Jurnal Profesi Medika : Jurnal Kedokteran dan Kesehatan
DOI: https://doi.org/10.33533/jpm.v18i1.7514
Vol 18 No 1 (2024) ISSN 0216-3438 (print); ISSN 2621-1122 (online)

ARTICLE

THE RELATIONSHIP BETWEEN PERSONAL HYGIENE AND THE PREVALENCE OF TINEA UNGUIUM INFECTION AMONG FARMERS IN JEMBER DISTRICT

Alyatul Himma[1], Diana Chusna Mufida[1*], Kristianningrum Dian Sofiana[1], Yunita Armiyanti[1], Dini Agustina[1]

[1]Fakultas Kedokteran, Universitas Jember, Jember, Indonesia

*Correspondence email : chusna.fk@unej.ac.id

ABSTRACT

The nail infection known as tinea unguium is brought on by dermatophyte fungi. Nails infected with the fungus will be discolored, thick, and brittle. Personal hygiene is one of the risk factors that can affect *tinea unguium*. The purpose of this study was to determine the relationship of personal hygiene to the prevalence of *tinea unguium* infection in farmers in the Jember Regency. The benefits of research can be used as a source of information about the importance of maintaining personal hygiene to avoid fungal infections that cause *tinea unguium*. Analytical observational method with cross-sectional approach was adopted in this investigation. Ten areas of the Jember Regency served as the research site from August to December of 2023. The participants in this research were all Jember Regency farmers. The sample in this study was calculated by the Slovin formula and obtained from as many as 100 farmers who met the inclusion and exclusion criteria. Sampling using mixed methods sampling. The statistical analysis used is Cramer's V test $\alpha = 0.05$. The results of this study show a significant relationship between personal hygiene and the prevalence of *tinea unguium* in farmers in Jember Regency with a p-value of 0.004 (0,004<0,05).

Keywords: Personal Hygiene; Tinea Unguium; Farmers; Fungal Infections

АБСТРАКТ

Ногтевая инфекция, известная как tinea unguium, вызывается грибками-дерматофитами. Ногти, зараженные грибком, обесцвечиваются, становятся толстыми и ломкими. Личная гигиена - один из факторов риска, который может повлиять на развитие тинеа унгуум. Цель данного исследования - определить связь личной гигиены с распространенностью инфекции tinea unguium среди фермеров в регентстве Джембер. Результаты исследования могут быть использованы в качестве источника информации о важности соблюдения личной гигиены во избежание грибковых инфекций, вызывающих тинеа унгуум. В данном исследовании использовался метод аналитического наблюдения с перекрестным подходом. Десять районов регентства Джембер служили местом проведения исследования с августа по декабрь 2023 года. Участниками исследования стали все фермеры регентства Джембер. Выборка в данном исследовании была рассчитана по формуле Словина и получена из 100 фермеров, которые соответствовали критериям включения и исключения. Выборка использовала смешанные методы отбора. В качестве статистического анализа использовался V-тест Крамера $\alpha = 0,05$. Результаты данного исследования показали значительную связь между личной гигиеной и распространенностью тинеа унгуум у фермеров в регентстве Джембер с р-значением 0,004 (0,004<0,05).

Ключевые слова: Личная гигиена; Тинеа унгуиум; Фермеры; Грибковые инфекции

Submitted: 6 February 2024 ; Received in revised form: 23 February 2024 ; Accepted: 26 February 2024 ; Available online: 15 June 2024
Published regularly: June 2024

INTRODUCTION

Tinea unguium is a nail infection caused by dermatophyte fungi. The types of dermatophyte fungi that are commonly found in hand and toenail infections are *Trichophyton rubrum* and *Trichophyton mentagrophytes.*[1] Cases of *tinea unguium* both in the world and in Indonesia are still quite high. Cases of nail infection in the literature study on the causes of *tinea unguium* on farmers' nails in Indonesia were found to be 51% infected by dermatophyte fungi.[2] Research in 2019 found that 90% of infections in toenails and 75% in fingernails were caused by dermatophytes, especially *Trichophyton mentagrophytes* and *Trichophyton rubrum.*[3]

