

CHAPTER I

INTRODUCTION

1.1 Research Background

Skin will experience aging as you get older. Premature aging occurs when the skin's aging process does not match the age it should be. One of the factors of premature aging is exposure to free radicals in the body. Free radicals are free atoms or molecules that have unpaired electrons in the outer shell¹.

The nature of free radicals is very reactive in finding partners by binding and attacking electrons around them such as DNA. If free radical molecules meet non-free radical molecules, they will form new radicals, which will be toxic to the cell's molecules². The aging process of the skin can be caused by the presence of free radicals³. The more often the skin is exposed to free radicals, the faster the aging process occurs⁴.

Antioxidants have the potential to capture free radicals⁵. Antioxidants are compounds that have hydrogen atoms or single electrons to stabilize free radicals into normal molecules and prevent damage. When normal conditions are at rest, the antioxidant defense system in the body can easily deal with free radicals⁶. However, antioxidant defense will cause a decrease in immunity against disease, if free radicals are produced excessively. So additional vitamin intake is needed as an

¹ Eka Pratiwi Mokoginta, "1. Pengaruh Metode Ekstraksi Terhadap Aktivitas Penangkal Radikal Bebas Ekstrak Metanol Kulit Biji Pinang Yaki (*Areca vestiaria giseke*)," *Pharmacon* 2, no. 4 (2013).

² Peter Brenneisen, Helmut Sies, and Karin Scharffetter-Kochanek, "Ultraviolet-B Irradiation and Matrix Metalloproteinases: From Induction via Signaling to Initial Events," *Annals of the New York Academy of Sciences* 973, no. 1 (2002): 31–43.

³ Arif Soeksmanto, Yatri Hapsari, and Partomuan Simanjuntak, "Antioxidant Content of Parts of Mahkota Dewa, *Phaleria Macrocarpa* [Scheff] Boerl.(Thymelaceae)," *Biodiversitas Journal of Biological Diversity* 8, no. 2 (2007).

⁴ Asri Werdhasari, "Peran Antioksidan Bagi Kesehatan," *Jurnal Biotek Medisiana Indonesia* 3, no. 2 (2014): 59–68.

⁵ Nur Candra Eka Setiawan and Hilda Amalia, "Aktivitas Antioksidan Ekstrak Biji Buah *Areca Vestiaria Giseke* Dan Fraksinya Dengan Metode DPPH (2, 2-Diphenyl-1-Picrylhydrazyl)," *J. Cis-Trans JC-T* 2, no. 1 (2017): 10.

⁶ Evy Lestari Ariyanti, Reti Puji Handayani, and Elih Sutisna Yanto, "Formulasi Sediaan Serum Antioksidan Dari Ekstrak Sari Tomat," *Journal of Holistic and Health Sciences* 4, no. 1 (2020): 50–57.

antioxidant⁷. This can be overcome by using antioxidants found in one of the plants, one of them is areca nut (*Areca catechu L.*)⁸.

A areca seeds (*Areca catechu L.*) have secondary metabolite alkaloids, flavonoids, tannins and saponins⁹. Based on research, areca nut extract (*Areca catechu L.*) has very strong antioxidant activity¹⁰. The flavonoid compounds found in areca nuts can play a role as antioxidant, prevent skin aging due to free radicals¹¹. The advantages possessed by these plants are one of the blessings that Allah has given to humans so that they can be utilized as well as possible. In accordance with the word of God which reads:

إِنَّ اللَّهَ فَالِقُ الْحَبِّ وَالنَّوَىٰ ۖ يُخْرِجُ الْحَيَّ مِنَ الْمَيِّتِ وَمُخْرِجُ الْمَيِّتِ مِنَ الْحَيِّ ۚ ذَٰلِكُمْ اللَّهُ ۚ
فَإِنِّي تُؤْفَكُونَ

“Indeed, Allah makes plants grow and fruit seeds grow. He brings out the living from the dead and brings out the dead from the living. (The one who has such qualities) is Allah, so why do you still turn away?” (QS. Al-An'am: 95)¹².

Based on research by Cahyanto (2018), ethanol extract of areca nut seeds (*Areca catechu L.*) has strong antioxidant activity with an IC₅₀ value of 3.5 µg/ml¹³. Data on the antioxidant activity of areca nut extract (*Areca catechu L.*) can help in the development of herbal raw materials for both the medicine and cosmetics

⁷ Setiawan and Amalia, “Aktivitas Antioksidan Ekstrak Biji Buah Areca Vestiararia Giseke Dan Fraksinya Dengan Metode DPPH (2, 2-Diphenyl-1-Picrylhydrazyl). *J. Cis-Trans JC-T* 1 no.2 (2017): 10.

