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Formulation Of Talas Leaf (Colocasia esculenta (L)Schott) Emulgel As A Candidate Of Antibacterial Causes Of Bulbs

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ABSTRACT

C. esculenta (L)Schott is used by the people of Papua as a boil medicine. C. esculenta (L)Schott has antibacterial activity against bacteria that cause boils (Staphylococcus aureus) with a concentration of 5%. This research aims to obtain a C. esculenta (L)Schott emulgel preparation that is physically and determine the effectiveness of talas leaf emulgel against bacteria that cause boils. C. esculenta (L)Schott extract with a concentration of 5% was made into an emulgel preparation using gelling agent carbopol 940. gelling agent carbopol 940 with various concentrations of 1%, 1.5%, and 2%. Then each formula was tested for its antibacterial effectiveness by the good diffusion method against boil-causing bacteria with a positive control of gentamicin cream. Data analysis was carried out by calculating the average of the inhibition zones for each concentration. C. esculenta (L)Schott extract emulgel formula is stable physically and is FII using a 1.5% gelling agent. Effectiveness test C. esculenta (L)Schott extract emulgel formula against boil causing bacteria (S. aureus), namely FI, FII, and FIII, with inhibition zone diameters of 18.24 mm, 18.99 mm, and 17.58 mm in the strong category.

***Keywords**: C. esculenta (L)Schott, emulgel, antibacterial.*

INTRODUCTION

S. aureus is the main pathogenic bacteria in humans that cause infectious diseases. Treatment infections caused by *S. aureus* bacteria in boils (furuncles) are usually treated with antibiotics such as penicillin, erythromycin, and clindamycin. (Barakbah, Sukanto, & Agusni. 2007). The use of antibiotics such as penicillin, erythromycin, and clindamycin has serious side effects on health (Negara. 2014).

This encourages the discovery of other sources of antibacterial drugs from natural ingredients that can act as antibacterials that are safer and relatively cheaper. One of the antibacterial plants used by the community to cure various diseases is talas (*C. esculenta* (L) Schott) (Wijaya et al. 2014).

C. esculenta (L)Schott with various chemical ingredients containing 6-C-glycosyl flavonoid and O-glycosyl flavonoid, including schaftoside, isoschaftoside, orientin, isovitexin, isoorientin, vitexin, and luteolin 7-O-sophoroside. Another study also mentioned that the content of talas leaves includes alkaloids, terpenes, saponins, flavonoids, tannins, flabatanins, anthraquinones, cardiac glycosides (Widhyastini, et al. 2018).

Discovered that an ethanol extract of talas leaves has antibacterial activity against *S.aureus* and *Salmonella typhi* bacteria. In testing the antibacterial activity by good diffusion, an extract concentration of 15% was the best concentration in forming an inhibition zone (Herwin. 2016).

Topical dosage forms of ointments and creams usually have a sticky nature and have a lower coefficient of spread, making it more difficult for patients to apply them to the skin. The use of gel more often is because the gel is easier to apply, is emollient, and not sticky so that it provides comfort to the skin. Gels have limitations in drug delivery that are hydrophobic. These limitations are overcome by a new topical dosage form, emulgel. Emulgels can deliver hydrophobic drugs mixed in the oil phase of the emulsion and have a higher ability to penetrate the skin but have gel-like properties in the presence of a gelling agent. It is a dermatological drug delivery agent that has several desirable properties, such as being easy to spread, not sticky and feeling greasy, emollient, easy to wash, bio-friendly, transparent form, and having a good appearance (Redkar, 2019)

The purpose of this study was to obtain talas leaf emulgel (*C. esculenta* (L)Schott) that met the physical requirements and received a talas leaf emulgel formula (*C. esculenta* (L)Schott), which is effective as an antibacterial that causes boils.

MATERIAL AND METHODS

Chemicals and Instrument

The chemicals used in this study were aquadest, carbopol 940, Cera alba, green talas leaves (*C. esculenta (*L) Schott), DMDM Hydantoin, DMSO 10%, ethanol 96%, liquid paraffin, propylene glycol, Span 80, Tween 80, TEA, S. aureus bacteria, and Mueller Hinton Agar.

The instruments used in this study consisted of glassware (Pyrex®), autoclave (Gea®), yellow tip, Bunsen, petri dish (Anromax®), incubator (Memmert®), caliper (Xpeteel®), micropipettes 20 -2000 l (Nesco®), microwave (Samsung®), object-glass, oven (Falc®), spare, dropper, volume pipette (Iwaki®), tweezers, horn spoon, and scale analytics (Mettlet Toledo®).

Extraction

200 grams of C. *esculenta* (L) Schott) simplicia were soaked with 2.5 L of 96% ethanol in a tightly closed maceration vessel and allowed to stand for 2X24 hours protected from light. The maceration results were filtered using a Buchner funnel. Remaceration was performed on the residue by soaking it in ethanol with the same treatment. The macerate was evaporated with a rotary evaporator (Harwin 2016).