Risk factors for *tinea unguium* include gender, age, immunosuppression (HIV-AIDS and diabetes mellitus), and trauma.[4] Other risk factors that can increase the occurrence of dermatophytosis, especially *tinea unguium*, are personal hygiene and work related to wet and humid environments.[5] One of the jobs that is closely related to personal hygiene is farmers. The work of farmers who have direct contact with the ground on the hands and feet, if not cleaned properly, will increase the risk of *tinea unguium*. Research conducted in Seginim District, South Bengkulu Province on rice field farmers in 2021 found that 40% suffered from *tinea unguium* due to lack of personal hygiene, especially on the feet that were not cleaned after activities in the fields, which would trigger the growth of fungi on the toenails.[6]

According to BPS data in 2020, Jember Regency has 510,116 farmers and farm laborers. With this figure, Jember Regency is the district in East Java Province with the most number of farmers. Currently, the incidence of *tinea unguium* is still high, the number of farmers in Jember Regency is quite large, and research discussing the relationship between personal hygiene and the prevalence of *tinea unguium* infection in Jember Regency is still limited. Therefore, researchers are interested in conducting research with the title of the relationship between personal hygiene and the prevalence of *tinea unguium* infection in farmers in Jember Regency.

MATERIAL AND METHODS

This study used a cross-sectional design and an analytical observational method. It was conducted from August to December 2023. The Ethics Commission of Faculty of Medicine University of Jember granted permission for this study with letter number 5004/UN25.1.10.2/KE/2023. The study's population consisted of all farmers in the Jember Regency, and the sample size of 100 farmers was determined by calculating the Slovin formula. The sample must meet the inclusion criteria, namely working as a farmer or farm laborer and having one of the symptoms of *tinea unguium* such as nails changing color to yellow or brown, onycholysis, brittle, and thick. In addition to the inclusion criteria, there were exclusion criteria, namely farmers who did not have hands or feet, secondary infections around the nails, and farmers with a history of HIV-AIDS or DM. The sampling technique used mixed method sampling[7], namely the selection of sub-districts using random sampling techniques and sampling using consecutive sampling techniques. Sampling in the form of hand or toenail scrapings in the study was carried out on farmers in 10 districts of Jember Regency, namely Arjasa, Kalisat, Pakusari, Sukorambi, Rambipuji, Ajung, Jenggawah, Panti, Mumbulsari, and Tempurejo. The acquired samples were brought to the University of Jember's Faculty of Medicine's Microbiology Laboratory for analysis.

The data used are primary data obtained from filling out questionnaire sheets about personal hygiene and the results of scraping examination of hand or toenails. The questionnaire in this study covers the hygiene of hair, skin, nails, hands, and feet. The questionnaire has been tested for validity and reliability using 60 samples. The validity test results with the Pearson correlation test obtained r-count>r-table (0.340>0.254), while the reliability test results using Cronbach's Alpha were 0.544. Filling out the questionnaire sheet and taking samples has received approval from the respondent by filling out the informed consent sheet. Examination of hand

 DOI: https://doi.org/ 10.33533/jpm.v18i1.7514 Vol 18 No 1 (2024)

or toenail scrapings is done in two ways, namely culture on Sabouraud Dextrose Agar (SDA) media and microscopy with lactophenol cotton blue (LCB) staining. Fungal culture examination on SDA media is carried out after 3-5 days of incubation.[8] Fungal identification was carried out by microscopic observation of SDA media overgrown with fungal colonies with LCB staining. Microscopic observations were made with 100x and 400x magnification.[1]

Both univariate and bivariate analyses will be performed on the results that were obtained. Using Cramer's V test, bivariate analysis was utilized in order to ascertain the nature of the relationship that exists between the variables. A significance level of 95% and an error tolerance of α = 0.05% serve as the foundation for making decisions regarding the acceptance or rejection of the hypothesis. Utilizing the SPSS software, both univariate and bivariate analyses were carried out successfully.

