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FORMULATION AND ACTIVITY TESTING OF AN ANTI-ACNE MICELLAR WATER FORMULATION CONTAINING BINAHONG LEAF EXTRACT (ANREDERA CORDIFOLIA TEN) AGAINST PROPIONIBACTERIUM ACNES

Sintia Nurmala[1], Kartika Sari[2]
Tarumanagara Institute's Undergraduate Program in Pharmacy
Email :sintianurm31@gmail.com,kartikasari@gmail.com

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Abstract
Acne (Acne vulgaris) is a chronic inflammation of the pilosebaceous glands caused by the bacteria Propionibacterium acnes and is a common skin problem, especially in adolescents with a prevalence of up to 85%. Binahong leaves (Anredera cordifolia) are known to contain secondary metabolites such as flavonoids, saponins, tannins, and alkaloids that have antibacterial potential. This study aims to formulate micellar water preparations from binahong leaf ethanol extract as an anti-acne facial cleanser and to evaluate its physical, chemical characteristics and antibacterial activity against Propionibacterium acnes bacteria. This study used a laboratory experimental method. Binahong leaf extract was obtained through a maceration method using 70% ethanol with a yield of 16.4%. Micellar water preparations were formulated in three variations of extract concentrations, namely 1%, 3% and 5%. Evaluation of the preparations included organoleptic tests, homogeneity, pH, viscosity, cleaning power, stability using the cycling test method and antibacterial activity testing using the disc diffusion method with clindamycin as a positive control. The results of the study showed that binahong leaf extract positively contained flavonoids, saponins, tannins, and alkaloids. All micellar water preparation formulas had good physical and chemical characteristics, were homogeneous, stable during testing, and had a pH that matched the physiological pH of facial skin. The results of the antibacterial activity test showed that preparations F1, F2 and F3 had antibacterial activity in the strong category with an average inhibition zone diameter of 11.35 ± 1.11 mm; 11.97 ± 2.40 mm; and 12.92 ± 0.56 mm. Based on the results of the study, the formula with a 5% extract concentration showed the best antibacterial activity against Propionibacterium acnes.

Keywords:*Micellar water, binahong leaves, acne, propionibacterium acnes.*

INTRODUCTION

*Acne vulgaris*Acne is one of the most common skin diseases in adolescents and young adults, with a prevalence that continues to increase globally. According to data from the Global Burden of Disease, approximately 85% of individuals aged 12–25 have experienced acne (Halim et al., 2023). This condition is characterized by chronic inflammation of the pilosebaceous unit, resulting in lesions such as comedones, papules, pustules, and nodules due to increased sebum production, follicular hyperkeratinization, and the proliferation of Propionibacterium acnes bacteria (Heng & Chew, 2020; Zhu et al., 2025). In addition to causing physical problems, acne also impacts the quality of life and psychological health of sufferers because it can reduce self-confidence and trigger emotional disturbances in adolescents and young adults (Hammill & Vaillancourt, 2023; Layton et al., 2021). The high incidence of acne vulgaris demonstrates the need for innovative skincare products that are effective, safe, and able to help reduce the colonization of acne-causing bacteria.

Maintaining facial skin cleanliness is an important step in preventing acne because the accumulation of oil, dust, and cosmetic residue can clog skin pores and trigger the growth of acne-causing bacteria (Siska Cahyaning Tyas et al., 2024). One facial cleansing product that is currently widely used is micellar water, a water-based preparation containing low-concentration non-ionic surfactants that can form micelles to remove dirt, oil, and makeup residue without the need to rinse (Ngete & Harti, 2025). Micellar water has a light texture, is easy to use, and is relatively safe for various skin types, including sensitive skin, making it increasingly popular as a daily facial cleanser (Dzakwan, 2020; Taale et al., 2023). The development of natural micellar water is an important concern because consumers tend to choose cosmetic products that contain herbal ingredients with a lower risk of irritation and good biological activity for acne-prone skin.

Although various anti-acne products are available on the market, most still use synthetic active ingredients that can potentially cause irritation, dry skin, bacterial resistance, and disrupt the balance of the skin microbiota when used long-term (Layton et al., 2021; Hammill & Vaillancourt, 2023). This situation has prompted the need to develop natural active ingredients that are safer but still have effective antibacterial activity against Propionibacterium acnes. One plant with potential for development is binahong leaves (Anredera cordifolia Ten.), which are known to contain flavonoids, alkaloids, saponins, and polyphenols with antibacterial, anti-inflammatory, and antioxidant properties (Sasebohe, Prakasita, et al., 2023). These secondary metabolites have the potential to inhibit the growth of acne-causing bacteria while helping reduce skin inflammation.

