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Development of Anti-Aging Cream Preparations with Active Substances from Plant Extracts: Physicochemical Review and Potential Applications

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ABSTRACT

Indonesia is known to be rich in biodiversity, including various types of plants that can be used as traditional medicines to treat various skin problems, including acne, skin lightening, and anti-aging. In optimizing efforts to overcome aging caused by free radicals, it is important to develop cosmetic formulations that are effective and comfortable to use. Cosmetics can be in various dosage forms, including gels, creams, powders, ointments, and lotions. It is necessary for the formulation and evaluation of anti-aging cream preparations containing active substances from plant extracts. The method used in this study is comparative research, which involves collecting data from various research journals via the internet. Literature research is conducted online through platforms such as Science Direct, ResearchGate, Google Scholar, and other journal sites. In addition, this study provides information on formulations of anti-aging creams containing active substances from plant extracts based on available scientific evidence in the literature. These findings indicate that the formula used in the development of this cream has the potential to be used in anti-aging products containing active substances from plant extracts. Although the results of this review show success in physicochemical stability, it is important to continue further research to test the effectiveness and safety of using this cream on human skin. More in-depth clinical trials will provide stronger evidence of the benefits and safety of this product. Thus, the development of cream preparations based on the results of this review provides a solid foundation for the development of cosmetic products that combine the natural properties of plants with excellence.

1. INTRODUCTION

Indonesia is known to be rich in biodiversity, including various types of plants that can be used as traditional medicine. These medicinal plants are widely used to treat various skin problems, including acne, skin brightening, and anti-aging. These plants come from natural sources and can be used as alternative medicine. One example of a medicinal plant that is commonly found in Indonesia is Turmeric (Curcuma longa Linn. syn. Curcuma domestica Val.). The root of this plant is used to treat various skin conditions, including acne and skin brightening. The use of medicinal plants in Indonesia dates back to ancient times, and traditional healers have been using them for thousands of years. These plants are believed to have various healing properties that can help treat various diseases. In recent years, the use of traditional medicine has grown in popularity due to its natural approach and minimal side effects. It is important to note that the use of traditional medicine should always be done under the guidance of a trained healthcare professional. While these plants may have therapeutic properties, they can also have side effects if not used properly. Therefore, it is important to consult a healthcare provider before using any traditional medicine.

In the use of medicinal raw materials from natural sources, it is important to support such use with scientific evidence. While experience can be an initial guide, scientific research is needed to prove the effectiveness and safety of such ingredients. One of the plants that has been widely researched and known to have anti-aging potential is Dewa Crown. Scientific research has been conducted to evaluate its content and effects on the aging process. Mahkota Dewa (Phaleria macrocarpa) is a plant originating

from Indonesia and has been used in traditional medicine. Several studies have shown that extracts or active compounds contained in Mahkota Dewa have antioxidant and anti-aging properties. Compounds such as flavonoids, polyphenols, and phytosterols found in Mahkota Dewa have the ability to fight oxidative damage and reduce signs of aging on the skin. They can help improve skin elasticity, reduce wrinkles, prevent hyperpigmentation, and provide anti-inflammatory effects. However, it is important to note that although Dewa Crown has anti-aging potential, more research is still needed to confirm its effectiveness and safety more thoroughly. Furthermore, the use of Dewa Crown or other natural ingredients as medicine should be done with caution and under the supervision of a competent professional. It is important to consult a doctor or health professional before using products made from Crown of God or other natural ingredients as part of an anti-aging or skincare program. Other ingredients that affect the anatomical structure of kulis are Betel Leaf [1], Narwastu [2], Corn Hair [3], Moringa Leaves [4], Raspberry Fruit and Grape Seed Extract [5], Litchi Fruit [1], Purple Sweet Potato Leaves [6], Rambutan [7] and Papaya [8].