RESULT

Table 1. Characteristics of the sample

Characteristic	Frequency +	Frequency -	Percentage
Gender			
Male	47	29	76%
Female	16	8	24%
Age (year)			
17-25	1	0	1%
26-30	2	1	3%
31-40	8	4	12%
41-50	19	7	26%
51-60	21	11	32%
>60	12	14	26%
Level Education			
College	2	2	4%
SHS	6	5	11%
JHS	7	4	11%
ES	27	13	40%
Not Graduated from ES	21	13	34%
Total	**63**	**37**	**100%**

Table 1 reveals that the majority of farmers in Jember District are male, with 76 people (76%) being male, 32 people (32%) being between the ages of 51 and 60 years old, and the majority of farmers in Jember District in this study being elementary school graduates (40%) with an education level of at least a high school diploma.

Table 2. Results of identification of fungal species on the nails of farmers in Jember Regency

Result	N	Percentage
Dermatophytes	**63**	**63%**
Trichophyton rubrum	25	25%
Trichophyton tonsurans	21	21%
Trichophyton mentagrophytes	8	8%
Epidermophyton floccosum	5	5%
Trichophyton verruscosum	3	3%
Microsporum gypseum	1	1%
Nondermatophytes	**26**	**26%**
Aspergillus sp.	26	26%
No fungi growth	**11**	**11%**
Total	**100**	**100%**

Table 2 demonstrates that 63 farmers (63%) had tinea unguium and 37 (37%) did not. Of the 57 positive results, 90% were due to Trichophyton sp. In this investigation, Trichophyton rubrum dominated with 25 (40%). In this investigation, nondermatophyte Aspergillus sp. fungus caused 26 negative results and 11 failures. Dermatophyte fungi are shown in Figures 1–6.

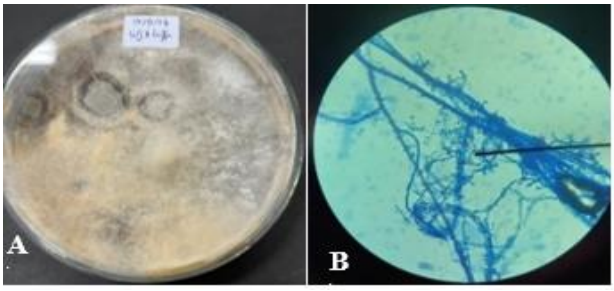

Figure 1. (A) Morphology of *T. rubrum* macroscopically on SDA media, (B) Morphology of *T. rubrum* with LCB staining at 400x magnification.

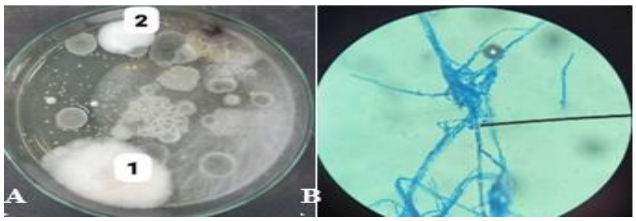

Figure 2. (A) Morphology of *T. tonsurans* macroscopically on SDA media, (B) Morphology of *T. tonsurans* with LCB staining at 400x magnification.

 DOI: https://doi.org/ 10.33533/jpm.v18i1.7514 Vol 18 No 1 (2024)

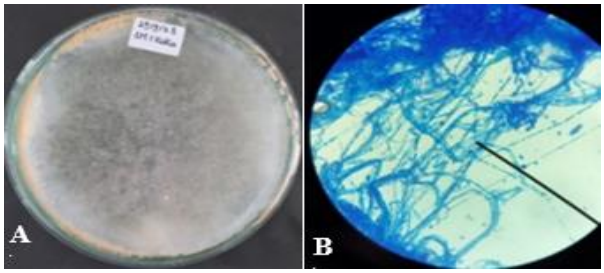

Figure 3. (A) Morphology of *T. mentagrophytes* macroscopically on SDA media, (B) Morphology of *T. mentagrophytes* with LCB staining at 400x magnification.