Previous research has shown that ethanol extract of binahong leaves has strong antibacterial activity against Propionibacterium acnes. Waris and Indarto (2023) reported that binahong leaf extract produced an inhibition zone diameter of 12.67 mm at a concentration of 5%, 20.33 mm at a concentration of 10%, and 25.67 mm at a concentration of 15%, indicating increasing bacterial inhibition capacity with increasing extract concentration. However, research related to the use of binahong leaf extract in micellar water formulations is still limited, especially those that examine the physicochemical characteristics of the preparation and its antibacterial activity against Propionibacterium acnes. Most previous studies have focused on gel or ointment dosage forms, making development in micellar water a relevant and innovative research opportunity (Sasebohe, Prakasita, et al., 2023; Waris & Indarto, 2023).

Based on these problems, this study aims to develop a micellar water formulation containing binahong leaf extract (Anredera cordifolia Ten.) as an antiacne preparation, evaluate the physical and chemical characteristics of the preparation, and test its antibacterial activity against Propionibacterium acnes. This research is important because it can be an alternative for developing natural facial cleansers that are safer and more effective for acne-prone skin. The novelty of this research lies in the formulation of binahong leaf extract into micellar water preparations combined with testing the physicochemical characteristics and antibacterial activity against Propionibacterium acnes, so it is expected to be able to provide scientific contributions in the development of natural-based herbal cosmetics as modern antiacne products.

METHOD

This research is an experimental laboratory study with a quantitative approach that aims to determine the antibacterial activity of micellar water preparations of binahong leaf extract (Anredera cordifolia Ten.) against Propionibacterium acnes bacteria. Experimental research was used because the researcher manipulated the independent variable in the form of variations in the concentration of binahong leaf extract in the preparation formulation to observe its effect on the physicochemical characteristics and antibacterial activity of the preparation. According to Sugiyono (2022), experimental research aims to determine the cause and effect relationship through certain treatments on the research object. A quantitative approach was used because the data obtained were in the form of numerical measurements such as pH values, viscosity, and the diameter of the antibacterial inhibition zone which were analyzed objectively (Creswell & Creswell, 2023; Sudaryono, 2022).

The research was conducted at the Pharmaceutical Preparation Technology Laboratory, Microbiology Laboratory, and Pharmacognosy and Phytochemistry Laboratory of the Tarumanagara Institute, Jakarta, from May to July 2025. The research stages included the process of making binahong leaf simplicia, extraction using the maceration method with 70% ethanol solvent, phytochemical screening, formulation of micellar water preparations, physicochemical evaluation, antibacterial activity testing using the disc diffusion method, and preparation stability testing using the cycling test method (Sasebohe et al., 2023; Mora, 2024). The maceration method was chosen because it is able to maintain the content of secondary metabolites such as flavonoids, alkaloids, tannins, and saponins which have the potential to be antibacterial against Propionibacterium acnes (Waris & Indarto, 2023; Noviyanty et al., 2022).

The population in this study was all micellar water formulations containing binahong leaf extract (Anredera cordifolia Ten.) as an active ingredient, which have the potential to be used as anti-acne preparations. The research samples were micellar water preparations containing binahong leaf extract with varying extract concentrations of 1%, 3%, and 5%, both with and without surfactants. Sample selection was carried out using a purposive sampling technique because the formulas were chosen based on scientific considerations and the research objective to evaluate the effect of extract concentration on antibacterial activity and the physical characteristics of the preparations (Sugiyono, 2022; Emzir, 2023).

The active ingredient sample used was binahong leaves (Anredera cordifolia Ten.) obtained from Babakan Village, Kawunganten District, Cilacap Regency, Central Java. Plant identification was carried out at the National Research and Innovation Agency (BRIN), Cibinong, Bogor, to ensure the authenticity and suitability of the plant species used in the study. The identification process is crucial to avoid misidentification of plants that could affect the validity of phytopharmaceutical research results (Sasebohe et al., 2023; Sudaryono, 2022).

The research instruments used included pharmaceutical and microbiology laboratory equipment such as a rotary evaporator, magnetic stirrer, Brookfield viscometer, pH meter, incubator, autoclave, analytical balance, petri dish, micropipette, and caliper. The research materials consisted of binahong leaves, 70% ethanol, polysorbate 20, glycerin, propylene glycol, sodium gluconate, phenoxyethanol, lactic acid, nutrient agar media, and Propionibacterium acnes bacteria. The use of laboratory instruments was carried out to obtain accurate quantitative data related to the physicochemical characteristics and antibacterial activity of the preparation (Mora, 2024; Anggi Prantika & Susanti, 2024a).

