

CHAPTER I INTRODUCTION

1.1 Research Background

Skin is the outermost layer of the body which functions as a protector. maintaining personal hygiene is essential for skin health and well-being. This aligns with Islamic teachings emphasizing the importance of cleanliness and purity.¹ As stated in Q.S Al Baqoroh 222:

إِنَّ اللَّهَ يُحِبُّ التَّوَّابِينَ وَيُحِبُّ الْمُطَهِّرِينَ (البقرة: ٢٢٢)

“Indeed, Allah loves those who repent and loves those who purify themselves”²

As highlighted in QS Al-Baqarah: 222, Allah commands Muslims to maintain personal hygiene as a means of avoiding. This underscores the importance of cleanliness and its connection to overall health disease. One of the most common skin problems among teenagers, both male and female, is acne. Prevalence rates for acne in women aged 14-17 years range from 83-85%, while in men aged 16-19 years, they range from 95-100%.³ Acne is characterized by inflammation of the polysebaceous follicles, resulting in the formation of blackheads, papules, pustules, nodules, and scar tissue. Clinically, acne is often caused by bacterial infections including *Staphylococcus aureus* and *Staphylococcus epidermidis*.⁴ Beyond acne, uncontrolled bacterial growth can lead to other skin problems such as boils, impetigo, abscesses, skin

¹ Angga Saputra Yasir et al., “Formulasi Dan Uji Aktivitas Gel Kombinasi Ekstrak Etanol Daun Lidah Buaya (Aloe Vera) Dan Daun Kemangi (Ocimum Sanctum L.) Sebagai Anti Jerawat Terhadap Bakteri *Staphylococcus Epidermidis*,” *Pharmacoscript* 4, no. 1 (2021): 70–86.

² Jajasan Penyelenggara Penterjemah/Pentafsir Al-Qoeraan (1967) / Tim Penyempurnaan Terjemahan Al-Qur’an (2016-2019) dan Lajnah Pentashihan Mushaf Al-Qur’an, “Al-Qur’an Dan Terjemahannya Edisi Penyempurnaan 2019, Juz 1-10. Kementerian Agama - Pustaka Lajnah, (2019), <https://pustakalajnah.kemenag.go.id/detail/135>.

³ Nur Sifatullah, “Jerawat (*Acne vulgaris*): Review Penyakit Infeksi Pada Kulit,” (2021).

⁴ Riezcky Yan Febrina, Gita Cahya Eka Darma, and Sani Ega Priani, “Uji Aktivitas Antibakteri Ekstrak Etanol Pucuk Daun Puspa (*Schima wallichii*) (DC.) Korth terhadap Bakteri *Staphylococcus epidermidis* dan Kajian Pengembangannya menjadi Sediaan Facial Wash,” *Prosiding Farmasi, Program Studi Farmasi, Fakultas Matematika Dan Ilmu Pengetahuan Alam, Universitas Islam Bandung* 7, no. 2 (2021): 180.

inflammation, and wound infections.⁵ These gram-positive bacteria are typically normal flora residing on the skin surface. However, changes in skin conditions can render them pathogenic, causing infections characterized by inflammation, swelling, and pus formation.⁶

Antibiotics are commonly used to inhibit the growth of acne-causing bacteria. However, their use can be associated with effects like redness, irritation, and itching, and may contribute to antibiotic resistance.⁷ To minimize these drawbacks, there is growing interest in exploring natural ingredients as potential alternatives for inhibiting bacterial growth.⁸

Areca nut extract contains secondary metabolic compounds such as alkaloids, flavonoids, tannins, and phenols, which have antibacterial activity.⁹ Based on research by Neda, et al. (2021), betel nut extract can inhibit the growth of gram-positive and gram-negative bacteria.¹⁰ Based on research by Meiriza et al. (2019), ethanol extract of areca nut seeds with concentrations of 10%, 20%, and 30% showed inhibition of *Staphylococcus epidermidis* and *Staphylococcus aureus* bacteria.¹¹ One of the uses of betel nut seeds to treat acne is to make a facial wash in gel form or what is called facial wash gel. Gel facial wash is used

⁵ Tiara Magvirah, Marwati Marwati, and Fikri Ardhani, "Uji Daya Hambat Bakteri *Staphylococcus aureus* Menggunakan Ekstrak Daun Tahongai (*Kleinhovia hospita*L.)," *Jurnal Peternakan Lingkungan Tropis* 2, no. 2 (2020): 41–50.