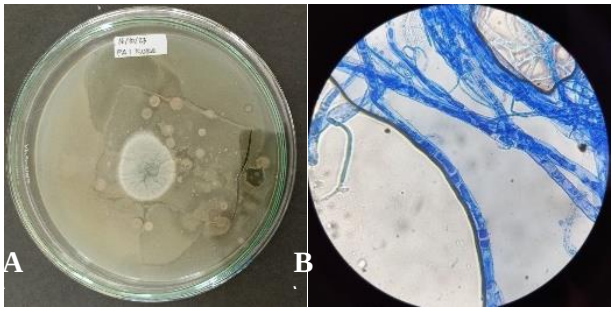

Figure 4. (A) Morphology of *E. floccosum* macroscopically on SDA media, (B) Morphology of *E. floccosum* with LCB staining at 400x magnification.

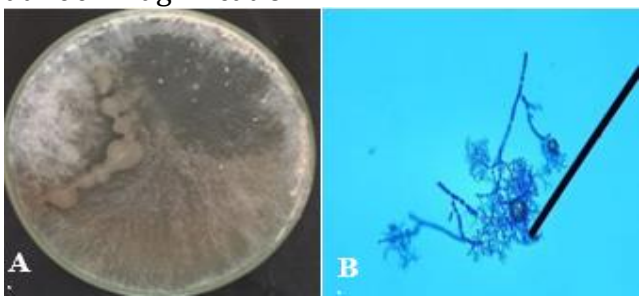

Figure 5. (A) Morphology of *T. verruscosum* macroscopically on SDA media, (B) Morphology of *T. verruscosum* with LCB staining at 400x magnification.

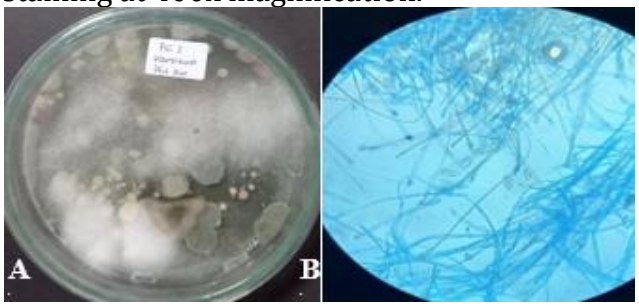

Figure 6. (A) Morphology of *M. gypseum* macroscopically on SDA media, (B) Morphology of *M. gypseum* with LCB staining at 400x magnification.

Table 3. Cross tabulation between personal hygiene behavior and the prevalence of *tinea unguium* infection among farmers in Jember Regency

		Tinea Unguium Infection		Total	*p-value*
		+	-		
Personal Hygiene	Good	16	20	36	0,004
	Moderate	39	17	56	
	Bad	8	0	8	
Total		63	37	100	

Table 3 shows that out of 100 respondents, farmers with good personal hygiene infected with *tinea unguium* were 16 people (16%), while those not infected with *tinea unguium* were 20 people (20%). Farmers with moderate personal hygiene were infected with *tinea unguium* as many as 39 people (39%), while those who did not experience *tinea unguium* infection were 17 people (17%).

All farmers with poor personal hygiene were infected with *tinea unguium*. Based on the results of Cramer's V test, the p-value <0.05 is 0.004 <0.05.