The data analysis technique was carried out descriptively quantitatively by presenting the test results in the form of tables and scientific narratives. Antibacterial activity data were expressed as the average diameter of the inhibition zone ± standard deviation (SD), while the physical evaluation of the preparation including organoleptic, homogeneity, pH, viscosity, cleaning power, and stability was analyzed based on the results of visual observation and instrument measurements. According to Creswell and Creswell (2023), descriptive analysis is used to describe

The research procedure began with the preparation of binahong leaf simplicia through a process of washing, drying at room temperature, grinding, and sieving to obtain simplicia powder. The simplicia powder was then extracted using the maceration method with 70% ethanol solvent for five days consisting of three days of maceration and two days of remaceration. The extracted filtrate was evaporated using a rotary evaporator at 40°C to obtain a thick extract, then the extract yield was calculated and phytochemical screening was carried out to identify the content of flavonoids, alkaloids, saponins, and tannins (Noviyanty et al., 2022; Sasebohe et al., 2023).

The next stage was the formulation of micellar water preparations with varying concentrations of binahong leaf extract using polysorbate 20 as a surfactant. All ingredients were mixed using a magnetic stirrer at 40–45°C until a homogeneous and stable preparation was formed. The preparations were then evaluated through organoleptic tests, homogeneity, pH, viscosity, cleaning power, and stability tests using the cycling test method for three cycles of low and high temperature storage (Dzakwan, 2020; Mora, 2021). Antibacterial activity was tested using the disc diffusion method against Propionibacterium acnes bacteria by observing the diameter of the inhibition zone formed after 24 hours of incubation at 37°C (Gede et al., 2020; Anggi Prantika & Susanti, 2024b).

RESULTS AND DISCUSSION

Plant Determination

Plant identification aims to ensure plant identity and prevent errors in selecting plants for research. Plant identification was conducted at the National Research and Innovation Agency (BRIN) in Cibinong, Bogor, West Java. The results of the identification on the plant used for the study were leaves of the binahong species, Anredera cordifolia (Ten) Steenis, of the Basellaceae family.

Results of Making Binahong Leaf Extract (Anredera Cordifolia Ten)

The binahong leaves used in this study were obtained from Babakan Village, Cilacap Regency. Fresh, unperforated leaves were used. This selection criterion was chosen to ensure high-quality raw materials, as fresh binahong leaves contain a high level of active ingredients (Nurul Hidayat et al., 2019).

The thick binahong leaf extract was obtained using a maceration extraction method using 70% ethanol. The maceration method was chosen for this study because it does not require heating, thus maintaining the stability of thermolabile compounds with easy and simple equipment.

The results of the binahong leaf extraction obtained a thick extract of 82 grams with a yield value of 16.4%. This yield value meets the requirements of the Indonesian Herbal Pharmacopoeia Edition II (2017), namely a yield of not less than 11.9%. When compared to previous studies, the yield value obtained is lower than the study of Sasebohe et al. (2023) but higher than the study of Anggi Prantika et al. (2024). This difference in yield value can be influenced by several factors, such as differences in solvent type, solvent amount ratio, maceration time, particle size of the simplex, and the extract evaporation process (Roy et al., 2021). The resulting thick binahong leaf extract has a greenish black color, a distinctive aroma of binahong leaves, and a thick texture.

Phytochemical Screening

The purpose of phytochemical screening is to determine the compound content of binahong leaf extract. The scope of the phytochemical screening includes testing for flavonoids, alkaloids, saponins, and tannins. The results of the phytochemical screening are shown in Table 1.

Table 1. Phytochemical Screening Results

No	Test	Reagent	Positive Indicators	Results
1	Flavonoid	Concentrated Mg+ HCl powder	The color turns yellow	+
2	Alkaloid	Mayer	White sediment	+
		Dragendorff	Orange Sediment	+
		Wagner	Brown Sediment	+
3.	Saponin	Hot Water	Stable foam	+
4	Tannin	Aquades+FECl3	Blackish green	+

Information:
(+) : There are secondary metabolite compounds
(-): There are no secondary metabolite compounds

Based on Table 1, the results of the phytochemical screening test of binahong leaf extract indicate the presence of secondary metabolites, namely flavonoids, alkaloids, tannins, and saponins. These phytochemical screening results are consistent with the results of the phytochemical screening of binahong leaf extract in the study by Anggi Prantika et al. (2024) which found that binahong leaves positively contained flavonoids, tannins, saponins, and alkaloids.

