Clove (Syzygium aromaticum) Effect on Growth *Malassezia Furfur* and *Aspergillus sp* on Media

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Abstract

Background: Malassezia furfur and Aspergillus sp are fungi associated with infection in humans. One of the plants that can use as anti fungi is clove (Syzygium aromaticum).

Aim: The purpose of this study was to determine the growth barriers of Malassezia furfur and Aspergillus sp on media with the addition of Clove Powder (Syzygium aromaticum).

Material and Method: The equipment used by cloves (Syzygium aromaticum) is a part of the reddish-green flower. The samples used in this study were Malassezia furfur and Aspergillus sp. Specimens planted on Saboraud Dextrose Agar media with the addition of clove powder (Syzygium aromaticum) in various concentrations.

Results: Malassezia furfur in media with clove powder concentration of 0%; 0.05%; 0.1% shows the number of colonies 1330; 1135; 765. Aspergillus niger, Aspergillus flavus, Aspergillus fumigatus on media with clove powder concentration of 0%; 0.05%; 0.2% indicates colony diameter of 6.8 cm; 5 cm; 3.7 cm (Aspergillus niger), 6.7 cm; 5 cm; 4.3 cm (Aspergillus flavus), 7 cm; 5 cm; 2.3 cm (Aspergillus fumigatus).

Conclusion: Media with Addition of Clove Powder (Syzygium aromaticum) can inhibit the growth of Malassezia furfur and Aspergillus sp.

Keywords*: Malassezia furfur; Aspergillus sp; Clove (Syzygium aromaticum).*

Introduction

The development of fungal infections in Indonesia strongly supported by a tropical climate with high humidity, sanitation, and an unhealthy lifestyle. Indonesia has a problem with bacterial and fungal infections. Bacterial infections such as tuberculosis[1,2,3] and Staphylococcus aureus[4,5] are significant obstacles. There are also environmental contaminant bacteria and fungal[6] such as Salmonella[7], E Coli[8], Staphylococcus aureus[9,10] and Bacillus[11,12]. Fungal infections such as Malassezia furfur which cause Pityriasis Versicolor often found in the community of children and adults.

Fungi can cause disease not only by infecting the body but also creating mycotoxin contaminated food. Foods contaminated by fungi have a potential danger to human health. Aspergillus flavus, Aspergillus fumigatus, and Aspergillus niger produce aflatoxin which is harmful to health

Handling fungal infections and contamination in food can use natural ingredients. Indonesia is a country rich in herbal plants such as Anredera cordifolia[13], Cananga odorata (Lamk). Hook[14], lime[15], Syzygium polyanthum[16], Carica papaya Linn[17], Jatropha curcas[18], Kaempferia galanga L.[19], Cinnamomum burmannii[20] Eleutherine palmifollia (L) Merr[21], Hibiscus sabdariffa L.[22]

Since ancient times herbal plants have been widely used as antimicrobials[23]. These herbaceous plants contain essential oils with antibacterial and antifungal activity[24]. Some essential oils show important antifungal activity, namely yeast, dermatophytes fungi, and Aspergillus strains. This therapy is mainly used in mucosal, skin, and respiratory tract diseases[25].

Syzygium aromaticum is a plant that widely cultivated in Indonesia. Clove and eugenol oils from

Syzygium aromaticum have antiseptic. Analgesic and anesthetic effects[26]. And have been tested in experimental animals as an antifungal[27,28]. Clove oil and Eugenol also have activities against filamentous fungus of food[29] and pathogenic fungi in humans[30].

Pinto et al. (2009) proved that clove oil and Eugenol had considerable antifungal activity against Candida, Aspergillus, and Dermatophytes fungi. Clove oil and Eugenol from clove flowers (Syzygium aromaticum) have been shown to inhibit the growth of Malassezia furfur and Aspergillus. But clove flowers (Syzygium aromaticum) which processed into powder have not been shown to inhibit the growth of these fungi. The clove powder material is expected to contain still essential oils which function as antifungals. Although this essential oil is not removed directly from the powder, it is possible to diffuse it on the media and thus inhibit the growth of Malassezia furfur and Aspergillus fungi. This study aims to describe the growth of Malassezia furfur and Aspergillus fungi on media with the addition of clove powder (Syzygium aromaticum) and determine the concentration to prevent the growth of fungi effectively[31].