DISCUSSION

These findings show that there are more men than women among farmers: 76 of them are men and 24 are women. Research by Nurfadillah *et al* found that 19 farmers (47.5%) were female and 21 farmers (52.5%) were male. This research is consistent with their findings.[9] Gender is more male than female due to the physical strength possessed by men in managing agricultural land is greater than women.[10]

The distribution of farmers in Jember Regency is dominated by productive age, namely 74 farmers (74%) aged from 17-60 years. Productive age according to the Central Bureau of Statistics has an age range between 15 and 64 years. The results of this study are in line with Devy and Ervianti's research in 2018 which found that 72.8% of productive age experienced dermatophytosis which included *tinea unguium*. The cause of productive age is at risk of dermatophytosis, especially *tinea unguium*, is that the activities carried out will

 DOI: https://doi.org/ 10.33533/jpm.v18i1.7514 Vol 18 No 1 (2024)

produce sweat and are not balanced with good personal hygiene.[11]

Based on the level of education of farmers in Jember District, 40 farmers (40%) were elementary school graduates. In addition, farmers with elementary school graduates were most infected with *tinea unguium.* In Table 1, 27 farmers with the last education level of elementary school were infected with *tinea unguium*. The data shows that someone who has a low education is at risk of *tinea unguium*. This study is in line with research by Yuwita *et.al* 2016, that a person with a primary school education level experiences a lot of *tinea cruris*, which is an infection in the groin area due to dermatophyte fungi.[12] This research is also in line with research conducted by Imaniar F at 2018 on rice farmers in Sekayu Banyuasin District, 47.1% of respondents with low education were infected with dermatophyte fungi. Many farmers with low education experience *tinea unguium* because they have more difficulty understanding information related to personal hygiene compared to people with higher education.[13]

The results of examination using culture and microscopy on 100 samples of nail clippings of farmers' hands or feet showed positive results of 63 people (63%) and negative results of 37 people (37%). The negative results in this study can be seen in Table 2 that most of them were caused by nondermatophyte fungi, namely *Aspergillus sp.* 26 samples (26%). Results from a 2019 study by Leung *et al*. indicate that nondermatophyte fungi may be the source of nail infections.[3]

A total of 63 people who were positive for *tinea unguium* were mostly caused by *Trichophyton sp.* pictures of dermatophyte fungi are shown in Figures 1, 2, 3, and 5. The positive sample results researched by Zafar *et.al* 2017 that nail infections caused by dermatophyte fungi are one type, namely *Trichophyton sp.*[1] The study's findings are consistent with those of Nurfadila et al.'s 2021 investigation, which demonstrates that the dermatophyte fungi that causes *tinea unguium* is *Trichophyton sp.* with the results of 47.5% of positive farmers *tinea unguium* caused by *Trichophyton rubrum* by 20% and *Trichophyton mentagrophytes* by 27.5%.[14]

Personal hygiene in this study includes hair, skin, feet, hands, and nails hygiene. Hair and skin hygiene were included in this study because transmission of *tinea unguium* can occur through direct contact, for example holding parts of hair or skin infected with the fungus.[4] Hair hygiene that is not maintained will make the hair look tangled and the hair shaft will experience health problems such as fungal infections. If the hair is infected with a fungus, it will cause itching which makes the sufferer scratch using their hands. The scratching process is carried out for a long time so that the fungus will spread to the nails. In this study[1], farmer was found to be infected with the dermatophyte fungus species *Microsporum gypseum.* images of fungi can be seen in Figure 6. This species is often found in *tinea capitis* and *tinea corporis.*[1] These results can be caused by respondents who accidentally touch people suffering from *tinea capitis* or *tinea corporis*. *Microsporum sp.* can cause nail infection in someone suffering from *tinea capitis*, but the case is very rare because *Microsporum sp.* has a low ability to infect hard keratinized tissue.[15]

The statistical test results of the relationship between personal hygiene and *tinea unguium* infection obtained a p-value <0.05, namely 0.004 <0.05. These results indicate that there is a significant relationship between personal hygiene and *tinea unguium* infection in farmers in the Jember Regency. Research on rice field farmers in Kebun Sari Amuntai Tengah Village by Amalia *et al*. found a strong correlation between personal hygiene and *tinea unguium* infection, which is consistent with our study. The statistical test results in the study were p-value 0.006 <0.05 and showed that a farmer who has good personal hygiene, then there is less risk of being infected with *tinea unguium.*[16] The results of this study show that all farmers who have poor personal hygiene experience *tinea unguium*. These results can be seen in Table 3 where 8 farmers with poor personal hygiene