Aging is a natural process that occurs in all living things, including humans. The effects of aging affect the physical condition and can be seen visually. Some of the disorders that usually occur in the aging process are wrinkles, loss of skin elasticity, and hyperpigmentation. Wrinkles are a common sign of aging on human skin. It is caused by a decrease in the production of collagen and elastin, the proteins that give skin its strength and elasticity. As a result, the skin loses its suppleness and creases or wrinkles appear. Loss of skin elasticity is also a common effect of aging. Skin elasticity decreases with age due to decreased production of collagen and elastin, as well as decreased activity of skin cells. As a result, the skin becomes less firm and less able to return to its original shape after being pulled or massaged. Hyperpigmentation is a condition in which there is an increased production of melanin, the pigment that gives skin its color. In the aging process, there is an uneven distribution of melanin, resulting in dark spots or hyperpigmentation. Factors such as sun exposure, inflammation, and genetics can influence hyperpigmentation. These physical changes are part of the natural aging process and may vary between individuals. While it is impossible to stop or reverse aging, proper skincare and a healthy lifestyle can help reduce its impact. The use of sunscreen, regular skincare, adequate hydration and a balanced diet can help keep skin healthy and slow down the signs of aging [9].

Aging can be influenced by intrinsic and extrinsic factors. Intrinsic factors involve internal factors that cannot be controlled, such as genetics, hormones and race. These are innate factors that play a role in the natural aging process and cannot be avoided. On the other hand, extrinsic factors involve external factors that can influence the aging process. Examples include exposure to sunlight, temperature, cigarette smoke, air humidity, and environmental pollution. Excessive exposure to these factors can accelerate the skin aging process. Sun exposure, especially ultraviolet (UV) light, is one of the biggest extrinsic factors that contribute to skin aging. UV exposure can damage collagen and elastin fibers in the skin, disrupt melanin production, and cause oxidative damage to skin cells. This can lead to wrinkles, loss of elasticity, and hyperpigmentation. Other extrinsic factors such as extreme temperatures, cigarette smoke, low air humidity, and exposure to pollution can also affect skin health and condition. They can cause dehydration, inflammation, and oxidative stress, which contribute to premature aging. To minimize the effects of aging caused by extrinsic factors, it is advisable to take protective measures, such as using sunscreen with an appropriate SPF (sun protection factor), avoiding direct sun exposure during the hottest hours, avoiding smoking and cigarette smoke, maintaining skin moisture by using moisturizers, and maintaining a healthy and clean environment to reduce exposure to pollution. Although intrinsic factors cannot be prevented, by adopting a healthy lifestyle and skin care routine, we can help keep our skin healthy and slow down the signs of aging [10].

Chronic and repeated sun exposure is called photoaging. Photoaging is the term used to describe skin aging caused by sun exposure. Prolonged and repeated exposure to ultraviolet (UV) light can cause damage to the structure and layers of the skin, especially the dermis. UV rays can penetrate the skin and cause the formation of free radicals in it. Free radicals are unstable molecules that can damage cell structures and skin components. In the case of photoaging, ultraviolet (UV) light can produce free radicals that cause damage to fibroblasts, the cells responsible for the production of collagen, elastin and basic substance. Damage to collagen, elastin, and the basic substance can lead to a decrease in their

function. Collagen is a protein that gives the skin strength and firmness, while elastin provides elasticity. The base substance is the extracellular matrix that provides structural support to the skin cells. As a result, the skin loses its elasticity and becomes less firm. This can lead to the appearance of wrinkles and fine lines on the skin surface. In addition, damage to the extracellular matrix can also disrupt skin cell regeneration, causing the skin to look dull, dry and unhealthy. It is important to protect the skin from excessive sun exposure to prevent photoaging. Using sunscreen with sufficient broad-spectrum protection and SPF (sun protection factor), wearing protective clothing, and avoiding direct sun exposure during the hottest hours are important steps to protect the skin from ultraviolet (UV) damage [11]. To prevent and reverse aging caused by free radicals, using antioxidants can be a good choice. Antioxidants are compounds that have the ability to donate one or two electrons to free radicals, thus Stableizing the free radicals. Thus, antioxidants can inhibit oxidative reactions in cells and reduce cell damage that can cause aging [12]. When free radicals form in the body, they can damage cell structures and important molecules such as DNA, proteins, and lipids. This can trigger the aging process and contribute to the development of age-related diseases. By consuming or using antioxidants, we can help neutralize free radicals and protect our cells from damage. Antioxidants work by donating lost electrons to free radicals, so the free radicals become stable and no longer react with other molecules. Some examples of commonly used antioxidants are vitamin C, vitamin E, beta-carotene, selenium, and flavonoids. Foods such as fruits, vegetables, whole grains, nuts, and green tea are good natural sources of antioxidants. It is important to remember that the use of antioxidants in preventing and managing aging is only one aspect of the treatment required. A balanced diet, healthy lifestyle, protection from excessive sun exposure, and proper skincare are also important factors in maintaining healthy and beautiful skin and reducing the signs of aging.