Manufacturing *C. esculenta* (L) Schott Emulgel

Emulsion base

The oil phase was prepared by mixing liquid paraffin, Cera alba, and Span 80, then

Table 1. Formulation talas leave emulgel

Materials	Emulgel Formula (%b/b)			
	Control	**F1**	F2	F3
Talas leave	-	5	5	5
Carbopol 940	1	1	1,5	2
Paraffin liquid	10	10	10	10
Span 80	5	5	5	5
Tween 80	5	5	5	5
Propilen glikol	5	5	5	5
Cera alba	2	2	2	2
DMDM hydantoin	-	0,5	0,5	0,5
TEA	4 drops	4 drops	5 drops	5 drops
Aquadest	ad 100	ad 100	ad 100	ad 100

heated and stirred until homogeneous. The aqueous phase was made by mixing Tween 80, and propylene glycol, then heated and stirred until homogeneous. The oil phase is added to the water phase and stirred to form an emulsion.

Emulgel

Carbopol which has been dispersed in distilled water with a concentration of 1%, 1.5%, and 2% is added with TEA until the gel thickens while stirring until homogeneous. The emulsion base was mixed with the gel until an emulgel was formed, then *C. esculenta* (L) Schott extract was added, then stirred until homogeneous.

Physical Evaluation of Emulgel preparations, namely organoleptic, homogeneity, pH test, spreadability test, viscosity test, type of emulsion, adhesion test.

Anti Bacterial Activity of *C. esculenta* (L) Schott Emulgel

As much as 15 mL of sterile MHA medium was poured aseptically into a petri dish. After the MHA medium is solidified, plant the backup in the petri dish. the bacterial suspension was mixed into 15 ml of homogenized MHA medium and then poured into a petri dish. After that, the C. esculenta (L) Schott emulgel was inserted into each well, and then the same treatment was carried out for gentamicin cream as a positive control. Then it was incubated for 1 x 24 hours at 37oC in the incubator. The inhibition zone that arises around the well is then measured in diameter using a caliper (Alfian, Rezeki, & Susanti. 2018).

RESULTS AND DISCUSSION

Emulgel can be made into a type of O/W or W/O emulsion, emulgel is effective for mixing into a gel base (Yani et al., 2017) Emulgel is a preparation that has high acceptability because emulgel has the same advantages as emulsions and gels. Therefore, emulgel can be used as a drug delivery system through the skin (Auliasari, 2016). Propylene glycol and oleic acid as enhancers are penetration-enhancing substances that function to assist drug absorption (Rusli et al., 2021) so that the active

substances can be easily delivered through the skin.

In this study, emulgel preparations were made using various concentrations of gelling agent carbopol, namely 1%, 1.5%, and 2%, to see the effect of gelling agent concentration on the stability of the emulgel preparation. Carbopol functions as a gelling agent as a gelling agent. During the development of carbopol 940, triethanolamine was added, which aims to neutralize the base because carbopol is acidic, while carbopol will form well at pH 6. So triethanolamine is added to make the base neutral. Besides that, the addition of triethanolamine can also make carbopol a clear gel and make it expand. The formulations were made with variations in carbopol concentrations of 940 FI, F2, F3 respectively, namely 1%, 1.5%, and 2%.

Organoleptically, the preparation has a characteristic smell of extract, emulsion form, and green color which is influenced by the addition of the extract. Organoleptic will affect the user's comfort, therefore the preparation should have an attractive shape, smell, and color (Table 2). (Purwaningsih et al., 2020)

All of the formulas obtained show a homogeneous arrangement (Table 3). Homogeneity is indicated by the absence of coarse grains in the preparation, and an even color match. If the cream preparation is homogeneous, it is assumed that the active substance content will always be the same at the time of administration (Purwaningsih et al., 2020).

Table 3. Homogeneity of of C. esculenta (L) Schott emulgel

Formula	Results
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous
Base	Homogeneous

The formulation has met the quality standards that have been set, namely fulfilling the requirements of the Indonesian National Standard (SNI) 16-4399-1996 with a limit range of 4.5-8.0. (Badan Standardisasi Nasional, 1996). If the pH is too acidic it will cause skin irritation, and if the pH is too alkaline it will cause scaly skin (Pratimasari et al., 2015).

Viscosity test shows that F1 and F2 are included in the standard Viscosity test according to SNI 16-4339-1996, namely with a limit of 2000-50,000 cps, while F3 is not included in the ranges, this is due to an increase in the concentration of the gelling agent will increase the viscosity value (Table 5) (Kusuma et al., 2018).