 DOI: https://doi.org/ 10.33533/jpm.v18i1.7514 Vol 18 No 1 (2024)

were infected with *tinea unguium*. A total of 50 farmers with moderate and poor personal hygiene did not keep their nails clean, that is, their nails were not short and clean. One of the factors influencing *tinea unguium* infection is poor personal hygiene, for example not cutting nails regularly and not washing feet after work with soap.[2]

Factors that may influence the occurrence of *tinea unguium* infection in this study include gender, age, education level, and personal hygiene. Factors such as age, education level, and gender were not statistically correlated, while personal hygiene was statistically analyzed. The work of farmers who are always in direct contact with water and soil can make fungi grow more easily. Farmers who work by using personal protective equipment if not balanced with good personal hygiene are at great risk of being infected with *tinea unguium*.[17] Therefore, a farmer must still maintain his personal hygiene to avoid diseases caused by fungi, especially *tinea unguium*.

CONCLUSION

This study concludes that there is a significant relationship between personal hygiene behavior and the occurrence of *tinea unguium* infection in farmers in Jember Regency. Positive results were mostly caused by *Trichophyton rubrum* and *Trichophyton tonsurans*, while *Aspergillus* species mostly caused negative results in this study. Factors such as gender, age, education level, and personal hygiene can influence the occurrence of *tinea unguium* infection. Good personal hygiene was identified as important in preventing such infections.

ACKNOWLEDGMENT

The authors would like to thank the Faculty of Medicine, University of Jember, which has permitted to use the microbiology laboratory in the examination of samples, all farmers who have been willing to be respondents and take the time to be interviewed, Mrs. Lilis Lestari as the FK UNEJ microbiology laboratory analyst who has helped in this research, as well as the thesis examiners who have provided input on this research. We would also like to thank all those who have supported and volunteered their time for this research so that this research runs smoothly.

DECLARATIONS

Conflict of interest. The authors declare that there is no conflict of interest.
Additional information. No additional information is available from this article.

REFERENCES

1. Zafar A, Jabeen K, Farooqi J. Practical guide and atlas for the diagnosis of fungal infections. [Internet]. 2017. 55–62 hal. Available from: https://ecommons.aku.edu/books
2. Kamil, Khasanah M, Marsudi LO, Sulastri. Studi Literature Agen dan Faktor Risiko Penyebab Tinea Unguium Pada Infeksi Kuku Kaki Petani. J Teknol Lab Med Borneo. 2021;1(1):34–41. Available from: https://jurnal.itkeswhs.ac.id/index.php/mlt/article/view/816x
3. Leung AKC, Lam JM, Leong KF, Hon KL, Barankin B, Leung AAM, et al. Onychomycosis: An Updated Review. Recent Pat Inflamm Allergy Drug Discov. 18 November 2019;14(1):32–45. DOI : https://doi.org/10.2174/1872213X13666191026090713
4. Jazdarehee A, Malekafzali L, Lee J, Lewis R, Mukovozov I. Transmission of Onychomycosis and Dermatophytosis between Household Members: A Scoping Review. Vol. 8, Journal of Fungi. MDPI; 2022. DOI: https://doi.org/10.3390/jof8010060
5. Surekha A, Kumar Gr, Sridevi K, Murty D, Usha G, Bharathi G. Superficial dermatomycoses: A prospective clinico-mycological study. J Clin Sci Res. 2015;4(1):7. DOI: https://doi.org/10.15380/2277-5706.JCSR.14.051
6. Hayati I, Marselina R. "Prevalensi Onikomikosis pada Petani Sawah di Kecamatan Seginim Kabupaten Bengkulu Selatan." ANJANI J Heal Sci Study [Internet]. 2021;1(2):49–53 DOI:

