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The Antimicrobe of *Kaempferia galanga* L. Rhizome against *Microsporum canis* and *Staphylococcus epidermidis* – In-vitro Study

Dewi Purnama[1], Kiki Nurtjahja*[2], Meida Nugrahalia[3], Ida Fauziah[1]

[1]Biology Study Program, Faculty of Science and Technology, Medan Area University, Jalan Kolam no.1, Medan 20223, Indonesia
[2]Biology Study Program, Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara, Jalan Bioteknologi no. 1 Medan, North Sumatera 20115, Indonesia
[3]Biology Study Program, Faculty of Mathematics and Natural Sciences, Universitas Negeri Medan, Jalan Willem Iskandar, Pasar V Medan Estate, Percut Sei Tuan, Deli Serdang, Medan, North Sumatera 20115, Indonesia

Abstract. This study aims to determine the ability of ethanolic extract of Kaempferia galanga L. rhizome in inhibiting the growth of Microsporum canis and Staphylococcus epidermidis. Rhizome concentrations used were 40, 50, 60, and 70%. Each treatment was replicate 4 times. Results showed that extract of K. galanga rhizome up to 70% have not significantly differences against M. canis and S. epidermidis. Rhizome extract of 70% inhibit the growth of M. canis with the highest inhibition 5.88 mm (in compared to ketoconazole 10.35 mm). Whereas the extract of 70% inhibit S. epidermidis with the highest inhibition 3.16 mm (in compared to chloramphenicol 25.49 mm).

Keywords: Kaempferia galanga, rhizome, Microsporum canis, Staphylococcus epidermidis

Abstrak. *Penelitian ini bertujuan untuk mengetahui kemampuan ekstrak etanol rimpang Kaempferia galanga L. dalam menghambat pertumbuhan Microsporum canis dan Staphylococcus epidermidis. Konsentrasi rimpang yang digunakan adalah 40, 50, 60, dan 70%. Setiap perlakuan diulang sebanyak 4 kali. Hasil penelitian menunjukkan bahwa ekstrak rimpang K. galanga hingga 70% tidak berbeda nyata terhadap M. canis dan S. epidermidis. Ekstrak rimpang 70% menghambat pertumbuhan M. canis dengan daya hambat tertinggi 5,88 mm (dibandingkan ketoconazole 10,35 mm). Sedangkan ekstrak 70% menghambat S. epidermidis dengan daya hambat tertinggi 3,16 mm (dibandingkan kloramfenikol 25,49 mm).*

Kata kunci*: Kaempferia galanga, rimpang, Microsporum canis, Staphylococcus epidermidis*

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*Corresponding author at: Departement of Biology, Faculty Mathematics and Natural Science, Universitas Sumatera Utara, Medan, Indonesia
E-mail address: kiki2@usu.ac.id

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1 Introduction

Kaempferia galanga L. is one of herb plants (Family Zingiberaceae), native to India and common grow in China, Myanmar, Indonesia, Malaysia, and Thailand [1]. The herb commonly used as mixed for food flavoring, spice since its highly aromas, cosmetics or as a traditional medicine [2, 3]. Rao and Kaladhar [4] reported that rhizome of *K. galanga* contain antioxidant and antimicrobial activity. The in vitro antimicrobial activity of the essential oil of *K. galanga* rhizome against Gram-positive and Gram-negative bacteria was reported by Tewtrakul et al. [5]. Whereas Belgis et al. [6] observed that essential oils of *K. galanga* rhizome contain ethyl p-methoxy cinnamate (23.65%) and ethyl cinnamate (5.98%) that potential as an antibacterial against *Staphylococcus pyogenes* and *Staphylococcus aureus* that can cause sore throat. Previous study by Parvez et al. [7] stated that crude extract of the rhizome *K. galanga* with petroleum, ether, acetone, and methanol have antimicrobial activities against Gram-positive bacteria (*Bacillus* sp., *Pseudomonas* sp.) and Gram-negative pathogenic bacteria (*Escherichia coli*, *Salmonella* sp., *Shigella sonnei*) [3]. The in vitro antifungal activity of essential oil of *K. galanga* rhizome against dermatophyte, filamentous fungi and yeast was studied by Jantan et.al. [8], they found that the essential oil showed selective antifungal activity against dermatophytes *Aspergillus fumigatus* but ineffective against yeasts. *Microsporum canis* is the most common dermatophyte in domestic and wild animals [9, 10]. The pathogen is easily transmitted to human, causing lesion on skin (tinea corporis) and to the head (tinea capitis).

Vuong and Otto [11] reported that *Staphylococcus epidermidis* is one of opportunistic bacteria on human that cause nosocomial infection and difficult to eradicate. Otto [12] also stated that *S. epidermidis* is more virulent than *Staphylococcus aureus.* Therefore, the objective of this current study is to determine the ability ethanolic extract of *Kaempferia galanga* rhizome in inhibiting the growth of *Microsporum canis* and *Staphylococcus epidermidis*.

