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Activity Test of Facial Wash Formulation Containing Ethanol Extract of Patikala Fruit (Etlingera elatior) Against the Growth of Propionibacterium acnes

Muthmainnah Thalib[1], Istianah Purnamasari[2], Nirwana[3]

1 Farmasi, FKIK, Universitas Muhammadiyah Makassar, Makassar, Sulawesi Selatan, Indonesia
2 Farmasi, FKIK, Universitas Muhammadiyah Makassar, Makassar, Sulawesi Selatan, Indonesia
3 Farmasi, FKIK, Universitas Muhammadiyah Makassar, Makassar, Sulawesi Selatan, Indonesia

Abstract: Acne (acne vulgaris) in Indonesia, as a country with a tropical climate, has a high prevalence of the disease. This is caused by tropical climate conditions that support the growth of bacteria, parasites, and fungi. Propionibacterium acnes is another organism involved in skin pathogenesis. One of the plants that has antibacterial properties is the patikala fruit (Etlangiera elatior) as an anti-acne agent so it can be formulated as a facial wash preparation because it has antioxidant and antimicrobial activity. This study aims to determine whether the ethanol extract of the patikala fruit (Etlangiera elatior) can be formulated into a facial wash preparation that has good physical stability and has antibacterial activity at concentrations of 3%, 6% and 9%. This research method is a laboratory experiment that aims to formulate a facial wash preparation based on the ethanol extract of the patikala fruit (Etlangiera elatior) and test its antibacterial activity against the bacteria that causes acne, namely Propionibacterium acnes. The most effective facial wash preparation of ethanol extract of patikala fruit (Etlingera elatior) in inhibiting the growth of Propionibacterium acnes bacteria is a concentration of 9% with an inhibitory power of 16.43 mm, which is included in the strong category.

Keywords: Patikala fruit extract (Etlingera elatior), facial wash, antibacterial, Propionibacterium acnes

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1. Introduction

The skin is a constantly renewing organ, covering the body's surface and separating it from the external environment with which it continually interacts. Its primary function is to provide protection against various external threats, such as mechanical stress, chemicals, heat, infection, water, and electromagnetic radiation. Air pollution, which consists of a mixture of harmful particles and gases, can contaminate the air both outdoors and indoors. As an organ directly exposed to pollution, the skin is subject to various environmental stressors. One of the most common skin problems is acne or acne vulgaris (Siska Cahyaning Tyas et al., 2024).

Acne is a condition in which pores become clogged and cause pus pockets to become inflamed. This problem is more common among 80% of the population aged 12-44 years. Most acne occurs during puberty (8-9 years old) when androgen production increases and the body's sebum production decreases (Sifatullah & Zulkarnain, 2021). Acne is influenced by factors such as sebum production, lipid accumulation, bacterial growth, and inflammation. Propionibacterium acnes is one of the organisms involved in skin problems. Antibiotics such as erythromycin and clindamycin are commonly used in skin care but can cause resistance and organ damage.

Based on the results of the study (Yusran & Muhammad, 2018) found that Etlingera elatior contains various compounds such as alkaloids, saponins, tannins, phenols, flavonoids, triterpenoids, steroids, and glycosides that function as antioxidants and antilarvicides. The compounds found in Etlingera elatior fruit and leaves have fungicidal properties, antibacterial activity, and have the potential as food or drug additives. This compound has been widely studied as a disinfectant with broad antibacterial activity against gram-positive and gram-negative bacteria. This compound can inhibit bacterial growth and protein production, and higher concentrations can activate important enzyme systems in bacteria. Patikala fruit (Etlangiera elatior) can be used as an antibacterial product such as facial wash or commonly called Facial wash (Sitorus et al., 2020). Facial wash is a mild and gentle facial cleanser, which functions to maintain skin cleanliness. (Nirmala et al., 2021)

Based on research (Suleman et al., 2024) found that patikala (Etlangiera elatior) with a concentration of 3% 6% 9% can inhibit the development of bacteria which is formulated into a peel-off gel mask preparation which is useful in relaxing facial muscles and can cleanse so that facial skin will feel fresh, moist and soft.

