

Growth of *Malassezia furfur* in Media with The Addition of Basil (*Ocimum basilicum* Linn) Powder

*Haris Nurdin Pratama, Leka Lutpiatina, Ratih Dewi Dwiyantri, Ahmad Muhlisin

Medical Laboratory Technology Poltekkes Kemenkes Banjarmasin

Mistar Cokrokusumo Street 4a Banjarbaru, Indonesia.

*E-mail: harisnurdin@gmail.com

Abstract: *Malassezia furfur* is very easy to infect the skin of people who are often in damp places with higher water content for a long time. One of the plants that can add to inhibit the growth of *Malassezia furfur* is basil. The purpose of this study was to determine the number of *Malassezia furfur* mushroom growths formed on the SDA media with the addition of basil powder concentrations of 2%, 4%, 6%, and 8% on day 5. The method used in this study was experimental with a post-test research design with control. The material used is the leaves of basil plants obtained from basil plantations in Sukamara Village, Landasan Ulin Banjarbaru, Indonesia. The results of the study, *Malassezia furfur*, grew in all concentrations with a creamy colony, smooth and soft texture with sizes between 1-2 mm and microscopically obtained hyphae and spores. The conclusion of this study, *Malassezia furfur* mushroom growth in all concentrations of 2%, 4%, 6%, and 8% with the results of the number of colonies in a row that is 798 colonies, 755 colonies, 661 colonies, 622 colonies. The results showed a decrease in the name of colonies, with each increase in concentration.

Keywords: basil powder; *Malassezia furfur*

INTRODUCTION

Skin disease can cause skin malfunction, and this is as serious as liver and kidney disease. One of the superficial skin diseases that most often appear in the community is the fungus tinea versicolor¹.

Tinea versicolor (Pityriasis Versicolor) in Indonesia has a high incidence. Some hospitals in Indonesia have a high number of patients with superficial dermatophytosis Pityriasis Versicolor in dermatophytosis. This disease is commonly found in low socioeconomic populations and is associated with high or low personal hygiene (2). Tinea versicolor is a skin disease that often occurs, both in women and men, especially health and poor sanitation. Tinea versicolor caused by the superficial fungus *Malassezia furfur*³.

Malassezia furfur is a type of fungus that can infect the stratum corneum of the epidermis of the skin that often suffers from people who often sweat. *Malassezia furfur* mushrooms are very easy to affect the skin of people who are often in damp places with higher water content in a long time⁴. *Malassezia furfur* is a hyphae phase that has invasive, pathogenic properties and can found at the site of the lesion. Parts of the body

Corresponding Author: Haris Nurdin Pratama

Medical Laboratory Technology Poltekkes Kemenkes Banjarmasin.

Mistar Cokrokusumo Street 4a Banjarbaru, Indonesia.

E-mail: harisnurdin@gmail.com

that can be attacked by this fungus occur on the body or other body parts, such as the armpits, groin, arms, upper legs, neck, and hairy scalp.

Utilization of natural ingredients began to bloom among the people as the phenomenon of resistance to chemical drugs increased⁵. One of the medicinal herbs used in the community is basil (*Ocimum basilicum* L.). Basil community used as a vegetable or salad. Aside from being a plant, basil also has the property to overcome bad breath, body odor, lifeless body, anti-inflammation, natural antibiotics, diuretics, analgesics, blood circulation, cleanse toxins, antimalarials, menstrual pain, antifungal, prevent cancer and reduce cholesterol. Basil is also rich in beta-carotene and magnesium, which functions to maintain and maintain heart health⁶. Besides, basil can treat headaches, coughs, diarrhea, constipation, warts, worms, kidney damage, and digestive problems⁷.

In basil plants (*Ocimum basilicum* L.) has many chemical contents, including saponins, flavonoids, tannins, and essential oils. The main ingredient in basil (*Ocimum basilicum* L.) is an essential oil⁸. Essential oils in basil leaves reported having an antibacterial activity⁹. Essential oils from this plant also function antimicrobial, antifungal, anticancer, anticonvulsant, hypnotic, and antioxidant^{10,11}. *Ocimum basilicum* L. is antioxidant and antimicrobial because of its content of phenolic acids and aromatic compounds^{12,13}. Basil extract can also reduce the number of minced pork microbes¹⁴.

