

Research Article

Clay sticks from the crude extract of *Zingiber ottensii* Valetton to inhibit the growth of Dermatophytes which are the cause of allergic rashes on the skin

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Abstract: Athlete's foot (*Tinea pedis*), Body ringworm (*Tinea corporis*), Jock itch (*Tinea cruris*), etc. These are diseases accumulated from fungi occurring on the skin, these types of fungi are classified in a group called Dermatophytes. At present, there are numerous options for treatment such as doctor appointments or using anti-fungal agents such as Clotrimazole of which when used for an extended amount of time can cause many side effects to the area of skin applied on such as rashes, hives, blisters etc. To provide an alternative, the project organizers have decided to study *Zingiber ottensii* Valetton's fungal inhibition properties via crude extracts, due to it being easily found in the local area of Chiang Mai province and are cheap. Clay sticks being a popular form of skin care due to its compact and easy to carry nature makes it a perfect fit to make as a product from the crude extracts of *Zingiber ottensii* Valetton. The study shows that the crude extract from *Zingiber ottensii* Valetton showed anti-fungal properties and were effective in inhibiting the growth of Dermatophytes but weren't as effective as the standard drug Clotrimazole. With that being said, the crude extracts of *Zingiber ottensii* Valetton were still suitable to make as a clay stick product.

Keywords: *Zingiber ottensii* Valetton; Clay sticks; Dermatophytes.

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1. INTRODUCTION

There is an important substance called Zingerone, which is effective in inhibiting the growth of fungi that are responsible for causing allergic rashes on the skin or Dermatophytes. These data led to the idea of using crude extracts from *Zingiber ottensii* Valetton. In our daily lives, we encounter air pollution, dust, smoke, and foreign objects on commonly touched surfaces such as Electric locomotives, stairs, elevators, etc. If neglected to clean them properly after contact, it may lead to fungi occurring on the skin and can cause diseases, these types of fungi are classified in a group called Dermatophytes. Many types of fungi can grow on the skin, such as the *Malassezia* genus. Some medicinal plants have the ability to inhibit fungi, such as betel leaves, galangal, cloves, etc. *Zingiber ottensii* Valetton is also another plant that can inhibit fungi. Moreover, they are easily found in the local area of Chiang Mai province and are cheap. Although there are number of treatments that are readily available. Be it with doctor appointments or using anti-fungal agents such as Clotrimazole which when

used often can cause rash, hives, blisters, burning, itching, peeling, redness, swelling, pain, or other signs of skin irritation. At present, there are many forms of skin care that clean the body. Clay stick is a popular skincare product because it comes in a compact stick form that is convenient to carry. The project organizers have therefore realized the importance of this matter and are interested in studying the effectiveness of crude extracts from *Zingiber ottensii* Valetton in inhibiting the growth of Dermatophytes and comparing them with widely used drugs prepared in the form of a clay stick. To further expand and develop it into an OTOP product for the community.

2. METHOD & MATERIAL

2.1 Preparation of crude extracts from *Zingiber ottensii* Valetton

1. Heat 500g of chopped up *Zingiber ottensii* Valetton in the oven at 200 °C until the pieces have dried out.
2. Immerse the dried *Zingiber ottensii* Valetton in 95% Ethanol with a ratio of 1:2 (W/V).
3. After three days, use filter cloth to filter the extract and the volatile the 95% Ethanol by Rotary evaporator.

2.2 Performance testing on Dermatophytes efficacy

1. Dilute the *Zingiber ottensii* Valetton crude extract into 100%, 75%, 50%, and 25% concentration. Prepare 12 plates of PDA which as follows Plate 1: Clotrimazole (positive control) Plate 2: Clotrimazole (positive control) Plate 3: distilled water (negative control) Plate 4: distilled water (negative control) Plate 5: *Zingiber ottensii* Valetton 100% Plate 6: *Zingiber ottensii* Valetton 100% Plate 7: *Zingiber ottensii* Valetton 75% Plate 8: *Zingiber ottensii* Valetton 75% Plate 9: *Zingiber ottensii* Valetton 50% Plate 10: *Zingiber ottensii* Valetton 50% Plate 11: *Zingiber ottensii* Valetton 25% Plate 12: *Zingiber ottensii* Valetton 25%.
2. Submerge the Antibiotic paper disc and place the corresponding substance onto the PDA which holds Dermatophytes.
3. Measure the clear zone for five days as soon as growth was prominent, and the data for each set was averaged.

2.3 Making of Clay sticks

1. Heat Sturdium Omega and stir until melted. Then, Mix Kaolin clay, Natural clay, and *Zingiber ottensii* Valetton crude extract at 70-80°C and stir until smooth.
2. Combine Syndicare TW50 with Emosoft DEC73 at 70-80°C and stir until smooth. Pour everything into a bowl and mix, while mixing slowly add the melted Sturdium Omega
3. Once everything has cooled to 50°C add Megacare Ph.D. and Actitope PCA mix and pour it into a container.