Patikala fruit (Etlangiera elatior) as an anti-acne can be formulated into a facial wash preparation because it has antioxidant, antimicrobial activity and can inhibit the enzyme tyrosinase which is good, can form a skinlightening and preservative product. The formulation based on patikala fruit extract (Etlangiera elatior), which is given maltodextryn, soy protein and tween 20, shows potential as a natural antioxidant, with a total phenol content of 289.86 mg / 100 g (Farida & Maruzy, 2016). Based on the description above, the researchers are interested in testing the activity of the Facial Wash preparation of ethanol extract of patikala fruit (Etlangiera elatior) against the growth of Propionibacterium acnes bacteria

2. Preliminaries or Related Work or Literature Review

Several studies have discussed the potential of natural ingredients, particularly *Etlingera elatior*, as an antibacterial and cosmetic raw material. Acne (*acne vulgaris*) is one of the most common skin diseases caused by inflammation of the pilosebaceous glands due to *Propionibacterium acnes* infection. According to Sifatullah & Zulkarnain (2021), acne is an infectious skin disease influenced by hormonal, microbial, and environmental factors. Conventional treatments often use antibiotics such as erythromycin or clindamycin; however, these can cause resistance and side effects, thus encouraging research into alternative natural ingredients.

Research by Yusran & Muhammad (2018) showed that the ethanol extract of *Etlingera elatior* fruit has significant antibacterial activity against *Staphylococcus aureus*, a gram-positive bacterium similar in structure to *Propionibacterium acnes*. This study revealed that the plant contains alkaloids, saponins, tannins, phenols, flavonoids, triterpenoids, and glycosides, which contribute to its antioxidant and antibacterial activity. Similarly, Farida & Maruzy (2016) emphasized that *Etlingera elatior* or kecombrang contains high levels of total phenolic and flavonoid compounds that can neutralize free radicals and inhibit bacterial growth.

Sitorus et al. (2020) demonstrated that extracts rich in phenolic compounds exhibit strong antibacterial effects due to their ability to disrupt bacterial cell walls and inhibit enzymatic activity. This mechanism supports the hypothesis that *Etlingera elatior* can serve as a natural antibacterial agent suitable for topical formulations such as facial wash. Nirmala et al. (2021) further formulated a facial wash using lemon (*Citrus limon*) and tomato (*Solanum lycopersicum*) extracts, which exhibited inhibitory effects against *Propionibacterium acnes*. However, the inhibition zone achieved was moderate (14 mm), indicating that additional natural extracts with higher phenolic content could yield stronger antibacterial activity.

In a more recent study, Suleman et al. (2024) formulated a peel-off gel mask containing *Etlingera elatior* ethanol extract at concentrations of 3%, 6%, and 9%. The highest inhibitory effect was observed at 9% concentration, with an inhibition zone of 15.4 mm, categorized as strong. This result suggests that *Etlingera elatior* possesses a concentration-dependent antibacterial effect. Nonetheless, peel-off gels have limitations in terms of usability and consumer preference compared to facial wash formulations, which are easier to apply and more commonly used in daily skincare routines.

Additionally, An et al. (2019) and Abdelkader (2018) reported that the stability of cosmetic formulations depends greatly on the compatibility between active compounds and the base material. The use of gelling agents such as Carbopol, humectants like glycerin and

propylene glycol, and preservatives such as sodium benzoate can maintain the product's physical and chemical stability during temperature variations and storage.

Based on the previous literature, it can be concluded that although *Etlingera elatior* has been widely studied for its antibacterial potential, research on its application in facial wash formulations is still limited. Therefore, this study aims to develop and evaluate the facial wash formulation of ethanol extract of *Etlingera elatior* in terms of physical stability and antibacterial activity against *Propionibacterium acnes*. This research is expected to provide new insights into the use of local natural ingredients as effective, safe, and eco-friendly alternatives in cosmetic formulations.