Antibacterial Activity Test Results of Binahong Leaf Extract (Anredera Cordifolia Ten)

The antibacterial activity of binahong leaf extract against Propionibacterium acnes bacteria was tested using the disc diffusion method with sodium chloride (NaCl) as a negative control and the antibiotic clindamycin as a positive control. The test results are shown in Table 2.

Table 2. Results of Binahong Leaf Extract Activity Test

Concentration	Mean ± SD (mm) Inhibition Zone Diameter (mm)	Inhibition Zone	Antibacterial Activity Level

1%	7.41±0.94	Formed	Currently
3%	7.75±0.81	Formed	Currently
5%	12.01±1.28	Formed	Strong
Positive Control	27,725	Formed	Very strong
Negative Control	0	Not Formed	-

Information:
1%: Test solution with 1% Binahong Leaf extract
3%: Test solution with 3% Binahong Leaf extract 5%: Test solution with 5%
Binahong Leaf extract
Negative control (-): Sodium chloride (NaCl)
Positive control (+): Clindamycin

"According to Davis and Scout (1971) stated the criteria for antibacterial inhibition as follows: if the inhibition zone <5 mm is said to be weak, 5-10 mm is said to be moderate, 11-20 mm is said to be strong and >20 mm is said to be very strong inhibition". Based on the test results, binahong leaf extract (Anredera cordifoloa ten) showed the ability to inhibit the growth of Propionibacterium acnes bacteria. Giving extracts with varying concentrations of 1%, 3%, and 5% showed the presence of an inhibition zone from binahong leaf extract with an average inhibition zone diameter of 7.41 mm; 7.75 mm; 12.01 mm with moderate inhibition categories; moderate; strong. The measurement results showed that the diameter of the inhibition zone tended to increase in proportion to the increase in extract concentration. The smallest inhibition zone was at a concentration of 1% and the largest inhibition zone was at a concentration of 5%. While in the positive control using clindamycin produced an inhibition zone diameter of 27.725 mm categorized as very strong. This indicates that clindamycin has higher antibacterial activity than binahong leaf extract. Clindamycin is an antibiotic capable of inhibiting and killing pathogenic bacteria. Clindamycin's mechanism of action against gram-positive bacteria is by inhibiting bacterial protein synthesis (Sasabohe et al. 2023). Meanwhile, in the negative control, no inhibition zone was formed, indicating that the solvent lacks antibacterial activity.

Physical Evaluation of Micellar Water Preparations of Binahong Leaf Extract

1. Organoleptic Test Results

Organoleptic testing was conducted to observe the visual appearance of the preparation, including texture, color, and aroma (Yericho et al., 2023). Organoleptic testing was conducted on three formulations of micellar water with binahong leaf extract (FI, F2, and F3) as presented in Table 3.

Table 3. Organoleptic Test Results

Formula	Color	Aroma	Texture
F1	Fawn	Special Extract	Liquid
F2	Greenish black	Special Extract	Liquid
F3	Greenish black	Special Extract	Liquid

Information:
F1: Micellar Water preparation formula with 1% Binahong Leaf extract
F2: Micellar Water preparation formula with 3% Binahong Leaf extract
F3: Micellar Water preparation formula with 5% Binahong Leaf extract

Based on the observation results presented in Table 5, it shows that the micellar water preparation in F1 produces a yellowish brown color, with a distinctive aroma of binahong leaves and a liquid texture. Meanwhile, F2 and F3 produce a greenish black color, a distinctive aroma of binahong leaf extract and a liquid texture. The color difference in each formula is influenced by the increasing concentration of binahong leaf extract added to the micellar water preparation, where the higher the concentration of the extract, the more intense the color becomes.

2. Homogeneity Test Results

Homogeneity testing is carried out by observing the uniformity of the particles to determine whether the ingredients in the preparation are evenly mixed (Yericho et al., 2023). The results of the homogeneity test for the micellar water preparation are seen in Table 4.

Table 4. Results of Homogeneity Test

Formula	Homogeneity
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous

Information:
F1: Micellar Water Formula with 1% Binahong Leaf Extract
F2: Micellar Water Formula with 3% Binahong Leaf Extract
F3: Micellar Water Formula with 5% Binahong Leaf Extract

Based on Table 4, the test results for F1, F2, and F3 produced a homogeneous preparation, meaning there was no visible sediment. This indicates that each ingredient in the three formulas was well mixed during the manufacturing process. A homogeneous preparation can produce good quality because it indicates that all ingredients in the preparation are evenly dispersed. A homogeneous preparation greatly influences the effectiveness of micellar water preparations. A homogeneous preparation will facilitate absorption into the skin, thus facilitating skin cleansing (Mora 2021).