Research conducted by [3] states that corn hair extract (Zea mays L) has very strong antioxidant activity and for the optimum cream formula has a ratio of tween 80 and span 80 emulgators, 4.5% to 5.5%. The optimum ratio between tween 80 and span 80 emulgators is 4.5% to 5.5%. Furthermore, research conducted in [5] stated that raspberry fruit extract and grape seed extract showed excellent free radical scavenging (antioxidant) activity. Stearic acid, triethanolamine, and other ingredients used in the preparation of the face cream also proved the stability of the preparation. Natural sources for excipients are more suitable due to their easy availability, non-toxicity, and biocompatible properties. After studying the physical parameters and evaluating stability studies, it was concluded that the product has the best capacity to dampen free radicals and can be used as a barrier to protect the skin. In optimizing efforts to slow down and address aging caused by free radicals, it is important to develop cosmetic formulations that are effective and convenient to use. Cosmetics can be in various dosage forms, including gels, creams, powders, ointments and lotions. This review article will present several formulations and evaluations of anti-aging cream preparations containing active substances from plant extracts.

2. METHOD

In this review article, the method used is a comparative research by collecting data from various research journals via the internet. Literature research was conducted online through platforms such as Science Direct, ResearchGate, Google Scholar, and other journal sites. Data collection was conducted through the documentation method by searching for data related to concepts, approaches, procedures, and data analysis of literature research. Inclusion criteria were journals and articles that discussed the formulation of anti-ageing cream formulations containing active ingredients from plant extracts. A total of 18 journals were used in this study, including 10 main journals and 8 auxiliary journals. These journals were selected based on their relevance to the research topic and availability. The sources referenced were national and international journals related to the topics of anti-aging cream formulation" and nti-aging c cream extract formulation". These keywords were used to search for and identify sources that were in line with the research objectives. By using comparative research methods and collecting various relevant sources, this review article presents information on the formulation of anti-ageing cream preparations containing active substances from plant extracts based on scientific evidence available in the literature.

3. RESULTS AND DISCUSSION

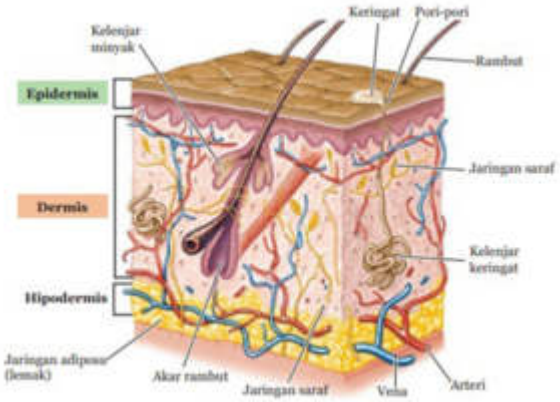

Figure 1. Skin Anantomy [13].