⁶ Gek Niken Tasya Lingling, "Potensi Ekstrak Daun Pandan Wangi (*Pandanus amaryllifolius* Roxb) Sebagai Antibakteri Pada Sediaan Gel Facial Wash," *Prosiding Workshop dan Seminar Nasional Farmasi, Program Studi Farmasi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Udayana* 1, no. 1 (2023): 94-283.

⁷ Indarto Indarto et al., "Aktivitas Antibakteri Ekstrak Daun Binahong Terhadap *Propionibacterium acnes*," *Biosfer: Jurnal Tadris Biologi* 10, no. 1 (2019): 67–78.

⁸ Meiriza Djohari, Wulandari Yulia Putri, and Erniza Pratiwi, "Isolasi Dan Uji Aktivitas Daya Hambat Ekstrak Etanol Biji Pinang (*Areca catechu* L.) Terhadap Bakteri Pada Lidah," *Jurnal Riset Kefarmasian Indonesia* 1, no. 3 (2019): 88–177.

⁹ M Senthil Amudhan, V Hazeena Begum, and K B Hebbar, "A Review On Phytochemical And Pharmacological Potential Of *Areca catechu* L. Seed," *International Journal Of Pharmaceutical Sciences And Research* 3, no. 11 (2012): 57–415.

¹⁰ Neda Jam et al., "Evaluation of Antibacterial Activity of Aqueous, Ethanolic and Methanolic Extracts of Areca Nut Fruit on Selected Bacteria," ed. Abadi Kahsu Gebre, *BioMed Research International* (2021): 1–8.

¹¹ Meiriza Djohari, Syilfia Hasti, and Rina Lestari, "Identifikasi Dan Uji Aktivitas Daya Hambat Ekstrak Etanol Biji Pinang (*Areca catechu* L.) Terhadap Isolat Bakteri Gusi," *Jurnal Penelitian Farmasi Indonesia* 7, no. 2 (2019): 67–68.

as the first step in skincare.¹² Gel facial wash is a preparation used as a facial cleanser that can remove oil, dust, and dirt that trigger facial skin problems.¹³ This dosage form is designed for sensitive, oily, and acne-prone skin. The gel formula can provide moisture to the skin so it does not irritate. Gel facial wash as a light-textured facial cleanser, keeps the skin clean, smooth, moisturized, and germ-free, and works more effectively directly into the skin.^{14,15}

Based on the background described above, it encourages researchers to utilize areca nut seeds as a natural ingredient in making facial wash gel preparations. The importance of this research is the development of natural facial wash products that are safe and effective in inhibiting the growth of bacteria that cause facial skin problems compared to the use of chemicals with more side effects. The use of natural ingredients facial wash gel as a facial cleanser is more environmentally friendly and natural.

1.2 Research Problems

The research problems in this study is:

1. What are the physical evaluation results from facial wash gel preparation of methanol extract of areca nut (*Areca catechu L.*)?
2. What are the inhibition test results from facial wash gel preparation methanol extract containing areca nut (*Areca catechu L.*) against the growth of *Staphylococcus aureus* bacteria?

1.3 Research Objectives

The objectives of this study are:

1. To evaluate the physical characteristics of facial wash gel preparations formulated with methanol extract of areca nut seeds (*Areca catechu L.*).

¹² Dyah Rahmasari et al., "Formulasi dan Evaluasi Sediaan Face Wash Gel Ekstrak Kulit Buah Naga," *Farmasains : Jurnal Ilmiah Ilmu Kefarmasian* 10, no. 2 (2023): 41–48.

¹³ Nia Yuniarsih et al., "Formulasi Dan Evaluasi Sifat Fisik Facial Wash Gel Ekstrak Kulit Buah Naga Merah (*Hylocereus polyrhizus*) Dengan Gelling Agent Carbopol," *Pharma Xplore : Jurnal Sains Dan Ilmu Farmasi* 5, no. 2 (2020): 57–67.

¹⁴ Dnyaneshwar Solanki et al., "Formulation, Development And Evaluation Of Instant Whitening Face Wash," *World Journal of Pharmaceutical Research* 9, no. 6 (2020): 56–2541.

¹⁵ Samiksha Yadav and Mansi Gupta, "Formulation and Evaluation of Anti-Acne Herbal Face Wash Gel," *Journal of Drug Delivery and Therapeutics* 9, no. 4 (2019): 25–523.

- To assess the inhibitory activity of facial wash gel preparations containing areca nut seed extract against the growth of *Staphylococcus aureus* bacteria.

1.4 Research Benefits

1. Theoretical Implications

The findings of this study can serve as a valuable reference for future research investigating the antibacterial effects of facial wash gel preparations formulated with methanol extract of areca nut seeds (*Areca catechu L.*) against *Staphylococcus aureus*.

