**Extra n-Heksana Antifungi Cream Alpinia Galanga**

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**Abstract.** The use of galangal in the community is a common thing, in addition to cooking, it is used also to treat skin diseases caused by fungi, but the application is still traditional. Besides, many studies report that the compound in ginger have activity as an antifungal, among others, *Trichophyton metagrophytes* that causes ringworm. One of the elucidations showed that the galangal ethanol extract was able to treat the rabbits’ skin affected by the fungus, but its ability was less than the active antifungal cream compound on the market, katenazol. Other studies have shown that ginger nonpolar extract effectively inhibits the growth of fungi *T. metagrophytes*, but it has not been applied in the form of cream, nor there has a report on the impact of galangal extract allergy cream. The study traces the nonpolar extract of galangal against *Trichophyton metagrophytes*, compared with katenazol, applied in the form of creams, and skin allergy test. Based on the search results, the minimum inhibitory diameter of the ringworm fungus, between the galangal n-hexane extract has a greater value than the positive control, which is 36 mm. Spot on TLC between galangal nonpolar extract have the same Rf as katenazol, 0,62, and this extract does not affect skin allergy after 2 hours of use. The result of this study is expected to improve the utilization of galangal as an antifungal in the form of cream.

1. **Introduction**

Galangal (*Alpinia galanga* L.), is a natural substance that has the ability as an anti-fungal [1,2]. This group of rhizomes contains phenyl propanoid compounds 1’-acetoxychoacetate acerare, 1’acetoxyyugene acetate, and 1’-hydrochloric acetate acid [3]. Based on previously conducted studies [4], the fungus on the skin causes ringworm dermatofitosis and the cause is *Trichophyton metagrophytes*. Meanwhile, search results [5], fungus on the skin can cause *panu*. Both of these skin diseases, easily attack the community in the tropics, because in principle the fungus can live and regenerate in conditions of high humidity air [6].

Utilization of galangal rhizome as an antifungal drug, is usually applied simply, that is by rubbing on the skin [5]. This easy way of use affects not all parts of the touched, because the shape of the galangal is still large, so the fungus is not touched by the active compound as opposed to it. The search [6] mentions, that the skin fungus usually lives on the moisted and hidden skin, including groin, armpits, and between toes. To improve the antifungal function of the galangal, it needs to be provided in other forms, as well as in the form of creams or ointments.

Searches done [4] showed that the ethanol extract of galangal in a cream can cure rabbits infected with *Trichophyton metagrophytes*. However, the diameter of the inhibitory area is only half of the DDH catecholamazole (positive control), the active compound in the antifungal cream on the market. In addition, there has been no test report of allergic cream test of ethanol galangal.

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Based on the above exposure, it is necessary to trace the galangal antifungal in the cream preparation, with nonpolar solvent extract, and allergy test.

2. Methods
This research was conducted at an integrated laboratory of UIN Sunan Gunung Djati, laboratory test of Bio Farma Jl. Sederhana Bandung. The ginger rhizomes were obtained from Cicalengka, while the *Trichophyton metagrophytes* fungus were obtained from Poltekes Rock, acetone, hexane, TLC and UV lamps 256 and 360 nm.

2.1. The sample preparation
Extraction is done by maceration manner, in which, galangal rhizome that has been taken is cleaned of soil and dirt, then washed. The rhizome galangals are sliced thinly with a knife, then dried in a dryer. They are dried at a temperature of 50, then blended until smooth. They are extracted by soaking in acetone for 3x24-hours. The next process is fractionated by using acetone, then filtered and evaporated using a rotary evaporator.

2.2. The making of nonpolar extract
Liquids fractionation is performed to obtain a purer extract. White galangal acetone extract obtained in the previous extraction stage was dissolved with 10 mL methanol. *N*-hexane solvent is then added as much as 10 mL, shaken by using a separating funnel. After visible separation, the methanol fraction located at the bottom layer is separated. This is done until the separation of the hexane top layer is clear or not yellow. *N*-hexane fraction of methanol is separated by a separator funnel. *N*-hexane fraction and each methanol fraction are evaporated, hexane and methanol fractions are obtained for further tests.

2.3. Thin layer chromatography
The test was performed twice, between the nonpolar fraction TLC and in the cream preparations. Eluent used was a mixture of chloroform, *n*-hexane: ethyl acetate 9: 1, 8: 2, and 7: 3. Then to ensure the number of stains, observations were done under UV light.

2.4. The making of cream
The creation of galangal extract cream refers to [7].

2.5. The antifungal and allergy test
Anti-fungal searches were performed in in vitro with disc-diffusion method. The test was performed on 10 adaptation respondents [8], in which the cream was smeared into the hands and waited for several minutes to 1 hour. This is done to dig information matching cream against skin.