2 Materials and Methods

Bacterial and fungal isolation

Microbes used in this experiment was culture collection of Microbiology Pharmacy Laboratory, Universitas Sumatera Utara.

Preparation of extract

A total of 3000 g fresh harvested *K. galanga* was purchased from local farmer at Tinokkah Village Sipispis Regency, Serdang Bedagai, North Sumatera. The process of extraction was conducted according to the procedures of Sasidharan et al. [13] with some modifications. The dried rhizome was ground into powder using blender. The powder in flask 1000 ml then were submerged in 95% (v/v) ethanol. The suspension was stirred at 28℃ at 100 rpm for 12 h and filtered. The residue obtained was re-extracted in 40 ml 95% of ethanol, stirred for 12 h and filtered. The filtrate obtained then was concentrated using a rotary evaporator and lyophilized in a freeze dryer.

The filtrate was dissolved in DMSO to make concentration 40, 50, 60 and 70%. Antifungal (ketoconazole) and antibacteria (chloramphenicol) used as positive control (K+) and sterilized distilled water were used as negative control (K-). Each treatment was repeated three times.

Antimicrobe activity

The antimicrobe activity was conducted based on zone method. The medium used was potato dextrose agar (PDA) and nutrient agar (NA).

Statistical analysis

We analyzed the observed data using analysis of variance (ANOVA) for statistically significant differences, followed by Duncan's multiple range test at the 5% probability level. We used the Statistical Analysis System (SAS) software (version 9.1 3) statistical package (SAS Institute Inc. North Carolina).

2 Results and Discussion

Ethanolic extract of *K. galanga* rhizome was potential inhibit the growth of *M. canis* and *S. epidermidis*. The growth inhibition was indicated as the presence of clear zone surrounding paper disc. In general, the extract on each concentration more inhibits *S. epidermidis* than *M. canis* (Figure 1). However, Rao and Kaladhar et al. [4] observed that rhizome extract of *K. galanga* as good activity against *Aspergillus niger* and *Candida albicans*) 11 to 22 mm) when compared to gram positive bacteria (9.5 to 13 mm). Selective toxicity of the extract against *M. canis* might occurred as reported by Jantan et al. [8].

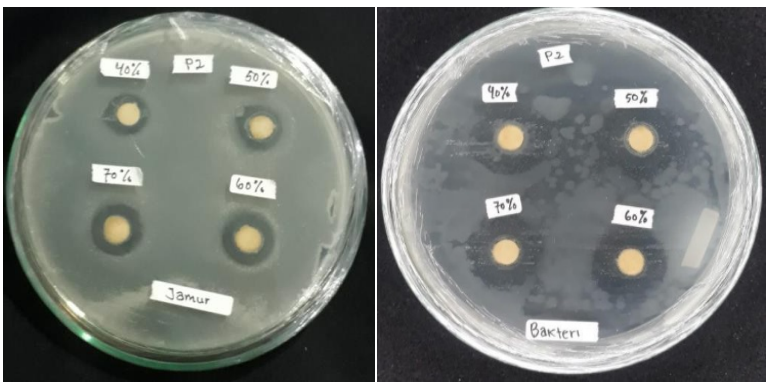

Figure 1. Inhibition zone ethanolic extract of *K. galanga* rhizome on *Microsporum canis* on PDA medium after 4 days at 28˚C (left), (b) Inhibition zone on NA medium on *Staphylococcus epidermidis* after 24 h at 28˚C (right)

Table 1 showed extract concentration of *K. galanga* from 40 to 70% inhibits the growth of *M. canis* and *S. epidermidis*. However, the inhibition not significantly different to concentration up to 70%. Control treatments, positive control (K+) i.e., ketoconazole (for *M. canis*) and chloramphenicol (for *S. epidermidis*) showed antimicrobial activity, both antimicrobes inhibit *M. canis* and *S. epidermidis* and showed significantly different to all extract treatments.

Table.1 Inhibition zone (mm) ethanolic extract of *K. galanga* rhizome on *Microsporum canis* and *Staphylococcus epidermidis*

Extract concentration (%)	Inhibition zone (mm)	
	Microsporum cannis	*Staphylococcus epidermidis*
K-	0.00 a	0.00 a
K+	25.49 b	10.35 c
40	2.01 a	3.94 b
50	2.90 a	3.96 b
60	3.04 a	5.45 b
70	3.16 a	5.88 b

Note: Numbers followed by same letters at the same column not significantly different (P<0.05)
K- = no extract; K+ = ketoconazole for *M. canis* and chloramphenicol for *S. epidermidis*

3 Conclusions

The ethanolic extract of *Kaempferia galanga* rhizome has shown antimicrobial activity against *Microsporum canis* and *Staphylococcus epidermidis* and hence the use of the rhizome extract is potential as an alternative antimicrobe.

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