Subjects and Methods

The population in this study was Clove flowers obtained at Jalan Meratus Kemuning Village, Banjarbaru Selatan District, South Kalimantan, Indonesia. The sample used is a fresh clove flower, which is reddish-green.

The independent variable of the study was SDA media with the addition of clove powder with a concentration variation of 0%, 0.05%, 0.1%, 0.2%, 0.5%, 1%, 2%. The dependent variable of the study was the growth of Malassezia furfur and Aspergillus sp as measured by colony diameter/number of colonies.

The cloves used are part of the fresh reddish flower. The flowers are washed first and dried in oven Hock at 45 ° C for 6 hours until the cloves are dry. Cloves are blended to powder and sieved on 40 mesh sieves. Making each concentration in 100 ml of Sabauraoud Dextrose Agar (SDA) so that the concentration is 0.05%: 0.05gr, 0.1%: 0,1gr, 0.2%: 0.2gr, 0.5%: 0.5gr, 1%: 1gr, 2%: 2gr.

Planting of Malassezia furfur used a suspension that conformed to the MacFarland Standard 0.1. Spread to Saboraud Dextrose Agar as much as 10µl then count the number of colonies on the 7th day after incubating room temperature.

Planting Aspergillus sp at Sabouraud Dextrose To use the ose at one point with a diameter of 1 cm, the width of the colony measured at the 7th-day room temperature incubation.

Results

The results of the description of the growth of Malassezia furfur on media by adding clove powder to each concentration can see in table 1.

Table 1. Number of Malassezia furfur colonies in media with clove powder

Concentration of clove powder	The number of Malassezia furfur colonies at 7th day incubation
0%	1330 colony
0,05 %	1135 colony
0,1 %	765 colony
0,2%	-
0,5 %	-
1 %	-
2 %	-

Calculation of the number of colonies of Malassezia furfur using the Colony Counter tool obtained the average number of colonies on the 7th day with 3 repetitions can be seen in table 2.

Table 2. Diameter of Aspergillus sp colonies in media with clove powder

Concentration of clove powder	Colony diameter of Aspergillus sp at 7th day incubation		
	Aspergillus niger	Aspergillus flavus	Aspergillus fumigatus
0%	6,8 cm	6,7 cm	7 cm
0,05%	5 cm	5 cm	5 cm
0,2%	3,7 cm	4,3 cm	2,3 cm
0,5%	-	-	-
1%	-	-	-
2%	-	-	-

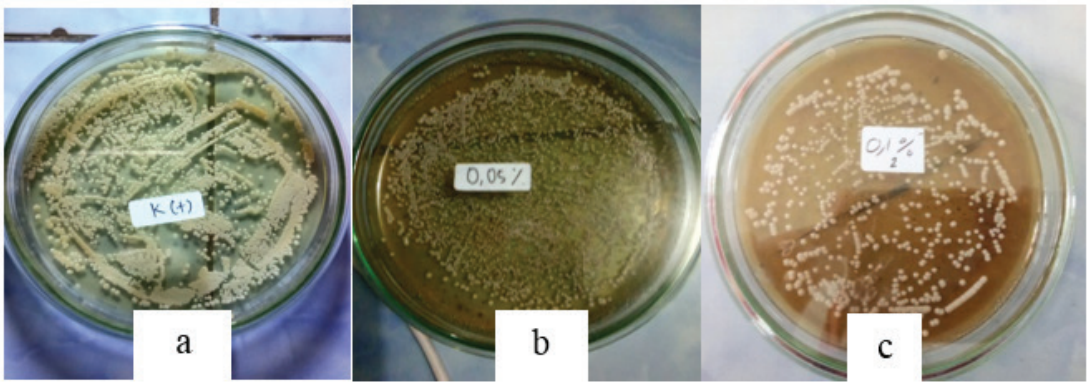

Figure 1. Malassezia furfur in media with clove powder 0% (a), 0.05% (b), 0.1% (c).