Gunadi & Dian's research (2010), about basil leaf essential oil against *Malassezia furfur* in vitro, showed the results of no growth of fungal colonies on media that had been added basil essential oil at concentrations of 100%, 50%, 25%, 12.5%, 6, 25%¹⁵.

Basil essential oil has shown to inhibit the growth of *Malassezia furfur* in the medium in vitro. Still, the basil leaves which processed into powder have not proven to inhibit the growth of these fungi. Basil material expected even to contain essential oils that function as antifungal. Although this essential oil is not released directly from the powder, it is possible to diffuse the media so that it inhibits the growth of *Malassezia furfur* mushrooms. This study aims to determine the picture of *Malassezia furfur* fungus growth in the media with the addition of basil powder.

MATERIALS AND METHODS

This type of research used in this study is experimental. The material used was the leaves of the basil plant obtained from the basil plantation in the village of Sukamara Landasan Ulin Banjarbaru, Indonesia which determined in the primary laboratory of the Faculty of Mathematics and Natural Sciences, Lambung Mangkurat University.

The basil used is fresh green leaves. The leaves are washed thoroughly first and roasted at 50°C for 6 hours until the basil is dry. Then blend the dried basil until it becomes powder. The powder sieved on a sieve. The treatment by taking the fungus *Malassezia furfur* was dissolved with sterile NaCl and then compared with MacFarland Standard 0.1. The 10 μ suspension spread over the surface of the Sabouraud Dextrose Agar (SDA) medium containing 2%, 4%, 6%, 8% basil powder, and control. It leveled with a bent triangle as a whole on the surface of the SDA media. Observe the growth of the fungus ie, the number of colonies macroscopically and microscopically on days 3-7.

RESULT AND DISCUSSION

The results of research on the growth picture of *Malassezia furfur* fungi on media with macroscopic addition of basil powder can see in Figure 1 and Table 1.

Table 1. Description of The Number of *Malassezia furfur* Colonies on Media with The Addition of Basil Powder

Concentration	Yields the average number of <i>Malassezia furfur</i> colonies with the addition of basil powder
Control	813 Colonies
2%	798 Colonies
4%	755 Colonies
6%	661 Colonies
8%	622 Colonies

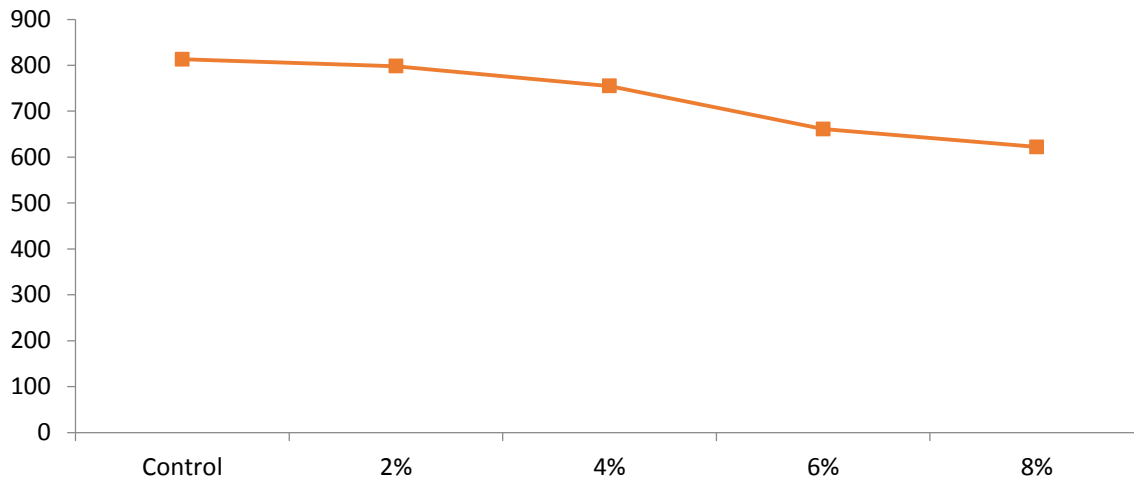


Figure 1 Overview of The Number of *Malassezia furfur* Colonies on Media with The Addition of Basil Powder