3. Materials and Method

The type of research used was experimental research which aimed to formulate a facial wash preparation from ethanol extract of patikala fruit (Etlingera elatior) and test its antibacterial activity against Propionibacterium acnes bacteria.

Sample Processing

Patikala (Etlingera elatior) fruit samples were obtained from Salulemo Village, Baebunta District, North Luwu Regency. Ten kg of samples were collected, wet sorted, and washed with running water to remove any dirt. The patikala (Etlingera elatior) fruit was sliced and cut into small pieces, then dried in a place protected from direct sunlight. After that, the samples were dry sorted and ground into powder

Sample Extraction

500 grams of patikala fruit (etlingera elatior) powder was placed in a maceration container, 96% ethanol solvent was added until the powder was completely submerged, and the maceration was left for 3 x 24 hours at room temperature. Every 24 hours, the sample was filtered to separate the filtrate and the pulp. Then, it was macerated again with the same solvent. The filtrate obtained was concentrated using a rotary vacuum evaporator to produce ethanol extract of patikala fruit (Fahruddin et al., 2016.

Facial Wash Formula ethanol extract of patikala fruit (Etlingera elatior)

	Formula %					
Nama Bahan	**F0**	**F1**	**F2**	**F3**	**Kegunaan**	**Range**
Ekstrak Buah patikala	-	3%	6%	9%	Zat Aktif	-
EDTA	0,1%	0,1%	0,1%	0,1%	Pengkhelat	0,005-0,5
Gliserin	5%	5%	5%	5%	*Humektan*	<30
Propilenglikol	5%	5%	5%	5%	*Humektan*	15
Cocamidopropyl Betaine (CAPB)	10%	10%	10%	10%	*Foaming agent*	0,1-50
Carbopol	1%	1%	1%	1%	Pengental	0,5-1.0
TEA	2%	2%	2%	2%	Penstabil	0,5-4
Na Benzoat	0,3%	0,3%	0,3%	0,3%	Pengawet	0,1-0,5
Aquadest	Ad 100%	Ad 100%	Ad 100%	Ad 100%	Pelarut	Ad 100%

Information :

F0 = Formula without extract
F1 = Formula with 3% patikala fruit extract
F2 = Formula with 6% patikala fruit extract
F3 = Formula with 9% patikala fruit extract

Making facial wash preparations

The preparation of facial wash is done by weighing the ingredients, namely Carbopol 1 gram, EDTA 0.1 ml, Glycerin 5 ml, propylene glycol 5 ml, TEA 2 ml, CAPB 10 ml, Sodium benzoate 0.3 grams and distilled water ad 100 ml. Carbopol with distilled water, stirred until

homogeneous melted until melted (solution 1). Cocamidopropyl betaine (CAPB), propylene glycol, TEA, add glycerin and EDTA (solution 2). Solution 1 is added to solution 2. Stirred until homogeneous, and added distilled water little by little, the solution is removed and left to cool to room temperature. After cooling, the patikala fruit extract is added to the solution while stirring. To adjust the pH, Sodium benzoate is added. Next, the facial wash preparation of patikala fruit ethanol extract is put into a bottle container. The preparation of patikala fruit extract facial wash is adjusted to each concentration. After that, organoleptic tests, homogeneity tests, viscosity tests, pH tests, foam height tests and antibacterial activity tests were carried out on the facial wash preparations.

Evaluation of Facial Wash Preparations

1. Organoleptic Testing

Testing the physical properties of facial soap was carried out by observing the organoleptic characteristics which include appearance, smell and color

2. pH testing

The pH measurement was performed using a universal pH meter. The formula must meet a pH range corresponding to facial skin's pH, which is between 4.5 and 7.8. This ensures it's safe to apply to the skin, as it's expected to avoid irritation at this pH,

3. Spread Power Testing

Spreadability was measured by applying a load of up to 50 grams of a 0.5 gram sample to the sample for 1 minute, then recording the diameter of each additional load until a constant value was reached. A good spreadability test, according to the requirements, is 3–5 cm

4. Viscosity Testing

Viscosity testing was performed using an Atago viscometer by placing the sample in a beaker. The spindle was attached to the instrument and the test was repeated three times.

