval in shape. the surface of the colony is smooth, smooth, slightly convex, slightly wet, shiny round, and yellowish white with a yellow reverse color.

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

Kingdom : Fungi
Phylum : Ascomycota
Subphylum : Saccharomycotina
Class : Saccharomycetes
Ordo : Saccharomycetales
Family : Saccharomycetaceae
Genus : Candida
Spesies : *Candida albicans* [5].

e. *Aspergillus terreus* (Fungus Isolate 6)

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

Table 11. The results of macroscopic observations of fungal isolates 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*	*Cotton soft*

Source: Primary Data, 2021

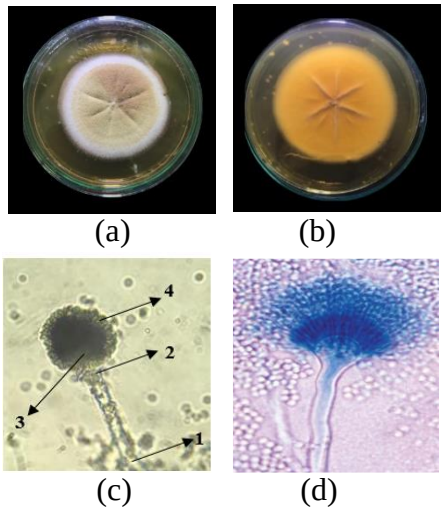
Based on microscopic observations made on fungal isolates 6, the characteristics as shown in Table 12.

Table 12. Microscopic observations of fungal isolates 6

No.	Observed Features	Observation result
1.	*Hyphae :*	
	a. Sneaky/No	*No*
2.	*Conidiophores :*	
	a. Colour	*Hialin*
	b. Branched/No	*No*
	c. Smooth Wall/NO	*Soft Branched*
3.	*Vesicel :*	
	a. Shape	*Round*
	b. There is / No	*There is*
	c. Colour	*Brown*
4.	*Conidia :*	
	a. Colour	*Darkness Brown*
	b. Shape	*Round*
	c. Wall	*Rhough*

Source: Primary Data, 2021

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



(a) (b) (c) (d)

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

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. Colorless (hyaline) conidiophores, 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
Filum : Ascomycota
Subfilum : Pezizomykotina
Kelas : Eurotiomycetes
Ordo : Eurotiales
Famili : Trichocomaceae
Genus : Aspergillus
Spesies : *Aspergillus terreus* [9].

f. *Rhizopus sp* (Fungus 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. 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

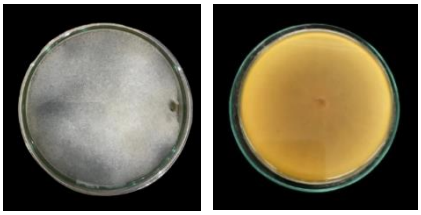
Based on microscopic observations made on fungal isolates 7 obtained the characteristics as shown in Table 14.

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

No	Observed Features	Observation result
1	*Hypahe :*	
	a. Sneaky/No	*No*
2	*Stolone :*	
	a. Colour	*Brown*
	b. Smooth Wall/No	*Soft*
3	*Rizhoid :*	
	a. Shape	*Branced*
	b. Colour	*Brown*
4	*Sporangiophores :*	
	a. Colour	*Brown*
5	*Sporangium :*	
	a. Colour	*Darkness Brown*
	b. Shape	*Round*
	c. Wall	*Soft*

Source: Primary Data, 2021

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



(a) (b)

(c) (d)

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

Macroscopic and microscopic observations (Figure 7), the fungal isolate 7 had the characteristics of having white to gray colonies and the opposite color was brownish white, the nature of the colony was in the form of cotton. Has hyphae that form rhizoid 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 isolate 7 is included in the species *Rhizopus sp* which can be classified as follows:

Kindom : Fungi
Divisi : Zygomycota
Kelas : Mucromycotina
Ordo : Mucorales
Famili : Mucoraceae
Genus : Rhizopus
Spesies : *Rhizopus sp* [8].

DISCUSSION

Based on the results of the examination of skin scrapings from the legs of a meat seller at the Terminal 42 market (Wednesday-Saturday) of Gorontalo City, which was carried out using the culture method or culturing on the media. *Saboraud Dextrose Agar* (SDA), Dermatophyte fungi were found, namely: *Trichophyton rubrum* and Non Dermatophytes namely *Aspergillus sp*, *Rhizopus sp*, *Candida albicans* and spesies *Metarhizium anisopliaea*.

Of the 15 samples of leg skin scrapings examined macroscopically and microscopically at a meat seller at the Terminal 42 market, Gorontalo City, there was only 1 type of dermatophyte fungus, namely *Trichophyton rubrum* with a percentage of about 53.3%, but the type of this fungus *Trichophyton rubrum* After being identified, there were 8 samples of skin scrapings from the feet of a meat seller at the Terminal 42 market, Gorontalo city. Dermatophyte fungi are a group of fungi that attack parts of the body that contain keratin such as skin, hair and nails. Fungus *Trichophyton rubrum* It is also the most common cause of dermatophytes [10].

Growth factor of *Trichophyton rubrum* influenced by their 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 Khusnul et al in 2018 Identification of Fungus on Between the toes of janitors in Tasikmalaya showed that as many as 8 janitors were infected with Dermatophyte fungal infections consisting of *Trichophyton rubrum* as much as 15%. Sinaga in 2020 where a type of fungus was

found *Trichophyton rubrum* as much as 71% of fish sellers in the market.

In addition to dermatophyte fungi, the sample also contained non-dermatophyte fungi *Aspergillus sp* among others are *Aspergillus niger* and *Aspergillus terreus*. *Aspergillus sp* is a free-living and ubiquitous contaminant fungus [14]. *Aspergillus sp* can contaminate in unfavorable environmental conditions such as a humid environment and the spread of this fungus is through the air. *Aspergilus sp* dangerous because it can cause infections in the human body such as allergies and also cause infections in the human lungs [15].

The results of the culture of skin scraping samples also found fungi of the genus *Rhizopus* in the foot skin scraping samples, *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]. This is what allows the *Candida albicans* fungus to be present 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 is because before sampling, 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 complained of itching in the area between their toes and dampness. According to Wolff and Johnson in 2012 the occurrence of tinea pedis on the feet is caused by moist and hot conditions of the feet and the time of wearing footwear. This can trigger the growth of fungus between the toes which can cause tinea pedis.

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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