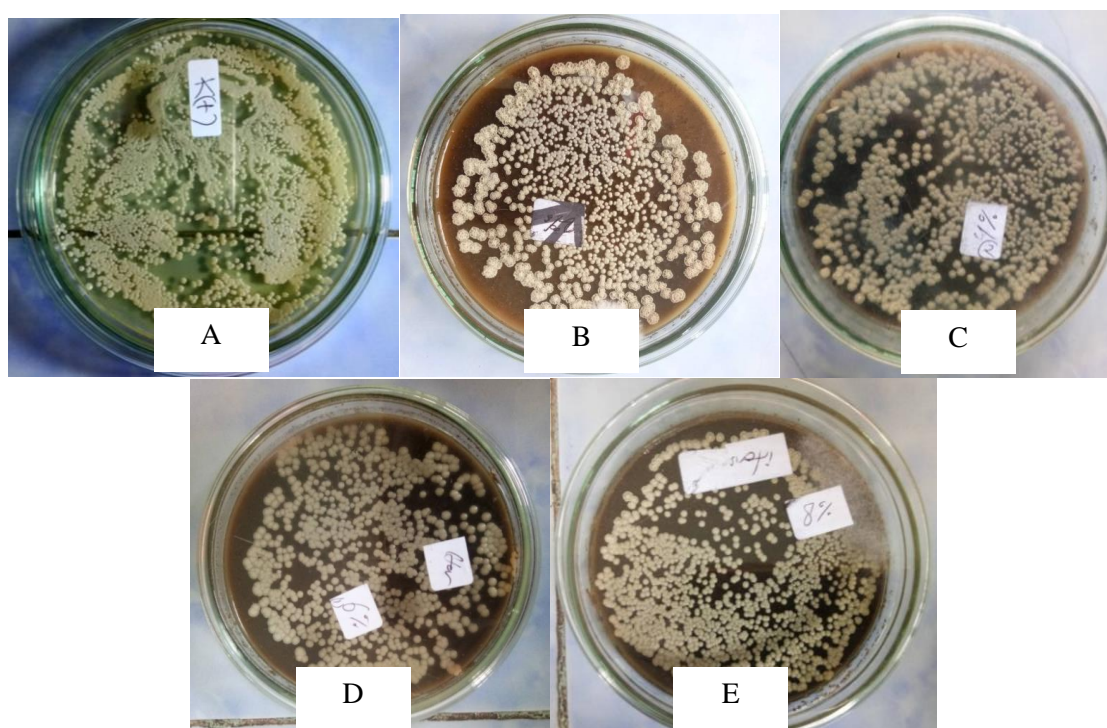
Figure 1 shows the growth in the number of colonies of each concentration, namely positive control, 2%, 4%, 6% and 8% with a difference of 15, 43, 94, and 39 fungal colonies respectively, then a decrease in the number of colonies is seen. from each concentration.

Malassezia furfur fungus growth results on the media with the addition of basil powder seen from the color, surface, and size of the *Malassezia furfur* mushroom colonies of each concentration.

At each concentration macroscopic examination was performed to see the color, surface, and size of the *Malassezia furfur* fungi colonies that had formed.

Table 2 Macroscopic Results of The Growth of The *Malassezia furfur*.

Concentration	Growth Results	Examination of <i>Malassezia furfur</i>				
		3rd day	4rd day	5rd day	6rd day	7rd day
Control	Color	Cream	Cream	Cream	Cream	Cream
	Surface	Smooth	Smooth	Smooth	Smooth	Smooth
	Size	± 1 mm	± 1 mm	± 1 mm	± 1 mm	± 1 mm
2%	Color	Cream	Cream	Cream	Cream	Cream
	Surface	Smooth	Smooth	Smooth	Smooth	Smooth
	Size	± 1 mm	± 1 mm	± 1 mm	± 1 mm	± 1 mm
4%	Color	Cream	Cream	Cream	Cream	Cream
	Surface	Smooth	Smooth	Smooth	Smooth	Smooth
	Size	± 1 mm	± 1 mm	± 1 mm	± 1 mm	± 1 mm
6%	Color	Cream	Cream	Cream	Cream	Cream
	Surface	Smooth	Smooth	Smooth	Smooth	Smooth
	Size	± 2 mm	± 2 mm	± 2 mm	± 2 mm	± 2 mm
8%	Color	Cream	Cream	Cream	Cream	Cream
	Surface	Smooth	Smooth	Smooth	Smooth	Smooth
	Size	± 2 mm	± 2 mm	± 2 cm	± 2 cm	± 2 mm