3. pH Test Results

pH testing is performed to determine the acidity or alkalinity of micellar water preparations to ensure their safety during use and avoid skin irritation. Preparations with a pH outside the skin's physiological pH range can cause undesirable effects, such as drying out the skin if the pH is too alkaline, or irritation if the pH is too acidic (Rachmadani, Nurlaila, & Harismah, 2022).

Table 5. pH Test Results

Formula	pH			Average value pH ±SD	Condition
					Literature SNI Standard 16-4380-1996 pH of facial skin
	I	II	III		
F1	5.88	5.58	5.30	5.58±0.290	4.5-7.8
F2	5.66	5.63	5.23	5.50±0.240	
F3	5.75	5.73	6.10	5.86±0.208	

Information:
F1: Micellar Water preparation formula with 1% Binahong Leaf extract
F2: Micellar Water preparation formula with 3% Binahong Leaf extract F3: Micellar Water preparation formula with 5% Binahong Leaf extract

Based on Table 5, the average pH values for F1 were 5.58±0.290; F2 5.50±0.240; and F3 5.86±0.208. All formulas showed pH values that were still within the pH range of facial skin based on the SNI 164380-1996 Standard, namely 4.5-7.8. This indicates that the resulting preparation meets pH requirements and is potentially safe for use on facial skin.

Viscosity Test

The viscosity test on micellar water preparations was carried out to determine the level of viscosity of the resulting preparation. The results of the viscosity test on micellar water preparations can be seen in Table 6.

Table 6. Viscosity Test Results

Formula	Viscosity (cPs)
F1	1.30
F2	1.70
F3	1.80

Information: F1: Formula*Micellar Water*with 1% Binahong Leaf extract
F2: Micellar Water Formula with 3% Binahong Leaf Extract
F3: Micellar Water Formula with 5% Binahong Leaf Extract

Based on the test results, the viscosity value of the micellar water preparation of binahong leaf extract in each formula was F1 1.30 cPs, F2 1.70 cPs, and F3 1.80 cPs. From these viscosity values, there was an increase in viscosity along with increasing concentration of binahong leaf extract. The formula with the highest concentration (F3) showed the greatest viscosity value, while the formula with the lowest concentration (F1) had the smallest viscosity. This indicates that the addition of the extract has an effect on increasing the viscosity of the preparation.

Net Power Test

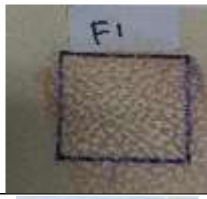
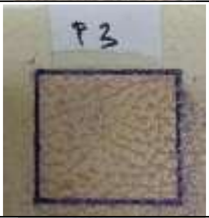
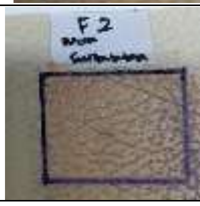
The cleansing power test was conducted to determine the ability of micellar water preparations to remove oily impurities from the skin's surface. The cleansing power test used visual observation on synthetic skin treated with foundation as a dirt model. Foundation was used because it is an oil-based cosmetic commonly used on facial skin (NR Putri et al., 2024).

The results showed an increase in cleaning power in preparations containing surfactants, namely F1 (slightly clean), F2 (fairly clean), and F3 (clean). This increase indicates that the concentration of binahong leaf extract contributes to cleaning ability. This is related to the saponin content in binahong leaf extract, which acts as a natural surfactant. However, due to its low cleaning power, synthetic surfactants are required to achieve good cleaning power (NR Putri et al., 2024).

In micellar water preparations without added surfactants, the resulting cleaning power is lower than preparations containing surfactants. This is seen in F1 and F2 which only show a slightly clean category, while F3 without surfactants reaches the clean category. These results indicate that increasing the extract concentration still affects the cleaning power even though there is no surfactant in the preparation. This ability is associated with the content of saponins as secondary metabolites in the form of glycosides composed of sugars bound to aglycones. Aglycones have a structure consisting of triterpenoid or steroid chains and are nonpolar, causing saponins to act like soap or detergents, thus being called natural surfactants (NR Putri et al., 2024). When compared to commercial micellar water which shows very clean results, all preparations in this study still have lower cleaning power.