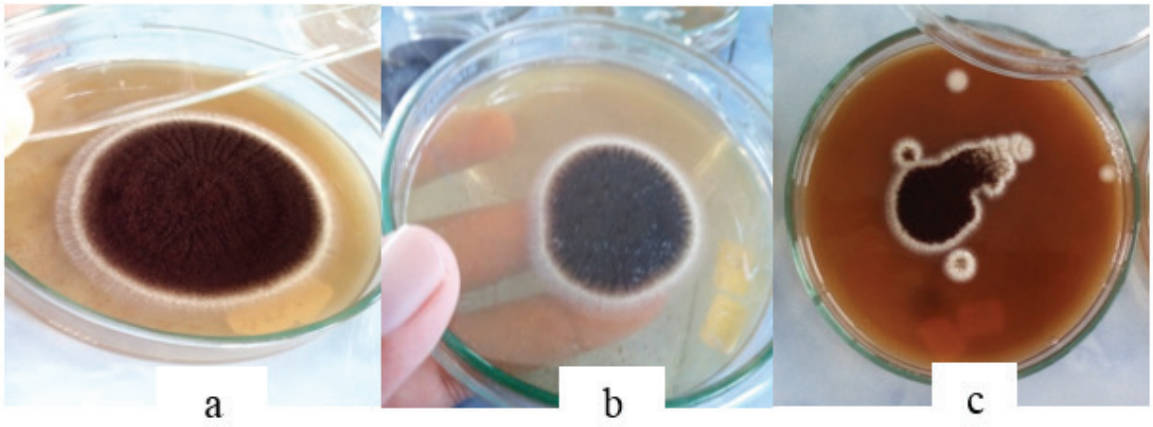

Figure 2. Aspergillus niger on media with the addition of clove powder 0% (a), 0.05% (b), and 0.2% (c)

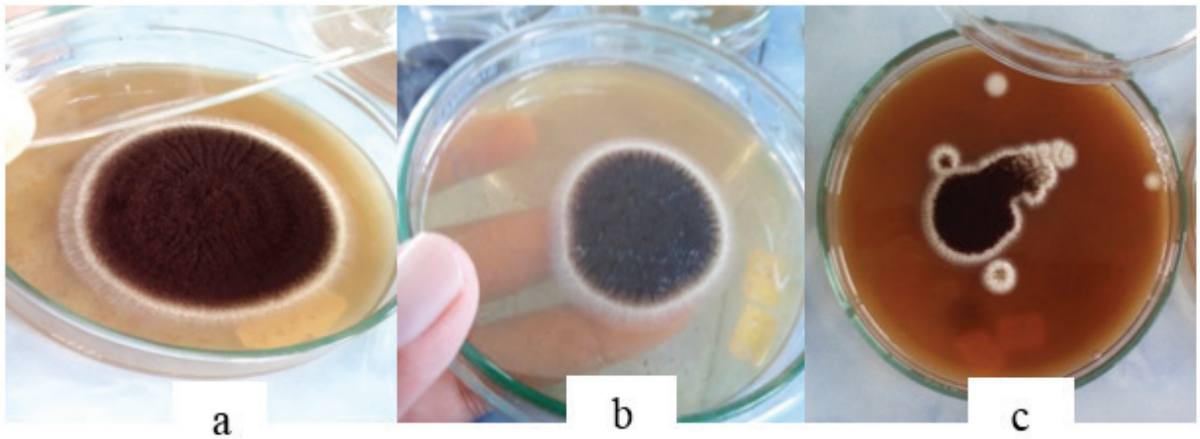

Figure 3. Aspergillus niger on media with the addition of clove powder 0% (a), 0.05% (b), and 0.2% (c)