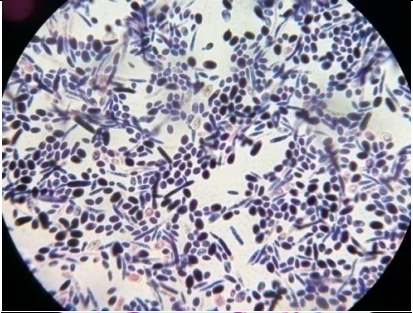
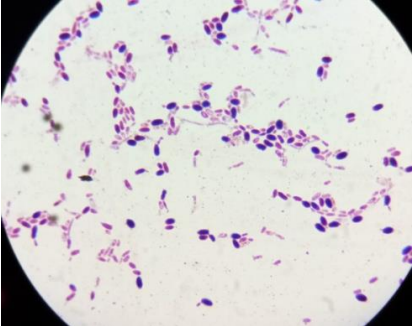




Media control = A, Basil Powder 2% = B, 4% = C, 6% = D, 8% = E

Figure 2. *Malassezia furfur* colonies on Media with The Addition of Basil Powder of Various Concentrations

At each concentration, the *Malassezia furfur* fungi colony took and gram stained. They then examined under a microscope to see fungal growth microscopically. The results of the growth of the fungus *Malassezia furfur* can be seen microscopically in table 3.

Table 3. Microscopic Images of *Malassezia furfur* Growth

Powder Concentration	Morphology	Figure
2%	hyphae and spores	
4%	hyphae and spores	
6%	hyphae and spores	
8%	hyphae and spores	

The results of the description of the growth of the fungus *Malassezia furfur* on Media With the Addition of Basil Powder at a concentration of 2%, 4%, 6%, and 8%. Fungi can grow at all concentrations of 2%, 4%, 6%, and 8%. At concentrations of 2%

and 4%, the fungus grows with the same colony size of ± 0.1 mm on average. At concentrations of 6% and 8%, the fungus grows with the same colony size of ± 0.2 mm on average.

Based on the results of research on the growth of *Malassezia furfur* fungi colonies on SDA media with the addition of basil powder. Fungi can grow at all concentrations of 2%, 4%, 6%, and 8%, but there is a decrease in the number of colonies from small levels to significant concentrations. They show that the basil leaves may contain compounds that have anti-fungal activity. Some compounds contained in basil leaves, which thought to have an action against *Malassezia furfur*, are eugenol.

According to Park (2007), eugenol can damage the mycelia and thus damage cell walls¹⁶. The cell wall of *Malassezia furfur* consists of sugar compounds (70%), protein (10%) and lipids (15-20%), and small amounts of nitrogen and sulfur¹⁷.

Other studies show basil essential oil can inhibit the growth of fungi such as *A. brassicicola*, *A. Flavus*, *F. Moniliform*, *P. grisea*, *F. proliferatum*¹⁸. Gunadi & Dian's research (2010), about basil leaf essential oil activity in *Malassezia furfur* in vitro, shows the results of not getting growth of fungal colonies on media that have been added basil essential oil at a concentration of 100%, 50%, 25%, 12.5% 6.25%.

This study uses basil powder in inhibiting the growth of *Malassezia furfur* at a concentration of 2%, 4%, 6%, and 8%. Less effective results found in inhibiting the fungus *Malassezia furfur*. They can cause differences in the types of materials used in the study, namely materials in the form of powder and essential oils of basil leaves. In the research of Gunadi and Dian (2010), Basil essential oil can inhibit *Malassezia furfur* at the lowest concentration, 6.25%, which is characterized by no growth in the media. Whereas in this study, basil powder was less able to inhibit the growth of *Malassezia furfur* at the highest concentration, 8% with a reduction in the number of colonies, although there is still growing so that the use of basil powder is less effective in inhibiting the growth of *Malassezia furfur* compared to essential oils.

The limitation of this study is the maximum concentration of basil powder used by 8% so that no powder concentration found, which could inhibit the growth of *Malassezia furfur* optimally (the colony did not grow on the media). Further research expected to use powder with a concentration of 10-50%.

CONCLUSION

Malassezia furfur mushroom growth in all concentrations of 2%, 4%, 6%, and 8% with the results of the number of colonies in a row that is 798 colonies, 755 colonies, 661 colonies, 622 colonies.

CONFLICT OF INTEREST

There were no conflicts of interest with related parties in this study.