⁸ Marlina Dewiastuti and Irma Fathul Hasanah, “Pengaruh Faktor-Faktor Risiko Penuaan Dini Di Kulit Pada Remaja Wanita Usia 18-21 Tahun,” *Jurnal Profesi Medika: Jurnal Kedokteran Dan Kesehatan* 10, no. 1 (2016).

⁹ Dewiastuti and Hasanah, “Pengaruh Faktor-Faktor Risiko Penuaan Dini Di Kulit Pada Remaja Wanita Usia 18-21 Tahun. *Jurnal Profesi Medika: Jurnal Kedokteran dan Kesehatan* 1, no. 10 (2016)”

¹⁰ Asrianto Asrianto et al., “Bioaktivitas Ekstrak Etanol Biji Pinang (*Areca catechu L.*) Terhadap *Staphylococcus Aureus* Dan *Escherichia Coli*: Bioactivity of Betel Nut (*Areca catechu L.*) Ethanol Extract against *Staphylococcus Aureus* and *Escherichia Coli*,” *Jurnal Sains Dan Kesehatan* 3, no. 6 (2021): 839–45.

¹¹ *Ibid.*

¹² Rosdialena R, “Dakwah Dan Tantangan Etika Global,” *TATHWIR: Jurnal Pengembangan Masyarakat Islam*, (2018): 23–43.

¹³ Heru A Cahyanto, “Aktivitas Antioksidan Ekstrak Etanol Biji Pinang (*Areca catechu, L.*),” *Jurnal Kementerian Perindustrian Republik Indonesia* 14, no. 02 (2018): 70–73.

industries. One innovation that can be developed is the manufacture of areca nut extract facial serum gel cosmetics.

Serum containing natural antioxidants is one of the cosmetic preparations that can overcome skin aging and act as an antioxidant. Serum is chosen because it has a high concentration of active ingredients, which makes it more quickly absorbed by the skin, so it has a comfortable effect and is easy to absorb and spread because of its low viscosity¹⁴. Another advantage of gel-based serum preparations is that they have a high water content, so they can moisturize the skin, shrink pores, black spots, and dry fine lines, preventing premature aging¹⁵. Based on the above background, research was carried out on antioxidant activity and evaluation of the quality of the areca nut ethanol extract facial serum gel preparation¹⁶.

1.2 Research Problems

The problem formulation in this research is:

1. How are the results of the quality evaluation of facial serum preparations from areca nut (*Areca catechu*) seed extract?
2. How is the antioxidant activity of facial serum preparations from Areca nut (*Areca catechu*) seed extract?
3. What concentration of areca seed extract (*Areca catechu*) produces a facial serum gel preparation with the highest antioxidant activity?

1.3 Research Objectives

The objectives of this research are:

1. Knowing the quality evaluation of facial serum gel preparations from Areca nut (*Areca catechu*) seed extract

¹⁴ Yanni Dhiani Mardhiani, "Formulasi Dan Stabilitas Sediaan Serum Dari Ekstrak Kopi Hijau (*Coffea Canephora* Var. *Robusta*) Sebagai Antioksidan," *Indonesia Natural Research Pharmaceutical Journal* 2, no. 2 (2017): 19–33.

¹⁵ Rosa Ichi Harum Pratiwi, Ni Luh Arpiwi, and IgasWahyuni, "Formulasi Serum Ekstrak Buah Malaka (*Phyllanthus emblica*) Sebagai Anti Aging Formulation of Serum from Malaka Fruit (*Phyllanthus emblica*) Extract as an Anti Aging," *Journal of Biological Sciences* 8, no. 2 (2021): 284–90.

¹⁶ Rima Apria Purwanti, Yunahara Farida, and Shelly Taurhesia, "Formulasi Sediaan Serum Anti Aging Dengan Kombinasi Dari Ekstrak Buah Tomat (*Lycopersicum esculentum* L.) Dan Ekstrak Kulit Buah Semangka (*Citrullus lanatus thunb.*)," *Jurnal Fitofarmaka Indonesia* 9, no. 2 (2022): 19–24.

