



## PREVALENCE OF FUNGAL INFECTIONS THAT CAUSE TINEA PEDIS IN FARMERS IN TEGALHARJO BANYUWANGI

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### ABSTRACT

*Tinea pedis is a type of superficial mycosis. Tinea pedis is a dermatophyte that is most often found in humans and is usually called water fleas. Lack of maintaining cleanliness and wearing closed shoes is one of the factors that causes Tinea pedis. Tinea pedis usually affects adults who work in wet or humid places, such as car and motorcycle washers, garbage collectors and farmers. When doing activities, the average farmer uses boots for too long. However, some farmers who do not wear boots while working experience itching on the soles of their feet. This research aims to determine the prevalence of fungal contamination that causes water fleas (Tinea pedis) in farmers in Tegalharjo village, Banyuwangi Regency. The population of this research are 30 farmers in Tegalharjo village, while the research sample is skin scrapings between the toes of the farmers. Then the sample obtained is directly examined by using a microscope and 10% KOH reagent. The results show that the farmers who are contaminated with the fungus that caused Tinea pedis are 6 people with a percentage (20%) and 24 people who are not contaminated with a percentage (80%). The incidence of infection Tinea Pedis among farmers in Tegalharjo Village, Banyuwangi Regency is also influenced by the duration of working in a day and the habit of wearing boots.*

## INTRODUCTION

Indonesia is referred to as an agrarian country because its population relies heavily on agriculture as a livelihood. The agricultural sector plays an important role for the Indonesian nation, especially in the national economy. The scope of farmers is mostly in

wet and muddy places. The lack of personal protective equipment requires the farmer's feet and hands to come into direct contact with muddy and watery areas. Therefore, many cases of contamination of the farmer's feet are caused by mold. *Tinea pedis* is a fungal infection of the hands and feet (Muhtadin & Latifah, 2019).

*Tinea pedis* or Indonesian people are more familiar with the name of water fleas is a disease due to *dermatophyte* fungal infections that infect the skin on the toes, soles of the feet, and the lateral part of the feet (Farihatun, 2018). The fungi that cause *tinea pedis* are *Trichophyton rubrum*, *Trichophyton mentagrophytes*, *Epidermophyton floccosum*. In addition *tinea pedis* is also caused by other fungi such as *Candida albicans* and *Microsporum gypseum* (Sevaroka, 2018). *Tinea pedis* or water fleas usually affect adults who work in wet or damp places, such as car and motorcycle washers, garbage collectors and farmers. Infection occurs because the fungus releases the enzyme keratinase that attacks the keratin layer of the skin. *Trichophyton rubrum* infection infects the skin and nails through the degradation of keratin, this is due to the ability of fungi to secrete proteolytic enzymes which are virulence factors, especially in *Trichophyton rubrum*. Infection can be spread from person to person through skin contact (Djuanda, 2013). Symptoms of fungal infections that cause *tinea pedis* are characterized by the skin appears reddish and itchy, on the fingers and soles of the feet look cracked or peeling, small boils filled with clear fluid, toenails experience thickening and discoloration (Indrawati & Fakhrudin, 2016).

Cases of *tinea pedis* at the Denai Health Center in Medan City in 2012, in January there were 102 cases of skin diseases, skin diseases caused by allergies as many as 104 cases, skin diseases caused by fungi as many as 10 cases. In the following month there was an increase in cases of skin diseases as many as 134 cases, skin diseases caused by allergies as many as 110 cases, skin diseases caused by fungi as many as 7 cases (Sajida et al., 2012). In other cases at RSUP Prof. Dr.R. D. Kandou Manado City found cases of dematofitosis with a total of 36 cases of *tinea kruris*, 17 cases of *tinea korporis*, 6 cases of *tinea capitis*, 4 cases of *tinea unguium*, 1 case of *tinea pedis* and 1 case of *tinea barbae* (Bertus et al., 2015).

Based on the results of Hartati's research, (2017), in the village of Curah Malang Jombang Regency in 2017, the incidence rate in 5 farmers infected with *Tinea pedis*, obtained positive results of 2 people (40%) and negatively a total of 3 people (60%).

Meanwhile, the results of Nurbidayah *et al.*, (2018) in Banitan village, Barito Kuala Regency in 2017 showed that the incidence rate in 13 farmers obtained positive results of tinea pedis in farmers as many as 8 people (61.5%) and negative results were obtained as many as 5 people (38.5%). Fungal infections in humans are influenced by two factors, namely endogenous factors that include physiological changes in the human body such as pregnancy, age, immunological disorders, and age, while the second factor is exogenous factors that include climate, high humidity, and type of work (Agustina *et al.*, 2021).

Many cases of tinea pedis in farmers have been reported, so researchers want to know the Prevalence of Fungal Infections That Cause tinea pedis in Farmers In Tegalharjo Village, Banyuwangi Regency. Moreover, from the observations of researchers on farmers in Tegalharjo village, Banyuwangi Regency, some farmers still do not use personal protective equipment when doing activities in the agricultural community.