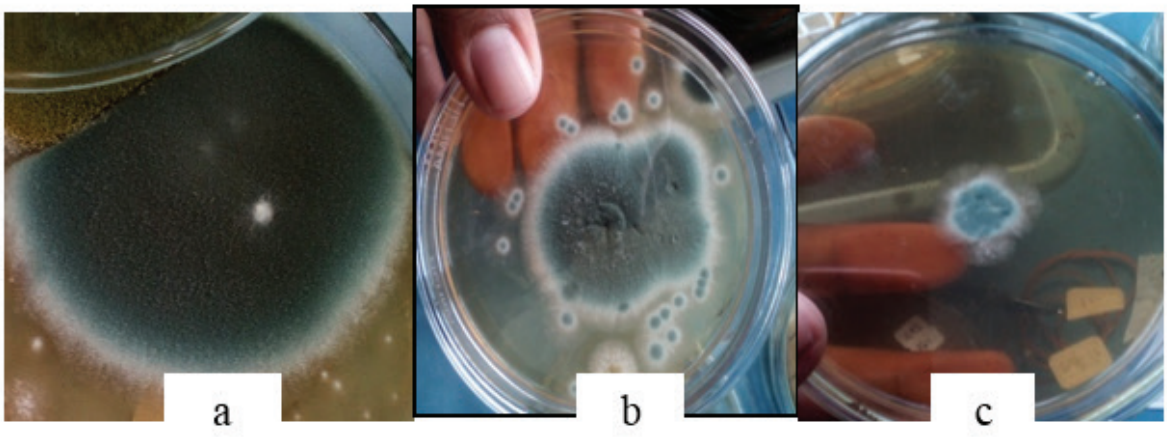

Figure 4. Aspergillus fumigatus on the media with the addition of clove powder 0% (a), 0.05% (b), and 0.2% (c)

Discussion

Based on the results in table 1, Malassezia furfur can inhibit by growth in media containing clove powder. This result is by Alharisy's research (2018), which proves that 1% clove extract (Syzygium aromaticum) can inhibit the growth of Malassezia furfur[32].

The results in table 2 show that there are differences in the diameter of the colonies of Aspergillus niger, Aspergillus flavus, Aspergillus fumigatus, each concentration of clove powder (Syzygium aromaticum). This study proves that clove powder can inhibit the growth of fungi. The same thing was confirmed by Utami's research (2010) that clove powder (Syzygium aromaticum) could hinder the growth of microbes and fungi at concentrations of 0.2% and 0.6% on pineapple jam[33]. According to Pinto et al. Research, clove oil can also inhibit the growth of Aspergillus sp[31].

Clove oil tends to cause interference with bacterial cell membranes and fungi[24]. This activity occurs in the lipid bilayer of cell membranes resulting in changes in permeability and leakage of cell contents[34]. Recent antimicrobial studies from several essential oils have shown disruption to bacterial membranes and fungi[35].

The effectiveness of inhibition of fungi by clove powder is also likely due to the eugenol compound found in clove plants. Eugenol is one of the main elements of clove oil (Syzygium aromaticum). Eugenol also shows excellent antimicrobial activity against fungi and Gram-positive. And Gram-negative bacteria[36].

According to Park et al. (2007), the mechanism of growth inhibition of fungi caused by compounds of Eugenol, which can damage misellia. Which have smooth cell walls with a long section of hyphae, Eugenol will damage the inner mitochondrial membrane of cells and damage cell walls. Mitochondria functions to produce energy and food because mitochondrial cells destroyed, so the energy and food sources in fungi cells are blocked so that the fungi will die. In Conclusion Media with Addition of Clove Powder (Syzygium aromaticum) can inhibit the growth of Malassezia furfur and Aspergillus sp[37].

Conclusion

Media with Addition of Clove Powder (Syzygium aromaticum) can inhibit the growth of Malassezia furfur and Aspergillus sp.

Conflict of Interest: Nil

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