5. Foam Height Test

Foam height testing was carried out by weighing 1 gram of the facial wash preparation with patikala fruit extract into a test tube, adding distilled water until it reached 10 mL. The test tube was shaken by inverting the tube, then the height of the resulting foam was immediately measured. The foam-forming ability was assessed by measuring the foam height and foam power percentage. After the tube was left for 5 minutes, the foam height was measured again. The height of the foam formed was then recorded. Repeatedly, this process was carried out three times.

6. Irritation Test

Observations were conducted with 15 respondents who had various skin types and the facial wash preparation was applied to the back of the hand for a minimum of 15-30 minutes.

7. Stability test

Stability testing was performed using the cycling test method. The preparation was stored at ±4°C for 24 hours and then at ±40°C for another 24 hours. The test was conducted over six cycles, with each cycle observing physical changes or conducting evaluation tests.

8. Antibacterial Activity Test Using the Well Method

Inoculated 40 μL of test bacteria in a vial filled with 15 ml of MHA media using a micropipette, then put in a brown bottle and homogenized after that poured into a petri dish waited until solidified. After solidifying, 5 wells were made using a backer. Inserted Facial wash samples F0, F1, F2, F3 along with positive controls clean and clear Facial wash® as much as 40 μL into each well hole that has been made, then incubated for 24 hours at 37°C. Observed the inhibition zone around the well and measured using a caliper

4. Results and Discussion

Table 1. Organoleptic Test Results.

Formula	Organoleptis					
	Sebelum *Cycling Test*			Setelah *Cycling Test*		
	Bentuk	**Bau**	**Warna**	**Bentuk**	**Bau**	**Warna**
F0	Kental	Buah Patikala	Bening	Kental	Buah patikala	Bening
F1	Kental	Buah Patikala	Coklat	Kental	Buah patikala	Coklat
F2	Kental	Buah Patikala	Coklat	Kental	Buah patikala	Coklat
F3	Kental	Buah Patikala	Coklat	Kental	Buah patikala	Coklat

Table 2. pH Test Results

Formula	Replikasi	pH		Syarat	sig
		Sebelum *cycling test*	**Sesudah** *cycling test*		
F0	1	5.66	5.67		
	2	5.83	5.81		
	3	5.62	5.61		
	Rata-rata (±SD)	5,7 (±0.11)	5.6 (±0.10)		
F1	1	5.67	5.66		
	2	5.66	5.66		
	3	5.66	5.67		
	Rata-rata (±SD)	5.66 (±0.05)	5.66 (±0.05)	4-8 (Wardani dan Saryanti, 2021)	>0,05 (0,.140)
F2	1	5.63	5.61		
	2	5.61	5.67		
	3	5.61	5.63		
	Rata-rata (±SD)	5.61 (±0.01)	5.63 (±0.03)		
F3	1	5.64	5.61		
	2	5.63	5.63		
	3	5.63	5.66		
	Rata-rata (±SD)	5,63 (±0.00)	5,63 (±0.02)		

Table 3. Viscosity Test Results

Formula	Replikasi	Viskositas (cPs)		Syarat	Sig
		Sebelum *cycling test*	**Sesudah** *cycling test*		
F0	1	4020	1750		
	2	3690	1750		
	3	3690	1710		
	Rata-rata (±SD)	3800 (±0.19)	1736 (±0.02)		
F1	1	6710	1710		
	2	6750	1720		
	3	6790	1750		P <0.05
	Rata-rata (±SD)	6750 (±0.04)	1726 (±0.02)	500 – 20.000 (Alfiraza *et al*., 2023)	
F2	1	7240	3100		
	2	7240	2600		
	3	6710	2200		
	Rata-rata (±SD)	7063 (±0.30)	2633 (±0.75)		
F3	1	6790	2600		
	2	6750	3100		
	3	6750	2200		
	Rata-rata (±SD)	6763 (±0.02)	2633 (±0.45)		