2. Practical Implications

The results of this study are expected to contribute to the body of scientific knowledge and enhance the understanding of readers, particularly regarding the antibacterial activity of facial wash gels containing methanol extract of areca nut seeds.

1.5 Authenticity Research

Table 1. Authenticity Research

Research Title	Research methods	Variables	Results	Research Differences
Bioactivity of Ethanol Extract of Areca Nut (<i>Areca catechu L.</i>) against <i>Staphylococcus aureus</i> and <i>Escherichia coli</i> ¹⁶	Laboratory experiments	Dependents: Inhibitory activity against <i>Staphylococcus aureus</i> and <i>Escherichia coli</i> Independent: Concentration of areca nut ethanol extract	Ethanol extract has better inhibitory power against <i>Staphylococcus aureus</i> bacteria compared to <i>Escherichia coli</i> .	Dependents: Antibacterial activity of <i>Staphylococcus aureus</i> Independent: Concentration of methanol extract of areca nut seeds in facial wash gel preparations

¹⁶ Asrianto Asrianto et al., "Bioactivity of Betel Nut (*Areca catechu L.*) Ethanol Extract against *Staphylococcus aureus* and *Escherichia coli*: Bioactivity of Betel Nut (*Areca catechu L.*) Ethanol Extract against *Staphylococcus aureus* and *Escherichia coli*," *Journal of Science and Health* 3, no. 6 (2021): 45–839.

Comparative Antimicrobial Activity of <i>Areca catechu</i> Nut Extracts Using Different Extracting Solvents ¹⁷	Laboratory experiments	Dependents: Comparative antimicrobial activity Independent: <i>Areca palm nut</i> extracts using different extracting solvents	The MIC and MBC values of ethanol were 0.377 and 0.753 mg/ml in <i>B. subtilis</i> , while in <i>S. aureus</i> they were 0.188 and 0.377. The MIC and MBC values of water extract were 1.56 mg/ml and 3.125 mg/ml in <i>B. subtilis</i> , while in <i>S. aureus</i> they were 0.094 and 0.188 mg/ml.	Dependents: Antibacterial activity of <i>Staphylococcus aureus</i> Independent: Concentration of methanol extract of areca nut seeds in facial wash gel preparations
Evaluation of Antibacterial Activity of Aqueous Ethanolic and Methanolic Extracts of Areca Nut Fruit on Selected Bacteria ¹⁸	Laboratory experiments	Dependents: Antibacterial Activity Independent: Extract of Aqueous, Ethanolic, and methanolic Areca nut fruit on selected bacteria	Methanol extract of betel nut is the most effective antibacterial agent against all pathogens at a concentration of 100 mg/ml. Water extract of betel nut is the least effective antibacterial agent and does not produce antibacterial activity against <i>Staphylococcus aureus</i> and <i>Escherichia coli</i> at low concentrations.	Dependents: Antibacterial activity of <i>Staphylococcus aureus</i> Independent: Concentration of methanol extract of areca nut seeds in facial wash gel preparations
Evaluation of Antibacterial Activities of Aqueous and Methanolic Extracts of <i>Areca catechu</i> Against Some	Experimental laboratory	Dependents: Antibacterial Activities Independent: Aqueous and Methanolic Extracts of <i>Areca catechu</i> Against Some	Methanol extract of areca nut can be a potential source for the development of antibacterial agents against <i>E. coli</i> and <i>S. aureus</i> which are	Dependents: Antibacterial activity of <i>Staphylococcus aureus</i> Independent: Concentration of methanol extract of areca nut

¹⁷ M Arifur Rahman et al., "Comparative Antimicrobial Activity of *Areca catechu* Nut Extracts using Different Extracting Solvents," Bangladesh Journal of Microbiology, Vol. 31 (2016), 19–23.

¹⁸ Jam et al., "Evaluation of Antibacterial Activity of Aqueous, Ethanolic and Methanolic Extracts of Areca Nut Fruit on Selected Bacteria."

Opportunistic Oral Bacteria ¹⁹	Opportunistic Oral Bacteria	commonly found in the human oral cavity and are responsible for several infections. Methanol extract of areca nut contains strong antibacterial substances which are proteinaceous and can be used in the treatment of several oral infections.	seeds in facial wash gel preparations
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¹⁹ Asmaa A. Faden, “Evaluation of Antibacterial Activities of Aqueous and Methanolic Extracts of *Areca catechu* Against Some Opportunistic Oral Bacteria,” *Biosciences Biotechnology Research Asia* 15, no. 3 (2018): 59–655.