3. FINDINGS

Table 1: Average diameter of anti-fungal area from each substance after 5 days of experiment.

Substance	Average diameter of antifungal area from each substance (mm)				
	Day 1	Day 2	Day 3	Day 4	Day 5
distilled water (-)	-	-	-	-	-
Clotrimazole (+)	22.30 ± 0.5	18.80 ± 0.5	16.56 ± 0.5	15.74 ± 0.5	14.45 ± 0.5
<i>Zingiber ottensii</i> Valeton 100%	14.02 ± 0.5	11.38 ± 0.5	8.96 ± 0.5	7.42 ± 0.5	5.23 ± 0.5
<i>Zingiber ottensii</i> Valeton 75%	10.11 ± 0.5	7.33 ± 0.5	5.12 ± 0.5	3.56 ± 0.5	1.01 ± 0.5
<i>Zingiber ottensii</i> Valeton 50%	6.48 ± 0.5	4.39 ± 0.5	2.23 ± 0.5	1.52 ± 0.5	-
<i>Zingiber ottensii</i> Valeton 25%	4.67 ± 0.5	2.58 ± 0.5	1.41 ± 0.5	-	-

From the experimental results table, it was found that the crude extract of *Zingiber ottensii* Valeton at 100% concentration was most effective in inhibiting dermatophytes when compared to the other concentrations, and the crude extract of *Zingiber ottensii* Valeton's anti-fungal properties decreased as the concentration went down. In the end, Clotrimazole the standard drug commonly used to inhibit the growth of fungi, was most effective in inhibiting the growth of dermatophytes. Although the crude extract of *Zingiber ottensii* Valeton proved to be less effective in inhibiting dermatophytes when compared to Clotrimazole, considering that the extract taken from *Zingiber ottensii* Valeton was still crude meaning the purity of the substance is considerably low, being able to have some anti-fungal properties still is very acceptable, therefore the project organizers have gone forward and made Clay sticks out of the crude extract of *Zingiber ottensii* Valeton at the concentration of 100%.



Figure 1. Clay stick applying on skin



Figure 2. Clay stick showcase



Figure 3. Clay stick showcase

4. DISCUSSION

The crude extracts of *Zingiber ottensii* Valeton all showed anti-fungal properties with the 100% concentration being the most effective in inhibiting the growth of Dermatophytes. Clotrimazole's fungal inhibition properties when compared to the crude extracts of *Zingiber ottensii* Valeton at all concentrations proved to be superior, this is due to the purity of both substances with *Zingiber ottensii* Valeton being less pure in the substance which holds anti-fungal properties leading to it not being as effective in inhibiting the growth of Dermatophytes when compared to Clotrimazole. With that being

said the performance of the crude extract from *Zingiber ottensii* Valeton at 100% concentration was more than acceptable thus was made into a product as mentioned above. In the future the project organizers hope to study *Zingiber ottensii* Valeton further to ensure that in future experiments the crude extract would become more efficient in inhibiting the growth of Dermatophytes and could be made into a higher quality product so it could become a OTOP product for Chiang mai which will benefit this province by opening up more job opportunities for harvesters of *Zingiber ottensii* Valeton to be able to add more value to the herb.

5. CONCLUSION

From the experiment, it was found that after 5 days, the crude extract from *Zingiber ottensii* Valeton was effective in inhibiting Dermatophytes though, not as effective as the anti-fungal agent Clotrimazole, with the following clear zone diameters from the fifth day: *Zingiber ottensii* Valeton at 100% concentration had a diameter of 5.23 ± 0.5 mm, *Zingiber ottensii* Valeton at 75% concentration had a diameter of 1.01 ± 0.5 mm, and the Clotrimazole had a diameter of 14.45 ± 0.5 mm. From the comparison, the crude extracts from *Zingiber ottensii* Valeton at 100% and 75% had a tiny clear zone due to the anti-fungal capabilities being run down as time went on, with it being on the fifth day of the experiment the clear zone for all experimental substances were expected to be less effective. This was proved with *Zingiber ottensii* Valeton at 50% and 25% concentration showing no signs of anti-fungal clear zone on the fifth and fourth day, respectively. Thus, it could be summarized that the crude extracts from *Zingiber ottensii* Valeton are effective in inhibiting the growth of Dermatophytes which are the cause of diseases on the skin. The crude extract from *Zingiber ottensii* Valeton at 100% concentration was most effective at inhibiting Dermatophytes, and the anti-fungal abilities of the crude extracts gradually went down as the concentration decreased. Regardless, the crude extracts from *Zingiber ottensii* Valeton were effective in inhibiting the growth of Dermatophytes but proved to be not as effective as Clotrimazole, the standard drug commonly used to inhibit the growth of fungi. So, the crude extract from *Zingiber ottensii* Valeton at the concentration of 100% was then added into the mixture to make a batch of clay sticks and therefore turned into a product which in the future hope to turn into an OTOP product for the community due to it being cheap to make and having less side effects to the standard drug Clotrimazole.

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