3. Results and discussion
3.1. Galangal extraction process
Galangal simplicia is dried and then formed into fine powder. Maceration is done by using acetone solvent. Results maceration (Table 1), in the form of extracts which would then be in fractionation by using methanol with *n*-hexane. The results of maceration can be seen in Table 1.

| No | Sample          | Weight (gram) | Rendeman (%) |
|----|----------------|---------------|--------------|
| 1  | Simplicia      | 650           | 10,83        |
| 2  | Galangal extract | 29,93         | 4,507        |
| 3  | Methanol       | 2             | 13,36        |
| 4  | *N*-hexane     | 6,49          | 43,36        |
The extraction is done 3x24 hours, this serves to keep all active substances in the galvanized soluble completely in the solvent. The extract produced was 29.93 g with 4.507% yield (Table 1). Fractionation is done by using a solvent of *n-hexane* and methanol. The use of *n-hexane* is expected to obtain active substance asetoksikhavikol 1'-acetate [9].

### 3.2. Phytochemical screening

Examination of phytochemical test of galangal acetone extract was carried out including tannin test, flavonoid test, saponin test, alkaloid test, steroid test and terpenoid test. The result of phytochemical test of galangal acetone extract shown in Table 2.

| No | Phytochemicals | Results |
|----|----------------|---------|
| 1  | Tanin          | +       |
| 2  | Flavonoids     | +       |
| 3  | Saponin        | -       |
| 4  | Alkaloids      | +       |
| 5  | Steroids       | +       |
| 6  | Terpenoid      | +       |

Based on Table 2, it can be stated that the positive galangal acetone extract contains tannins, flavonoids, alkaloids, terpenoids, steroids, and negatives containing saponins. This is in line with research [4].

### 3.3. The thin layer chromatography of nonpolar extract

**Figure 1a.** the TLC galangal extract under the UV 254 lamp and **Figure 1b.** TLC under the UV lights 360 nm

P In Figure 1a and b, shown that the TLC results found ginger extract nonpolar fraction Rf 0.62 and Rf 0.71. This is in accordance with [10] at a flow rate of 0.62 is Rf and the properties of simple phenolic spectrum and Rf 0.71 is phenyl propene Rf 0.7.

### 3.4. The Battery power test of Trichophyton Mentagrophytes

The determination value of Minimum Barrier Concentration (KHM) aims to determine the strength of antifungal activity. This test was conducted in microbiology laboratory of PT. Bio Farma (Persero). In this test, the positive controls used were ketoconazole.
Table 3. Results of Minimum Inhibitory Concentration Nonpolar Fraction of Galangal Extract

| No | Sample         | Insertion Zone Diameter (mm) |
|----|----------------|-----------------------------|
| 1  | Galangal extract | 36                          |
| 2  | Positive control | 30                          |

Based on KHM values (Table 3 and Figure 2), the nonpolar fraction of galangal extract is greater than positive control, i.e. 36 mm. The zone of resistor can be observed by looking at the clear zone shown in Figure 2. It is aligned [11] \( n \)-hexane galangal fraction contained phenol compound, which works denature cell proteins and cell membranes, and is fungi static or fungicidal. On the other hand [9] states that \( 1\)-acetoxy khavikol phenyl acetate which are compounds capable of inhibiting the growth of fungi pronoid \( M. \) canis and \( Trichophyton mentagrophytes \).

![Figure 2](image)

Figure 2. Results of inhibitory text of fraction nonpolar fraction of galangal extract

3.5. Creation of cream

Table 4. Composition Cream

| No | Material     | Composition (g) |
|----|--------------|-----------------|
| 1  | Olive oil    | 3               |
| 2  | Coconut oil  | 1               |
| 3  | Tween 80     | 1.5             |
| 4  | Beeswax      | 5               |
| 5  | Glycerol     | 2               |
| 6  | Water        | 30              |
| 7  | Galangal extract | 0.1        |

![Figure 3](image)

Figure 3. Nonpattern galangal extract cream

Figure 3 shows the creams formed according to the composition of Table 4, organoleptically seen as soft, white, non-sticky, semi-solid, and stable.
3.6. Allergy test
Based on Table 5, ten participants for 2 hours did not experience the onset of itching or spotting. This suggests that the cream does not cause allergies to the skin.

| Time / tested (minutes) | Results                           |
|------------------------|----------------------------------|
| 0-30                   | From the time 0-120 nothing      |
| 31-60                  | happened, no itching, no red or  |
| 61-90                  | hot (nor irritated)              |
| 91-120                 |                                   |

3.7. The DTC tests
Figure 4 shows that galangal nonpolar extract cream has the same Rf as commercial antifungal cream, the resulting Rf has similarities to the commercial flow rate of commercial antifungal cream. Catecholamine is a commercial component having Rf 0.12. Meanwhile, the stains produced by the non-polar alloy cream extract of galangal, in addition to having a stain on the same Rf, also have more spots, i.e. stains at Rf 0.14, 0.32, and 0.4. This can happen because the secondary antifungal metabolite compounds have been isolated or separated from other components.

![Figure 4. Comparison Test results antifungal cream TLC extract of galangal (ginger CF) with a commercial anti-fungal cream (C commercial)](image)

4. Conclusion
The non-galvanized extract of galangal in cream preparation, has the ability as anti-fungi with minimum inhibitory value of 36 mm larger than the control, has the same Rf as the control, that is 0.6. In addition, galangal nonpolar extract preparations do not have an allergic effect on the skin.

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