Table 7. Net Power Test Results

Formula	Results		Conclusion
	Before	After	

F1			A Little Clean
F2			Clean Enough
F3			Clean
F1 Non-Surfactant			A Little Clean
F2 Non-Surfactant			A Little Clean
F3 Non-Surfactant			Clean
Commercial Micellar Water			Very Clean

Antibacterial Activity Test Results of Micellar Water Preparations Made from Binahong Leaf Extract (Anredera Cordifolia Ten)

Antibacterial activity test was conducted to determine the ability of micellar water preparation of binahong leaf extract (Anredera Cordifolia ten) in inhibiting the growth of propionibacterium acnes bacteria.

Table 8. Antibacterial Activity Test Results of Micellar Water Extract of Binahong Leaves

Formula	Average Zone Diameter Resistor	Level Activity Antibacterial	Inhibition Zone
F1	11.35±1.11	Strong	Formed
F2	11.97±2.40	Strong	Formed
F3	12.92±0.56	Strong	Formed
Positive Control	23.78±3.74	Very strong	Formed

Information:
F1: Micellar Water Formula with 1% Binahong Leaf Extract
F2: Micellar Water Formula with 3% Binahong Leaf Extract
F3: Micellar Water Formula with 5% Binahong Leaf Extract

Based on the test results presented in Table 10, all preparations, namely F1, F2 and F3, showed the formation of inhibition zones. This indicates that all three preparations have activity in inhibiting bacterial growth. The average diameter of the resulting inhibition zone was 11.35 ± 1.11 mm in F1, 11.97 ± 2.40 in F2, and 12.92 ± 0.56 mm in F3. These values indicate an increase in the diameter of the inhibition zone along with the increasing concentration of binahong leaf extract in the preparation. Based on the classification of inhibition power according to Davis and Stout in Ginting et. al. (2025), all preparations are included in the category of strong antibacterial activity because they have an inhibition zone diameter in the range of 10-20 mm. Meanwhile, the positive control had an average inhibition zone of 23.78 ± 3.74 mm which is included in the very strong category (> 20 mm).

The presence of antibacterial activity in micellar water preparations is thought to be due to the presence of active compounds that have antibacterial mechanisms in binahong leaves, including flavonoids, alkaloids and saponins (Sasebohe, Cantya
Prakasita, et al., 2023)

Stability Test Results

1. **Organoleptic Test Results**

The organoleptic test of micellar water preparations involves visual observation of color, shape/consistency, and odor (NR Putri et al., 2024). The results of the organoleptic observations over three cycles can be seen in Table 9.

Table 9. Results of Oragoleptic Stability Test

Cycle	**F1**			**F2**			**F3**		
	Color	Form	Smell	Color	Form	Smell	Color	Form	Smell
I	Fawn	Liquid	Special extract	Greenish black	Liquid	Special extract	Greenish Black	Liquid	Special extract
2	Fawn	Liquid	Special Extract	Greenish Black	Liquid	Special Extract	Greenish Black	Liquid	Special Extract
3	Fawn	Liquid	Special Extract	Greenish Black	Liquid	Special Extract	Greenish Black	Liquid	Special Extract

The results of the organoleptic evaluation during 3 observation cycles, on F1, F2, and F3, did not show any changes in color, shape, or odor during storage.
The preparation remained consistent, namely yellowish brown in F1 and greenish black in F2 and F3, with a liquid form and the distinctive smell of binahong leaf extract.
This indicates that the micellar water preparation of binahong leaf extract showed good organoleptic stability during the stability test.

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2. Homogeneity Test

The homogeneity test is performed to ensure that all ingredients in the preparation are evenly mixed. This is observed through the uniformity of the particles in the preparation. The results of the homogeneity stability test are presented in Table 10.

Table 10. Results of Homogeneity Stability Test

cycle	F1	F2	F3
1	Homogeneous	Homogeneous	Homogeneous
2	Homogeneous	Homogeneous	Homogeneous
3	Homogeneous	Homogeneous	Homogeneous

Based on the results of visual observations carried out during 3 cycles, the results obtained were that F1, F2, and F3 micellar water preparations of binahong leaf extract remained homogeneous because they did not show any sedimentation or coarse particles.

3. pH test

The pH of the preparation is measured to ensure it matches the physiological pH range of facial skin, thus minimizing the risk of irritation or disruption of the skin's barrier function. If the pH of the preparation is too acidic, it will cause skin irritation. Conversely, if the preparation is too alkaline, it can cause dryness (Rachmadani et al., 2022).