## **MATERIALS AND METHODS**

This type of research is descriptive, to illustrate the prevalence of tinea pedis in farmers in Tegalharjo Village, Banyuwangi Regency. Data was obtained by filling out questionnaires based on interviews and laboratory tests by cultured foot scraping samples on SDA media. Samples of skin scraping between the toes are microscopically examined using 10% KOH, which serves to lyse the skin's epithelial cells so that true hyphae or spores are obtained. Magnification of the microscope used 10x and 40x.

The study variable is tinea pedis infection. Infection with tinea pedis is determined based on infection from one of the fungi that cause Tinea pedis, namely fungi genus *Microsporum*, *Tricophyton*, *Epidermophyton* on the toes, from the results of microscopic examination. The data was analyzed descriptively to determine the prevalence of tinea pedis and to find out the relationship between the length of work as a farmer, the duration of working as a farmer per day, and the wearing of rubber boots with the status of tinea pedis, the data was analyzed using chi-square.

### ***Time and Place of Research***

This study was conducted at the Surabaya Regional Health Laboratory. This study was conducted from October to December 2020.

### ***Research Subjects***

Subject in this study is a farmer in Tegalharjo Village, Banyuwangi Regency as many as 30 farmers (total sampling). While the subject of the examination is in the form of scraping the skin between the farmer's toes.

### ***Tools and Materials***

The tools used in this study include: analytical balance sheet, *hot plate*, erlenmeyer, beaker glass, drip pipette, bunsen, measuring cup, spatula, watch glass, sterile petri dish, scalpel, *object glass*, *cover glass*, pipette pasteur, *autoclave*, *blade*, pH paper, plastic wrap, bunsen. Material used in this study include: *Sabouraud Dextrose Agar* (SDA), aquadest, alcohol swab, KOH 10%

### ***Sampling procedure***

The skin on the sidelines of the toes to be scraped is sterilized first by using *an alcohol swab*. skin between the toes or soles of the feet is then scraped using a scalpel. The results of scraping the skin are put in a sterile container and given a sample code.

### ***Inspection procedures***

Clean object glass dripped KOH 10% as much as 0.1 ml. Hasil scraping of the skin between the legs is taken with roundose and placed on the object glass that has been dripped KOH 10% then flattened with the heart. The object glass is then covered with a glass cover. After that it was observed under a microscope with objective lens magnification of 10x and 40x. The observations were recorded and then likened to the book Atlas of Mycology to find out the species observed.

## **RESULTS AND DISCUSSION**

Microscopic observations showed that the sample was said to be positive because hyphae and spores were found from the fungus that causes tinea pedis, instead said to be negative because no hyphae and spores caused tinea pedis. The fungus that causes tinea pedis consists of Research variables is tinea pedis infection. From microscopic observations (**Table 1**), it was found that 20% of samples were infected with tinea pedis,

while 80% of samples were not found to have tinea pedis infection. As for the factors that affect the infection of tinea pedis, including the length of time to be a farmer, the duration of work per day, and the use of rubber boots. To find out the relationship between tinea pedis infection and infectious factors, it is necessary to conduct the following statistical tests.

**Table 1.** Microscopic observation results of skin scraping between toes farmers in Tegalharjo Village, Banyuwangi Regency

Microscopic examination	Percentage (+)	Percentage (-)	Sum
	6 (20%)	24 (80%)	30

**Table 2.** Long-standing relationship of working as a farmer with tinea pedis status

Observed variables	Percentage (+)	Percentage (-)	Sum	P. Value
Peasant profession				Sig. 0,099
<3 Years	0 (0%)	8 (100%)	8	>0.05
>3 Years	6 (27,27%)	16 (72,73%)	22	

The results of the analysis on the long-standing relationship of working as a farmer with tinea pedis with *chisquare test* are as follows : with the length of work as a farmer in Tegalharjo Kabupaten Banyuwangi Village, based on the length of work as a farmer for < 3 years by 100% did not experience tinea pedis, while those who have worked as farmers >3 years, there are 27.27% experiencing tin pedieas. From the results of chi-square calculations, it is known that there is no meaningful relationship between tinea pedis and the length of work as a farmer (P: 0.05) (**Table 2**).

According to Kurniawati *et al.* (2006), the length of work as a farmer is one of the predisposing factors, namely the factors that trigger tinea pedis infection. This can happen because working as a farmer in the rice fields sometimes the feet are submerged in water for a long time and after that usually farmers do not immediately clean their feet. This moist scope of work is what makes one of the factors for the onset of fungal infections in the feet.