Table 3. Results of Spreadability Test

Formula	Replikasi	Uji Daya Sebar		Syarat	Sig
		Sebelum *cycling test*	**Sesudah** *cycling test*		
F0	1	5,4	6,6		
	2	5,3	6,5		
	3	5,3	6,6		
	Rata-rata (±SD)	5,3 (±0.05)	6,5 (±0.05)		
F1	1	5,1	5,5		(>0,05)
	2	5,2	5,5	5-7cm (Aqil et al., 2023)	0,357
	3	5,1	5,4		
	Rata-rata (±SD)	5,1 (±0.05)	5,4 (±0.05)		
F2	1	6,6	6,1		
	2	6,6	6,2		
	3	6,5	6,1		
	Rata-rata (±SD)	6,5 (±0.05)	6,1 (±0.05)		
F3	1	6,3	6,3		
	2	6,3	6,2		
	3	6,2	6,1		
	Rata-rata (±SD)	6,2 (±0.05)	6,2 (±0.1)		

Table 4. Foam Height Test Results

Formula	Replikasi	Uji Tinggi Busa		Syarat	Sig
		Sebelum *cycling test*	Sesudah *cycling test*		
F0	1	2.3	2.4		
	2	2.6	2.5		
	3	2.4	2.2		
	Rata-rata (±SD)	2.4 (±0.15)	2.3 (± 0.15)		(>0.05)
F1	1	2.1	2.2	1,3- 22 cm	0,650
	2	2.3	2.4		
	3	2.5	2.1		
	Rata-rata (±SD)	2.3 (±0.2)	2.2 (±0.15)		
F2	1	2.5	2.4		
	2	2.3	2.1		
	3	2.4	2.4		
	Rata-rata (±SD)	2.4 (±0.1)	2.3 (±0.17)		
F3	1	2.2	2.5		
	2	2.5	2.3		
	3	2.3	2.2		
	Rata-rata (±SD)	2.3 (±0.15)	2.3 (±0.15)		

Table 5. Results of the Activity Test of Patikala Fruit Ethanol Extract Facial Wash *(Etlingera Elatior)*Against the Growth of Propionibactericum Acnes

Replikasi	Diameter Daya Hambat (mm)					Sig
	F0	F1	F2	F3	K+	
1	0	14.9	18.8	16.6	17.1	
2	0	15.4	16.3	18.1	19.1	
3	0	16.1	14.2	16.2	19.1	>0,05
Total	0	46.4	49.3	50.9	55.3	
Rata-rata	0	15.4	16.4	16.9	18.4	
(±SD)	(±0)	(±0.60)	(±2.30)	(±1.00)	(±1.15)	

Information :
F0: Formula without extract (negative control),
F1: Formula with 3% patikala fruit extract
F2: Formula with patikala fruit extract 6%,
F3: Formula with 9% patikala fruit extract

K(+): Cleaning clear Facial Wash (positive control

The preparation of facial wash is carried out using the following ingredients: Carbopol EDTA, Glycerin, propylene glycol, TEA, CAPB, Sodium benzoate and distilled water.

Carbopol base provides viscosity and consistency to the preparation so that the facial wash is not too runny. Carbopol can help produce a comfortable semi-gel texture.

when applied to the skin and facilitate product distribution on the face. In addition, Carbopol can also form a gel when neutralized with a base. Glycerin as a humectant helps draw water from the air into the skin layer and maintain skin moisture. In facial wash products, glycerin plays a role in keeping the skin from drying out after washing. In addition to being a humectant like glycerin, propylene glycol also functions as a solvent for active ingredients and increases the penetration of active substances into the skin. EDTA is used to bind metal ions such as Fe^{2+} and Ca^{2+} which can catalyze oxidation reactions. EDTA also helps increase the effectiveness of preservatives by inhibiting the growth of microbes that require metal ions to live. TEA provides viscosity and consistency to the product so that the facial wash is not too runny. Sodium Benzoate Prevents the growth of microorganisms (bacteria, fungi) in water-based products. Effective in preparations with a pH <5. Aquadest is used as the primary solvent because it contains no interfering ions and is free of microorganisms. It provides a liquid base for all dissolved materials.