Table 11. Results of pH Stability Test

pH				Literature SNI Standard 16-4380-1996 pH of facial skin
Cycle	F1	F2	F3	
I	5	5	5	4.5-7.8
2	5	5	5	
3	5	5	5	

Based on the measurement results using a pH meter before the cycling test, the average pH value for F1 was 5.58±0.290, F2 5.50±0.240, and F3 5.86±0.208. This value indicates that the three formulas are in the facial skin pH range of 4.5-7.8 (Rachmadani et al., 2022). After conducting a pH stability test using the cycling test method for 3 cycles using universal pH paper. The measurement results showed that all formulas had a pH of 5 in cycles 1, 2, and 3. This value is still within the safe pH range for the skin according to the literature standard SNI 16-4380-1996 facial skin pH. Differences in measurement results between the pH meter and universal pH paper can be caused by the sensitivity and accuracy level of the instrument. Nevertheless, the results from both pH measuring instruments indicate that the pH of the preparation is still within the appropriate range for use on facial skin.

CONCLUSION

This study shows that the ethanol extract of binahong leaves (Anredera cordifolia Ten.) was successfully formulated into micellar water preparations that had good physical and chemical characteristics and were stable during testing. All formulas produced homogeneous preparations, had a pH that matched the physiological pH of facial skin, good viscosity, and increased cleaning power with increasing extract concentration. The results of the antibacterial test showed that all formulas were able to inhibit the growth of Propionibacterium acnes with a strong activity category. The formula with an extract concentration of 5% provided the best antibacterial activity with the largest inhibition zone diameter compared to the other formulas. These findings prove that binahong leaves have the potential to be developed as a natural active ingredient in micellar water-based anti-acne facial cleansers that are safer and more practical to use.

However, this study still has limitations because the testing was only conducted on a laboratory scale and did not include irritation tests, skin safety tests, or in vivo effectiveness tests on humans. Furthermore, the stability observations were conducted over a relatively short period of time, thus not being able to describe the product's long-term stability. Further research is recommended to conduct toxicity testing, clinical trials on acne-prone skin, and formula optimization using a wider variety of surfactants and extract concentrations to achieve optimal effectiveness and comfort of use. Practically, the results of this study can form the basis for the development of natural anti-acne herbal cosmetics that have antibacterial activity and have the potential to become a safer alternative to facial skin care products for the public.

REFERENCES

Achmad, M. N., Masengi, A. S. R., Posangi, J., Fatimawali, & Mambo, C. D. (2024). Skrining fitokimia dan uji aktivitas antibakteri ekstrak etanol daun binahong (*Anredera cordifolia* (Ten.) Steenis) terhadap *Streptococcus mutans* dan *Escherichia coli*. *Jurnal Bios Logos, 14*(3), 1–13. https://doi.org/10.35799/jbl.v14i3.54394

Anggi Prantika, S., & Susanti, D. (2024a). Uji aktivitas antibakteri ekstrak etanol daun binahong (*Anredera cordifolia* (Ten.) Steenis) terhadap bakteri *Staphylococcus epidermidis* dan *Propionibacterium acnes*. *Jurnal Ilmu Farmasi, 15*(1).

Ananda, N. C. R., Sulaiman, S., & Suwarmi. (2017). Pengaruh peningkatan Tween 20 sebagai surfaktan terhadap karakteristik dan kestabilan fisik sediaan self nanoemulsifying drug delivery system (SNEDDS) simvastatin. *Media Farmasi Indonesia, 10*(2), 940–948.

Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). Sage Publications.

Dzakwan, M. (2020). Formulasi micellar based water ekstrak bunga telang. *Parapemikir: Jurnal Ilmiah Farmasi, 9*(2), 61–67. https://doi.org/10.30591/pjif.v9i2.2043

Emzir. (2023). *Metodologi penelitian pendidikan: Kuantitatif dan kualitatif*. Rajawali Pers.

Gede, I. P., Purwa Hita, A., Eka Arimbawa, P., & Windydaca Bp, D. (2020). Uji aktivitas antibakteri ekstrak etanol 70% daun binahong (*Anredera cordifolia* (Ten.) Steenis) terhadap bakteri *Staphylococcus aureus*. *Jurnal Ilmiah Medicamento, 9*(2), 49–54.

Halim, M., Tuahuns, F., & Rianto, L. (2023). Pengaruh demografi usia remaja terhadap pengetahuan swamedikasi jerawat. *Majalah Farmaseutik, 19*(1), 14–20. https://doi.org/10.22146/farmaseutik.v19i1.81856

Hammill, K., & Vaillancourt, M. (2023). Acne vulgaris and psychosocial impact among adolescents and young adults. *Journal of Dermatological Treatment, 34*(2), 1–8.