Based on the variable duration of the farmer's working time for < 6 hours / day 100% did not experience tinea pedis, while as many as 6 or 37.5% of farmers who worked > 6 hours / day experienced tinea pedis. There is a meaningful relationship between tinea pedis and the duration of work in a day (P<0.05) (**Table 3**).

**Table 3.** Relationship of *tinea pedis* infection with duration of work as a farmers in Tegalharjo Village, Banyuwangi Regency

Observed variables	Percentage (+)	Percentage (-)	Sum	P. Value
Duration of Work/day				Sig. 0,010
<6 Hours	0 (0%)	14 (100%)	14	<0.05
>6 Hours	6 (37,5%)	10 (62,5%)	16	

From the results, it shows that longer working hours show more positive results than those who work shorter working hours. According to (Napitupulu *et al.*, 2016), the longer the contact with his work, skin irritation or inflammation can occur, causing abnormalities in the skin. This condition can be worse if farmers pay less attention to their cleanliness, especially washing their feet after working in the rice fields.

The next variable is the use of boots made of rubber. It turns out that farmers who use rubber boots, as many as 5 farmers or 45.45% experience *tinea pedis*, while 1 farmer or 5.26% who do not use rubber boots experience *tinea pedis*. From the results of *Chi-square* statistical calculations, it can be known that there is a meaningful relationship between *tinea Pedis* and the use of rubber boots ( $P < 0.05$ ) (**Table 4**).

**Table 4.** Relationship of *tinea pedis* infection with the use of rubber boots in farmers in Tegalharjo Village Banyuwangi Regency

Observed variables	Percentage (+)	Percentage (-)	Sum	P. Value
The use of rubber boots				Sig. 0,008
Yes	5 (45,45)	6 (54,55)	11	<0.05
Not	1 (5,26%)	18 (94,74)	19	



**Figure 1.** SDA media results after incubation for 4-5 Days

Tinea pedis infection in farmers can also be associated with the habit of farmers who use rubber boots. These rubber boots cannot absorb sweat and can cause the feet to produce more sweat, so the humidity level if using rubber boots is higher. Coupled with the activities of farmers who if in the rice fields are inundated with water. The use of shoes that are closed for a long time and made from not absorbing sweat, is a risk factor for tinea pedis infection. According to (Napitupulu *et al.* 2016) the high incidence of tinea pedis contamination is caused by skin moisture. In addition, humidity in the environment such as in wet or muddy areas is also a major factor in the occurrence of tinea pedis.

On microscopic observations, found 6 positive samples of tinea pedis with an infecting fungus is *Trichophyton* sp. This fungus is a type of mold that causes tinea pedis infection in humans (Sunartatie, 2010). *Trichophyton* sp. It is a fungus that belongs to the group Deuteromycetes. Microscopically, *Trichophyton* sp. have hyphae with several branches, generally short branches and are the result of hyphae completion (Alfiana *et al.*, 2018). The hyphae or mycelium is generally not insulated, except for the hyphae that will form or produce conidia. Konidia owned by *Trichophyton* sp. It can take the form of macroconidia or microconidia. Macroconidia are pencil-shaped and consist of several cells, while microconidia are oblong and thin-walled. *Trichophyton* sp mushrooms. Growth media shows hyphae or mycelium that is smooth white and looks like cotton, although sometimes it can also be another color depending on the pigment it has (Saputra, 2015).

*Trichophyton* sp. is a species of dermatopita fungus. Dermatophyte fungus is a group of fungi that grow on a keratin tissue as a food source. Keratin tissue found in humans includes nails, stratum corneum skin, and hair (Sondakh *et al.*, 2016). In addition to *Trichophyton* sp., there is also a fungus that causes tinea pedis in humans, namely *Microsporum* sp. Another species is *Epidermophyton* sp. It usually causes tinea pedis infection in animals, especially in goats and cows (Sunartatie, 2010).

Based on the results of observations and questionnaires conducted by researchers, proving that almost all farmers have a healthy lifestyle before work and after work. Maintaining cleanliness is needed in a job such as using personal protective equipment, washing hands and feet finished work, after that drying so as not to be damp so as to prevent the occurrence of mold that causes tinea pedis. This is also in accordance with the theory according to (Napitupulu *et al.* 2016), which is a step to realize health, namely

by maintaining personal hygiene first. A clean body prevents the occurrence of a disease, especially in diseases related to personal hygiene. If personal hygiene is bad then it is very easy for the body to be affected by various diseases. For example, skin diseases, oral diseases, digestive tract diseases, and infectious diseases.

### **CONCLUSION**

Thirty samples from farmers in Tegalharjo Village, Banyuwangi Regency showed that 20% of samples were infected with tinea pedis and 80% were not infected with tinea pedis. So that, the prevalence of tinea pedis in farmers in Tegalharjo Village, Banyuwangi Regency is 20%. Those low prevalence of tinea pedis is relates to farmer's healthy lifestyle before and after work in Tegalrejo Village.

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