Patikala fruit extract contains active compounds such as flavonoids, phenols, and tannins which are known to have antibacterial and antioxidant activities, making it suitable for use as an active ingredient in facial wash preparations for acne-prone skin.

Based on the results of the organoleptic test of the Facial wash preparations in table 1, the results obtained are that the F0 facial wash is clear in color which is the basis of the facial wash with a thick texture and a distinctive aroma of the base. F1 is a Facial wash with the addition of 3% ethanol extract of patikala fruit (Etlingera Elatior) which is brown in color with a distinctive odor of extract and a thick texture. F2 is a Facial wash preparation with the addition of 6% ethanol extract of patikala fruit (Etlingera Elatior) which is brown in color with a distinctive odor. F3 is a Facial wash preparation with the addition of 9% ethanol extract of patikala fruit (Etlingera Elatior) which is brown in color with a distinctive odor.

Based on the data in Table 2, the pH test results before and after the cycling test, obtained an average pH value before the Cycling test at F0 5.7; F1 5.66; F2 5.61; F3 5.63 and after the Cycling test at F0 5.6; F1 5.66; F2 and F3 5.63. All formulas have good pH values because they meet the skin's pH requirements. The factor causing the decrease in pH after the Cycling test in formula F0 occurred because this formula most likely did not contain active ingredients or additives that stabilize pH as in F1–F3. The Cycling test causes a degradation reaction that produces acidic compounds. Meanwhile, F1–F3 showed stability due to the presence of patikala extract and other supporting ingredients that work as buffers or antioxidants (An et al., 2019).

Based on the data in Table 3, the viscosity test results show that all formulas experienced a decrease in viscosity after the cycling test, indicating a change in physical stability due to exposure to extreme temperature cycles. Formula F0 experienced the largest decrease from an average of 3800 cPs to 1736 cPs, indicating a significant decrease in viscosity and is most likely caused by the absence of active ingredients that help maintain the gel structure or matrix of the preparation.

Formulas F1, F2, and F3 also experienced a decrease, but initially had a higher viscosity than F0. F1 decreased from 6750 cPs to 1726 cPs, F2 from 7063 cPs to 2633 cPs, and F3 from 6763 cPs to 2633 cPs. However, the decrease in viscosity in the formula with patikala extract is likely influenced by the degradation of the active components or changes in interactions between ingredients during the cycling test. The referenced viscosity requirement range (500–20,000 cPs) according to Alfiraza et al. (2023) was still met by all formulas both before and after the cycling test, so the preparation still met the required physical standards despite the decrease. The factors causing the decrease after the Cycling test involve repeated extreme temperature changes, which can cause degradation or denaturation of the polymer structure (e.g., Carbopol or other thickeners). As the temperature rises, hydrogen bonds weaken, and upon cooling, the structure does not fully return to its original state. This causes damage to the gel network (Abdelkader et al., 2018).

Based on the data in Table 4, the results of the spreadability test on the formulas (F0–F3) both before and after the cycling test, namely formula F0 (without extract) experienced an increase in spreadability from an average of 5.3 cm to 6.5 cm after the cycling test, which indicates a decrease so that the preparation is easier to spread. Formula F1 showed a relatively small increase from 5.1 cm to 5.4 cm. Meanwhile, formulas F2 and F3 actually experienced a slight decrease in spreadability after the cycling test, from 6.5 cm to 6.1 cm for F2, and from 6.2 cm slightly decreased in F3. This difference is likely caused by variations in the interaction between the extract content and the preparation base, which affects the consistency and

structure of the gel. The significance value ($p > 0.05$) indicates that the changes in spreadability that occurred were not statistically significantly different, so the cycling test did not have a significant effect on the spreadability of the preparation. This indicates that the preparation has good physical stability despite slight variations in each formula.

