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International Journal of Clinical Case Reports and Reviews
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Research Article

The Efficacy of Dzarirah oil (*Acorus calamus L.*) Against Bacteria Propionibacterium Acnes that Induce Maskne Disease

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Received Date: June 20 2022 | **Accepted Date:** July 25 2022 | **Published Date:** October 19 2022

Citation: Amalia T. Utami , Ghassan A. A. Qarah (2022). The Efficacy of Dzarirah oil (Acorus calamus L.) Against Bacteria Propionibacterium Acnes that Induce Maskne Disease. *International Journal of Clinical Case Reports and Reviews*. 12(1); DOI:10.31579/2690-4861/231

Abstract

Maskne is a pimple that occurs as a result of using a mask with hot ingredients and using it for too long. Maskne is a new term that comes from the word mask plus acne. According to dermatologists, the continuous use of masks causes a build-up of bacteria and dirt that clogs the skin pores and triggers acne and other skin problems. The reason is, the skin area around the cheeks and chin does not get air circulation because it is covered by a mask. The Centers for Disease Control and Prevention and the World Health Organization require the use of masks for all people around the world to prevent exposure to the Corona virus which causes COVID-19 infection. However, there are effects from using this mask in the form of pimples and other facial skin irritations. The Maskne triggered by infection of Propionylbacterium acnes which plays a role in irritation of the follicular epithelium and facilitates the occurrence of Maskne. Medical treatment is mostly done is by giving topical and oral antibiotics which are relatively more expensive and can cause side effects. As an alternative medicine in the community, dzariroh (*Acorus calamus L.*) can be used which has been scientifically proven to have antibacterial activity. Dzarirah is a type of plant that is mentioned in the hadith to treat the acne of the wife of Rasulullah SAW. The prophet's wives told that one day the Prophet met them. Rasulullah then saw among them a kind of pimple grew. Rasulullah then asked, "Do you have the perfume of dzarirah ?." They said they had. Rasulullah said, "Put your pimples on while reading a prayer, 'O Allah, who reduce the large and the small ones, reduce my acne'." The α and β asarone compounds are antimicrobial compounds that can inhibit the growth of P. acne bacteria. The results showed that dzarirah oil could inhibit the growth of Propionibacterium acnes bacteria at a concentration of 2.5% while killing at a concentration of 25%. Dzarirah oil is effective in inhibiting the growth of Propionibacterium acnes bacteria at a concentration of 2.5% and is a MIC (Minimum Inhibitory Concentration). Dzarirah oil is proven to be effective in killing Propionibacterium acnes bacteria at a concentration of 25% and is an MBC (Minimum Bactericidal Concentration).

Keywords: dzarirah oil; acarus calamus; propionibacterium acnes; maskne

Introduction

Acorus calamus L. or also known as the sweet flag is a species in the Acoraceae family. Acorus calamus is a plant that has many benefits including medicine [6], foodstuff [3], and is also useful in land conservation. Pai and McCarthy [14] stated that Acorus calamus is one of the socio-economically important plant species used in wetland restoration projects that can act as an economic incentive for conservation and restoration.

At first, *Acorus calamus L.* was included in the Araceae family [taro], but eventually it was expelled from that family and included in the Arecaceae family because it had very different characteristics, especially in its leaf structure and rhizome. Chang (2010) stated that the genus Acorus is not related to the Araceae family.

Acorus calamus L. has long been used by local Indonesian people as a fever medicine by the Simalungun Batak ethnic group [12], and the Karo Batak [11,12,13], malnutrition [12] and medicine for postpartum mothers by the Minangkabau ethnicity [7]. The many benefits of Acorus calamus have resulted in this plant being cultivated by the Angkola Mandailing Batak ethnic group in their yards [12]. Rhizoma is a part that is used in a single form or a potion.

The efficacy of plants as medicinal substances is related to their secondary metabolites. From various research reports, although rhizomes are the most frequently used, almost all organs [roots, rhizomes, and leaves] of

A. calamus contain essential oil. Essential oil is a compound of the terpenoid group, especially monoterpenoids and sesquiterpenoids which are volatile at room temperature [7]. This results in plants that have essential oils to produce distinctive aromas [3]. Aaron is the main essence found in A. calamus [6]. However, the essential oil content in A. calamus is strongly influenced by internal and external factors. This causes the essential oil content to differ from one region to another. Internal factors that affect the asaron content of the *Acorus calamus L*., especially the karyotype of the chromosome number [Hanelt et al. 2001]. Although there have been many studies on A. calamus, comprehensive discussion of its use and secondary metabolite content is still very limited, especially its use as an anti-cancer and anti-microbial.