Table 2. Organoleptic of *C. esculenta* (L) Schott emulgel

Formula	Results
F1	Green, distinctive odor, emulgel
F2	Green, distinctive odor, emulgel
F3	Green, distinctive odor, emulgel
Base	White, Odorless, Emulgel

Table 4. pH of *C. esculenta* (L) Schott emulgel

Formula	pH
F1	5,14
F2	4,83
F3	4,77
Base	5,12

Table 5. viscosity of *C. esculenta* (L) Schott emulgel

Formula	Viscosity (cps)
F1	8.833
F2	38.000
F3	52.166
Base	0

Table 7. Spreadability of *C. esculenta* (L) Schott emulgel

Formula	Results
F1	O/W
F2	O/W
F3	O/W
Base	O/W

The Spreadability test in F1 showed that the dispersion power exceeded the threshold of good dispersion, while F2 and F3 had good dispersion of 5-7 cm indicating a semi-solid concentration very convenient to use (Garg et al, 2002). Good Spreadability makes the contact between the drug and the skin wide so that the absorption of the drug in the skin takes place quickly (Genatrika &Nurkhikmah, 2016).

The emulsion type test showed that methylene blue could be dispersed into the emulgel. If the water phase is blue then the cream is of type O/W because water is the outermost phase. This indicates that the type of cream produced is the O/W type. The amount of water contained in the emulgel is large enough so that methylene blue is easily soluble in the inner water and can color the preparation evenly (Putranti et al., 2019).

The results of the F3 adhesiveness test showed higher adhesion than F1 and F2, this was due to the high carbopol concentration. The higher the carbopol concentration used, the higher the viscosity, so the thicker the preparation, the longer the adhesive power (Ansari, 2011). Adhesiveness indicates the ability of the preparation to adhere to the skin. It is hoped that with high stickiness, the duration of drug attachment to the skin will increase which will provide an opportunity for the active substance to penetrate the drug into the skin better (Kusuma et al., 2018). So that it can be concluded from the physical test of emulgel preparations, the preparation closest to a good physical test is formula II (FII) almost all evaluations get good results except for the evaluation of adhesion.

Anti Bacterial Activity of *C. esculenta* (L) Schott Emulgel

An antibacterial is said to have activity against bacteria if it has the following strengths: if it gives a value of inhibition zone with a size of 6-10 mm it is categorized as weak, 11-20 mm is categorized as active, and 21-30 or more is categorized as very active (Muharni, 2017). Based on the data obtained

Table 6. Spreadability of *C. esculenta* (L) Schott emulgel

Formula	Spreadability (cm)
F1	7,3
F2	5,4
F3	5,1
Base	5,2

Table 7. Adhesion of *C. esculenta* (L) Schott emulgel

Formula	Adhesion (second)
F1	0,72
F2	1,1
F3	1,27
Base	1,44

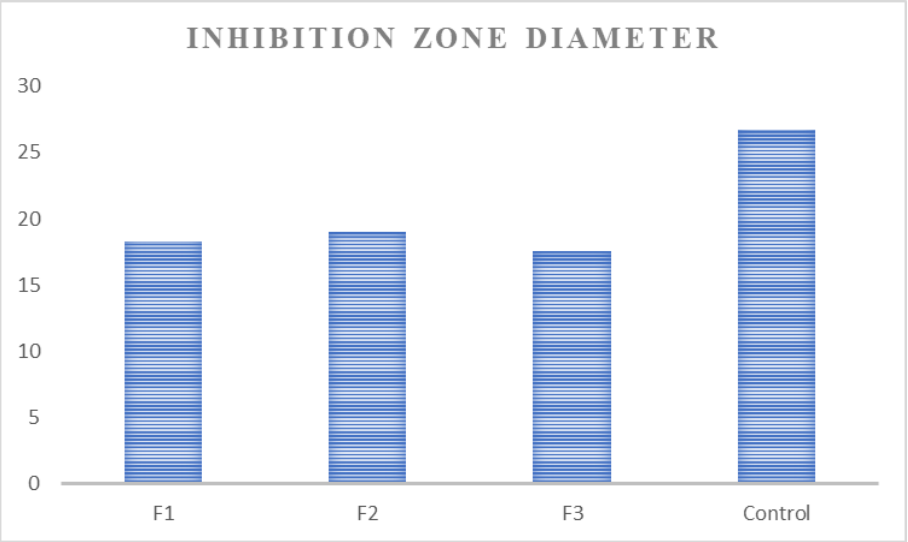

Figure 1. Anti Bacterial Activity of C. esculenta (L) Schott Emulgel. Control as a gentamicin cream.

from the diameter of the inhibition zone of the *C. esculenta* (L) Schott emulgel, the antibacterial activity of the *C. esculenta* (L) Schott emulgel was in the active or strong category. In accordance with research (Siskayanti et al., 2022) said that the antibacterial activity test of the ethanol extract of taro leaves against Staphylococcus aureus bacteria was 16.51mm.

CONCLUSION

C. esculenta (L) Schott extract can be formulated as an emulgel with a carbopol concentration of 1.5% (F2) and shows the best activity against the growth of *S. aureus*.

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