REFERENCES

1. Deviannita E. *Expert System to Diagnose Types of Skin Infectious Diseases*. Semarang: Universitas Diponegoro; 2010.
2. Mustofa A. *Prevalence and Risk Factors for Pityriasis versicolor in Semarang City Traffic Police*. Skripsi. Semarang: Universitas Diponegoro; 2014.
3. Siregar, R. S. *Skin Fungus Disease*. Jakarta: Buku Kedokteran; 2005

4. Hayati, Inayah. *Identification of Malassezia furfur fungi in fishermen with skin disease in RT 09 Kelurahan Malabro, Bengkulu City*. Bengkulu : Akademi Analisis Kesehatan Harapan Bangsa Bengkulu, Indonesia; 2014
5. Sastroamidjojo S. *Original Indonesian medicine*. Ed 6. Jakarta: Dian Rakyat; 2001. p. 141
6. Lenton Patricia, Majerus Georgia, Bakhdash Bashar. Conseling and treating bad breath patients, a step-by step approach. *The Jurnal of Contemporary Dental Practice*. 2001;2(2):2001.
7. G. Tsasi, T. Mailis, A. Daskalaki et al. The effect of harvesting on the composition of essential oils from five varieties of *Ocimum basilicum* L. cultivated in the Island of Kefalonia, Greece. *Plants*. 2017;6(3)
8. Muchtaridi. Penelitian pengembangan minyak atsiri sebagai aromaterapi dan potensinya sebagai produk sediaan farmasi. *J. Tek. Ind*. 17(3):80-88.
9. Yosephine Ardiana Dewi, Wulanjati Martha Purnami, Saifullah Teuku Nanda, Astuti Puji. Formulasi mouthwash minyak atsiri daun kemangi (*Ocimum basilicum* L.) Serta uji antibakteri dan antibiofilm terhadap bakteri streptococcus mutans secara in vitro. *Trad. Med. J*. May 2013;18(2):95-102
10. Jakowienko, B. Wójcik-Stopczyńska, and D. Jadczyk. Antifungal activity of essential oils from two varieties of sweet basil (*Ocimum basilicum* L.). *Vegetable Crops Research Bulletin*. 2011;74(1):97–106
11. R. Joshi. Chemical composition and antimicrobial activity of the essential oil of *Ocimum basilicum* L. (sweet basil) from Western Ghats of North West Karnataka, India. *Ancient Science of Life*. 2014; 33(3):149
12. S. K. Marwat, M. S. Khan, S. Ghulam, N. Anwar, G. Mustafa, and K. Usman. Phytochemical constituents and pharmacological activities of sweet *Basil-Ocimum basilicum* L. (Lamiaceae). *Asian Journal of Chemistry*. 2011;23(9):3773–3782
13. H. A. A. Taie, Z. A.-E. R. Salama, and S. Radwan. Potential activity of basil plants as a source of antioxidants and anticancer agents as affected by organic and bio-organic fertilization. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*. 2010;38(1):119–127
14. Kuzelov, D. Andronikov, N. Taskov, E. Sofijanov, and D. Saneva. Oxidative stability effect of basil, garlic and muscat blossom extracts on lipids and microbiology of minced meat. *Comptes rendus de l'Academie bulgare des Sciences*. 2017;70(9):1227–1236.
15. Gunardi & D. Dian. Pemisahan Minyak Atsiri Daun Kemangi (*Ocimum Basilicum* Linn) Secara Kromatografi Lapis Tipis Dan Aktivitasnya Terhadap *Malassezia furfur* In Vitro. *Media Medika Muda*. 2010; 4:63-68
16. Park, M.-J., Gwak, K.-S., Yang, I., Choi, W.-S., Jin Jo, H., Chang, J.-W., et al. Antifungal activities of the essential oils in *syzygium aromaticum* merr. Et perry and leptosperum petersonii bailetheir constituents against various dermatophytes. *Journal of Microbiology*. 2007;45: 460-465
17. Ashbee HR, Evans V. Immunology of disease associated with *Malassezia* species. *Clinical Microbiology Reviews*. 2002;15(1):21-57
18. Piyo, A., J. Udomsilp, P. Khang-Khun, dan P. Thobunluepop. Antifungal Activity of Essential Oils from Basil (*Ocimum basilicum* Linn.) and Sweet Fennel (*Ocimum*

gratissimum Linn): Alternative Strategies to Control Pathogenic Fungi in Organic Rice. *As.J.Food Ag-Ind.* 2009;Special Issue:S2- S9.