https://doi.org/10.37638/anjani.v1i2.217
7. Radhakrishnan G. Sampling in Mixed Methods Research. Int J Adv Nurs Manag. 2014;2(March):24–7. Available from: https://ijanm.com/HTMLPaper.aspx?Journal=International%20Journal%20of%20Advances%20in%20Nursing%20Management;PID=2014-2-1-7
8. Fahmi, Norma Farizah, Dwi Aprilia YK. Pola Infeksi Jamur Kuku (Onikomikosis) Jari Tangan dan kaki pada Pekerja Tempat Penitipan Hewan pada Media Potato Dextrose Agar. J Ilmu Kesehat Bhakti Husada Heal Sci J. 2021;12(2):107–23. DOI: https://doi.org/10.34305/jikbh.v12i2.324
9. Nurfadillah, Hartati, Sulfiani. Identifikasi Jamur Dermatofita Penyebab Tinea unguium pada Kuku kaki Petani di Dusun Ballakale Desa Aska Kecamatan Sinjai selatan Kabupaten Sinjai. Kampurui J Kesehat Masy [Internet]. 2021;3(2):84–92. DOI: https://doi.org/10.55340/kjkm.v3i2.498
10. Permatasari A, M. Rondhi. Faktor-Faktor yang Memengaruhi Petani Padi dalam Mengikuti Kemitraan di Indonesia. J Agribisnis Indones. 16 Juni 2022;10(1):15–30. DOI: https://doi.org/10.29244/jai.2022.10.1.15-30
11. Devy D, Ervianti E. Studi Retrospektif: Karakteristik Dermatofitosis. Period Dermatology Venereol. 2018;30(1):66–72. Available from: https://e-journal.unair.ac.id/BIKK/article/download/4573/pdf_1
12. Yuwita W, Ramali LM, N RM. Karakteristik Tinea Kruris dan / atau Tinea Kapitis di RSUD Ciamis Jawa Barat. Berk Ilmu Kesehat Kulit dan Kelamin – Period Dermatology Venereol. 2016;28(2):42–51. Available from: https://e-journal.unair.ac.id/BIKK/article/download/2815/2034
13. Restiyani, Safari WF, Syafaat M. Hubungan Personal Hygiene Dengan Mikosis Superfisialis di Pondok Pesantren. Vol. 6. 2023. Available from: https://repository.binawan.ac.id/2526/
14. Nurfadila A, Hermansyah H, Karneli, Refai. Gambaran Keberadaan Tinea Unguium Pada Kuku Kaki Petani Padi Di Kelurahan Sungai Selincah Kecamatan Kalidoni Kota Palembang Tahun 2021. J Fatmawati Lab Med Sci. 2021;1(1):27–40. Available from: https://repository.poltekkespalembang.ac.id/items/show/2954
15. Martínez E, Ameen M, Tejada D, Arenas R. "Microsporum spp. onychomycosis: Disease presentation, risk factors and treatment responses in an urban population." Brazilian J Infect Dis. Maret 2014;18(2):181–6. DOI: https://doi.org/10.1016/j.bjid.2013.08.005
16. Amalia R, Rifqoh R, Nurmansyah D. Corelation of Personal Hygiene Towards Tinea unguium Infection on Farmers Toe-nails in the Kelurahan Kebun Sari Districts Amuntai Middle. J Ergasterio [Internet]. 2018;5(2):31–8. Available from: http://jurnalstikesborneolestari.ac.id/index.php/analisborles/article/view/160.
17. Erik Erika E, Faqihatus Syarifah Has D. Hubungan Penggunaan Alat Pelindung Diri dengan Penyakit Tinea Pedis pada Petani Sayur dan Buat di Desa Lampah. J Mitra Kesehat [Internet]. 2023;06(01):1–9. DOI: https://doi.org/10.47522/jmk.v6i1.184