Heng, A. H. S., & Chew, F. T. (2020). Systematic review of the epidemiology of acne vulgaris. *Scientific Reports, 10*(1), 5754. https://doi.org/10.1038/s41598-020-62715-3

Layton, A. M., Thiboutot, D., & Tan, J. (2021). Reviewing the global burden of acne: How could we improve care to reduce the burden? *British Journal of Dermatology, 184*(2), 219–225. https://doi.org/10.1111/bjd.19477

Mora, D. M. (2021). *Formulasi sediaan cleansing water kombinasi ekstrak kulit buah apel hijau (Malus sylvestris (L.) Mill.) dan teh hijau (Camellia sinensis) dengan variasi konsentrasi PEG-7 glyceryl cocoate sebagai surfaktan* [Skripsi, Universitas Pakuan].

Mora, D. M. (2024). Evaluasi fisik dan stabilitas sediaan micellar water berbahan alam. *Jurnal Farmasi Indonesia, 21*(1), 45–53.

N. R. Putri, Agustin, D., & Ningrum, R. F. (2024). Formulasi sediaan cair micellar water dari ekstrak buah belimbing wuluh (*Averrhoa bilimbi* L.) menggunakan variasi konsentrasi surfaktan poloxamer 188. *Jurnal Akademi Farmasi Prayoga, 6*(2), 33–46.

Nabillah, A.-Z., & Chatri, M. (2024). Peranan senyawa metabolit sekunder untuk pengendalian penyakit pada tanaman. *Jurnal Pendidikan Tambusai, 8*(1), 15900–15911.

Narulita, W., Sri Anggoro, B., Novitasari, A., & Universitas Islam Negeri Raden Intan Lampung. (2019). Aktivitas antibakteri ekstrak daun binahong terhadap *Propionibacterium acnes*. *Biosfer: Jurnal Tadris Biologi, 10*(1), 67–78. http://ejournal.radenintan.ac.id/index.php/biosfer/index

Ngete, A. F., & Harti, A. S. (2025). Uji antioksidan formula sediaan micellar water ekstrak bunga kertas (*Bougainvillea glabra* Var). *Journal of Innovative and Creativity, 5*(2), 10828–10833.

Noviyanty, Y., Febrianti, R., et al. (2022). Fraksinasi dan skrining fraksi ekstrak etanol daun binahong (*Anredera cordifolia* (Ten.) Steenis) dengan menggunakan metode kromatografi lapis tipis. *Jurnal Ilmiah Pharmacy, 9*(2).

Rachmadani, N., Nurlaila, N., & Harismah, K. (2022). Evaluasi pH sediaan kosmetik dan keamanan terhadap kulit wajah. *Jurnal Farmasi Sains dan Praktis, 8*(1), 22–28.

Roy, U. K., Nielsen, B. V., & Milledge, J. J. (2021). Antioxidant production in *Dunaliella*. *Applied Sciences, 11*(9), 3959. https://doi.org/10.3390/app11093959

Sasebohe, V. Y., Prakasita, V. C., & Aditiyarini, D. (2023). Aktivitas antibakteri ekstrak etanol daun binahong terhadap *Staphylococcus aureus* dan *Propionibacterium acnes* penyebab jerawat. *Sciscitatio, 4*(1), 1–14. https://doi.org/10.21460/sciscitatio.2023.41.107

Sudaryono. (2022). *Metodologi penelitian kuantitatif, kualitatif, dan mix method* (2nd ed.). Rajawali Pers.

Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Taale, E., et al. (2023). Development and evaluation of herbal micellar water formulations for sensitive skin. *International Journal of Cosmetic Science, 45*(3), 201–210.

Waris, M., & Indarto, I. (2023). Aktivitas antibakteri ekstrak daun binahong terhadap *Propionibacterium acnes* berdasarkan variasi konsentrasi ekstrak. *Jurnal Farmasi dan Kesehatan, 12*(2), 88–96.

Yericho, M., Audina, M., Rizali, M., & Sari, U. (2023). Formulasi dan uji stabilitas fisik micellar water ekstrak etanol daun pegagan (*Centella asiatica*). *Jurnal Farmasi Indonesia, 18*(2), 77–85.

Zhu, T., et al. (2025). Advances in acne vulgaris pathogenesis and treatment strategies. *Dermatology Reports, 17*(1), 1–12.