2. To determine the antioxidant activity of facial serum gel preparations from Areca nut (*Areca catechu*) seed extract
3. Find out the concentration of areca nut extract (*Areca catechu*) in produces facial serum gel preparations with the highest antioxidant activity.

1.4 Research Benefits

1. Theoretical Benefits

The results of this research provide scientific information regarding the antioxidant activity of areca nut (*Areca catechu*) seed extract in vitro. And can be used as reference material for further research regarding the contents of Areca nut seeds, especially the effect of antioxidant activity on facial serum gel and can guarantee its safety for the public.

2. Practical Benefit

Practically, the results of this research will be useful and increase knowledge and broaden the insight of readers, especially facial serum gel users. Traditional treatments can also provide practical benefits for the general public due to in the Areca nut plant (*Areca catechu*) as an antioxidant.

1.5 Authenticity of Research

Research on the effect of antioxidant activity has been carried out by several researchers, as shown in table 1 below.

Table 1. *Aunthenticity of Research*

Research Title	Research methods	Variable	Results	Research Differences
Antioxidant Activity Test of 50% Ethanol Extract of Areca Seed (<i>Areca catechu</i>) Using the DPPH (2,2-diphenyl-1-	Experimental	Dependents: Antioxidant activity. Independent: Ethanol extract of areca seeds (<i>Areca catechu</i>) with 5 concentration series, namely 10	The 50% ethanol extract of areca nut seeds (<i>areca catechu</i>) has very strong antioxidant activity against the free radical compound DPPH (2,2-diphenyl-1-picrylhydrazyl) with an IC50 value of 27,565 ppm.	Dependents: Antioxidant activity of facial serum preparations. Independent: Effect of variations in concentration of areca nut (<i>areca</i>

picryhydrazyl) Method ¹⁷		ppm, 50 ppm, 100ppm, 150 ppm and 200ppm.		<i>catechu</i>) seed extract.
Formulation of Antioxidant Serum from Tomato Juice Extract (<i>Solanum lycopersicum L.</i>) and Cinnamon Extract (<i>Cinnamomum burmannii</i>) as Skin Care ¹⁸	Laboratory experimental	Dependents: Facial serum formulation as an antioxidant. Independent: Tomato juice extract and cinnamon extract in a ratio of 3 grams: 0.5 grams and adding 1 gram of xanthan gum for F1, 1.2 grams for F2, 1.4 grams for F3.	The organoleptic tests' results showed changes on days 9 to 21. The pH stability results obtained from 3 serum samples showed a change in pH in the preparations stored at room temperature (15- 30°C) in the second week. The serum preference test results for texture were 93.3% in formula 1, color was 97% in formula 1, and aroma was 83.3% in formula 2.	Dependents: Antioxidant activity of facial serum preparations. Independent: Effect of variations in concentration of areca nut (<i>areca catechu</i>) seed extract.
Antioxidant Activity Test of Areca Nut (<i>Areca Catethu L</i>) Extracts and Peel Fractions from West Tanjung Jabung Regency ¹⁹	Laboratory experimental	Dependents: Antioxidant activity of areca nut peel extracts and fractions. Independent: Extract and fraction of betel nut skin (<i>areca catechu linn</i>)	Areca nut peel extract can be used as a natural antioxidant because it has very strong antioxidant activity	Dependents: Antioxidant activity of facial serum preparations Independent: Effect of variations in concentration of areca nut extract (<i>areca catechu</i>).

¹⁷ Humaryanto et al., "Uji Aktivitas Antioksidan Ekstrak Etanol 50% Biji Pinang (*Areca catechu L.*) Dengan Metode DPPH (2,2-Diphenyl-1-Picryhydrazyl)," *Jurnal Ilmiah Manuntung* 9, no. 1 (2023): 58–63.

¹⁸ Ariyanti, Handayani, and Yanto, "Formulasi Sediaan Serum Antioksidan Dari Ekstrak Sari Tomat. *Journal of Holistic and Health Sciences*, no. 4 (2020): 50-57."

¹⁹ Indah Sagita Cahyani, Armini Hadriyati, and Yulianis Yulianis, "Uji Aktivitas Antioksidan Ekstrak Dan Fraklsi Kulit Buah Pinang (*Areca catechu L*) Dari Kabupaten Tanjung Jabung Barat," *Journal of Healthcare Technology and Medicine* 6, no. 1 (2020): 179–84.