Acne is caused by several factors, one of which is the Propionibacterium acnes bacteria. Gaspari and Stephen [5] stated that Propionibacterium acnes includes normal flora of the skin, gram-positive, pleomorphic, and anaerobic bacteria. These bacteria play a role in the formation of acne, by producing lipases that break down free fatty acids from skin lipids, causing inflammation. The resulting inflammation causes Propionibacterium acnes to proliferate and aggravates inflammatory lesions by stimulating the production of proinflammatory cytokines. These bacteria are not pathogenic under normal conditions, but if there is a change in skin conditions, the bacteria will turn out to be invasive. The secretions of sweat glands and sebaceous glands which produce water, amino acids, urea, salts, and fatty acids are a source of nutrition for bacteria. These bacteria play a role in the chemotactic inflammation process and the formation of lipolytic enzymes that convert the oily substance fraction [sebum] into a solid mass, which causes blockage of the sebaceous gland ducts [2]. Propionibacterium acnes is a dangerous bacteria that can cause inflammation of the skin, especially on facial skin, so it needs to be prevented.

Method And Results

This research is a laboratory experimental study, using a completely randomized design (CRD) with 5 treatments and 4 replications. The techniques used are well, dilution techniques and colony counting techniques. The parameters in this study were the diameter of the bacterial growth inhibition zone, the color change formed in each bacterial dilution tube, and the calculation of the number of Propionibacterium acnes bacterial colonies.

The dilution method is divided into 2, namely liquid and solid dilution. The dilution method is used to measure the MIC (minimum inhibitory level) while the solid dilution method is used to determine the MBC (minimum bactericidal level). The method used in the liquid dilution method is to make a series of dilutions of the antimicrobial agent in liquid media which is added with the test microbes. The solid dilution method is carried out by inoculating the test microbes on agar media containing antimicrobial agents. The advantage of this dilution method is that the only antimicrobial control agent tested can be used for testing several test microbes [8]. The results of testing Dzarirah oil against P. Acne are presented in Figure 1.

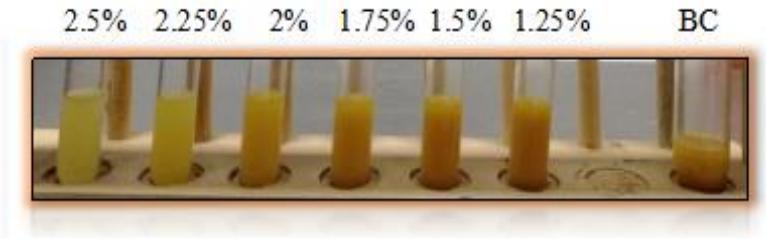

Figure 1 *Dzarirah oil dilution tube against P. Acne*

The diffusion method was used to determine the sensitivity of the tested microbes to antimicrobial agents. This method is done using disc paper. A disc paper was inserted into the agar medium that had been inoculated with the bacteria and filled with the test compound. The clear area on the surface of the agar media indicates an inhibition of the growth of microorganisms by antimicrobial agents. The advantage of this diffusion method is that it is easy to do because it does not have special tools and includes greater flexibility in choosing the drug to be examined [8].

The dilution method was used to determine the MIC and MBC of antimicrobial drugs. The principle of this dilution method is to use a series of test tubes filled with liquid media and P. Acne test bacteria cells. The MIC of the drug is shown from the lowest concentration of antibiotics in the tube with the results of the culture starting to appear clear (no microbial growth). The lowest concentration of drug in a solid culture is indicated by the absence of growth of microbial colonies in the MBC of the drug against the tested bacteria. This experiment uses antibiotics from Dzarirah oil. . In Table 1, the best value for teaching and learning activities in dzarirah oil is 25%.

Then done counting the number of colonies of P.Acne at each concentration with four repetitions by using Colony Counter. Counting the number of colonies of P.Acne at each Mc Conkey Agar. Results planting MAC media of various concentrations of the extract can be seen in Table 1.

Treatment	Repetition				Mean
	1	2	3	4	
1.25%	2.1×10^7	2.2×10^7	2.3×10^7	3.4×10^7	2.5×10^7
1.5%	1.4×10^6	2.7×10^6	3.4×10^6	2.9×10^6	2.6×10^6
1.75%	4.7×10^5	4.2×10^5	4.1×10^5	4.2×10^5	4.3×10^5
2%	2.7×10^4	2.2×10^4	3.4×10^4	3.7×10^4	3×10^4
2.25%	1.2×10^3	1.3×10^3	1.7×10^3	1.9×10^3	1.5×10^3
2.5%	9.2×10^2	9.8×10^2	9.7×10^2	9.6×10^2	9.6×10^2
10%	4.2×10^1	4.5×10^1	6.2×10^1	7.2×10^1	5.5×10^1

25%	0%	0%	0%	0%	0%
50%	0%	0%	0%	0%	0%

Table 1. *The Results Mean Colony of P.Acne in Different Treatment*

Result

The α and β asarone compounds are antimicrobial compounds that can inhibit the growth of P. acne bacteria. The results showed that dzarirah oil could inhibit the growth of Propionibacterium acnes bacteria at a concentration of 2.5% while killing at a concentration of 25%. Dzarirah oil is effective in inhibiting the growth of Propionibacterium acnes bacteria at a concentration of 2.5% and is a MIC (Minimum Inhibitory Concentration). Dzarirah oil is proven to be effective in killing *Propionibacterium acnes* bacteria at a concentration of 25% and is an MBC (*Minimum Bactericidal Concentration*).

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DOI: 10.31579/2690-4861/231