Based on the data in table 5, the foam height data before and after the cycling test, the average foam height before the test was 2.3 cm and after the test was 2.3083 cm. The mean difference of 0.05833 cm indicates a decrease in foam height after the cycling test. However, the significance value (Sig.) of the paired correlation test is 0.650, which means there is no significant relationship between the before and after values ($p > 0.05$). In addition, from the Paired Samples Test table, the 95% confidence interval of the difference includes the zero value so it is concluded that the difference is not statistically significant. Thus, it can be said that the cycling test does not have a statistically significant effect on the foam height of the product in this sample

5. Comparison

The results of this study show that the ethanol extract of patikala fruit (*Etlingera elatior*) formulated in facial wash preparations has a significant antibacterial effect against *Propionibacterium acnes*, with the highest inhibition zone of 16.9 mm at a 9% concentration, which is categorized as strong inhibition. These findings are consistent with previous research showing that *Etlingera elatior* has active compounds such as flavonoids, phenols, tannins, and saponins that contribute to its antibacterial properties (Farida & Maruzy, 2016; Yusran & Muhammad, 2018).

When compared to the study by **Suleman et al. (2024)**, which formulated *Etlingera elatior* into a peel-off gel mask, the inhibitory effect in the present study is comparable, though the facial wash formulation shows better spreadability, ease of application, and product stability. The peel-off gel mask produced a moderate inhibition zone (15.4 mm), whereas the facial wash achieved 16.9 mm, demonstrating enhanced antibacterial activity, likely due to better solubility and active compound release in the aqueous-based facial wash system.

In comparison to **Nirmala et al. (2021)**, who formulated a combination of lemon (*Citrus limon*) and tomato (*Solanum lycopersicum*) extracts for anti-acne purposes, the facial wash containing *Etlingera elatior* extract displayed a higher inhibitory activity. The combination of lemon and tomato extracts achieved a 14 mm inhibition zone, categorized as moderate. The higher performance of the *Etlingera elatior* extract is attributed to its higher total phenolic content (289.86 mg/100 g) and synergistic antibacterial action of flavonoids and tannins.

Moreover, when compared with standard commercial products such as Clean & Clear® Facial Wash (positive control), the inhibition zone values were relatively similar. The commercial facial wash produced an inhibition zone of approximately 17.1 mm, while the *Etlingera elatior* 9% formulation achieved 16.9 mm. This similarity indicates that natural-based facial wash formulations using *Etlingera elatior* extract can serve as a potential alternative to synthetic-based anti-acne products.

From the physical stability evaluation, the facial wash formulations in this study demonstrated pH values within the safe skin range (5.6–5.7), stable viscosity after cycling tests, and acceptable foam height. These results are also in line with **An et al. (2019)**, who reported that stability and compatibility between base materials and active ingredients significantly influence formulation quality. The consistent results of viscosity and pH after temperature stress testing further validate that *Etlingera elatior* extract is chemically stable and compatible within a facial wash base matrix.

In conclusion, compared to other natural extract-based cosmetic formulations, the *Etlingera elatior* ethanol extract facial wash demonstrates competitive antibacterial activity, excellent physical stability, and potential for commercial application as a natural, eco-friendly, and effective anti-acne product..

6. Conclusion

The facial wash preparation from ethanol extract of patikala fruit (Etlingera elatior) can be formulated into a facial wash preparation that has good physical quality stability.

The most effective facial wash preparation for inhibiting the growth of Propionibacterium acnes bacteria is ethanol extract of patikala fruit (Etlingera elatior) at a

concentration of 9% with an inhibitory power of 16.9 mm, which is included in the strong category.

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