Skin is the outermost and largest organ of the human body. In addition, the skin also has several important functions, including: 1) Protection: The skin acts as a physical barrier that protects the body's deeper tissues, organs, and structures from various external factors. This protective function includes protecting against ultraviolet (UV) light, microorganism infection, and physical injury. 2) Temperature regulation: The skin helps regulate body temperature by regulating sweat production and vasoconstriction or vasodilation of blood vessels in the skin. This process helps maintain an optimal body temperature. 3) Sensation: The skin has many sensory receptors that allow us to feel touch, temperature, pressure, pain and other sensations. This allows us to respond appropriately to the environment and protect the body from potential dangers. 4) Absorption and excretion: The skin has the ability to absorb certain substances, such as topical medications, and also plays a role in the process of excreting substances that are not needed by the body through sweat. 5) Vitamin D production: The skin contains vitamin D precursors that can be synthesized by exposure to UVB (UltraViolet B) sunlight. Vitamin D is important for bone health and the immune system [12]. In performing these functions, the skin must maintain a balance between protection and interaction with the environment. Proper skin care and protection, including the use of sunscreen, good hygiene, and hydration, is essential to maintain skin health and beauty and prevent damage from ultraviolet (UV) exposure, dehydration, and microorganism infections. The following are the results of the review of data sources, namely the known formulations and results of physicochemical evaluation of cream preparations from various extracts from tables 1 to 10.

Table 1. Composition of Antiaging Cream from Betel Leaf Extract (Piper betel)

No.	Material	Total (%b/b)	Description
1.	Betel Leaf Extract	2	Active Substance
2.	Tween 80	2	Emulsifiers
3.	Stearic acid	6	Emulsifiers
4.	Cetyl alcohol	3	Thickener
5.	Propylene glycol	4	Emulsifiers
6.	Glycerin	2	Humectants
7.	Mineral oil	3	Emollients
8.	Methyl paraben	0,02	Preservatives
9.	Suling Water	qs	Carrier

From the table above, the composition of anti-aging cream using betel leaf extract (Piper betel) includes 1) Betel Leaf Extract: The amount used is 2% by weight to total weight (w/b). Betel leaf extract is the main active substance in this cream formulation. This extract has potential as an anti-aging agent that can help reduce signs of aging on the skin. 2) Tween 80: The amount used was 2% wt/w. Tween 80 is an emulsifier used to achieve homogeneity in cream formulations. The emulsifier helps in the

merging of water and oil phases in the cream. 3) Stearic acid: The amount used was 6% w/b. Stearic acid is also an emulsifier that helps in the incorporation of water and oil phases in the cream. In addition, stearic acid also acts as a Stableizer in the cream formulation. 4) Cetyl alcohol: The amount used was 3% w/w. Cetyl alcohol serves as a thickener in the cream formulation. The thickener helps in giving a cohesive texture and good consistency to the cream. 5) Propylene glycol: The amount used was 4% w/w. Propylene glycol is an emulsifier that helps in combining the water and oil phases in cream formulations. In addition, propylene glycol also acts as a humectant that helps in maintaining skin moisture. 6) Glycerin: The amount used is 2% w/w. Glycerin is a humectant that helps maintain skin moisture. Humectants act as moisturizing agents that bind and retain water on the skin. 7) Mineral oil: The amount used is 3% w/w. Mineral oil is an emollient that helps soften and moisturize the skin. Emollients form a protective film over the skin to retain moisture and prevent water loss. 8) Methyl paraben: The amount used is 0.02% w/w. Methyl paraben is a preservative used to prevent the growth of microorganisms in cream formulations. The preservative helps to maintain product Stableity and safety. 9) Distilled Water: The amount used is as much as required (quantum satis - qs). Distilled water is used as a carrier or solvent in cream formulations. In this cream formulation, betel leaf extract is used as the main active substance that has anti-aging potential. Other ingredients such as tween 80, stearic acid, cetyl alcohol, propylene glycol, glycerin, mineral oil, methyl paraben, and distilled water were also used to impart certain properties to the cream such as emulsifier, thickener, humectant, emollient, and preservative. The amount of ingredients is measured in percentage by weight to achieve the desired composition.

Table 2. Composition of Antiaging Cream from Crown of God Extract (Phaleria macrocarpa)

No.	Material	Total (%b/b)	Description
1.	Mangiferin	1 dan 3	Active Substance
2.	Stearic acid	10	Emulsifiers
3.	Cetyl alcohol	6	Thickener
4.	Liquid paraffin	6.6	Emollients
5.	Glycerin	5	Humectants
6.	Methyl paraben	0,05	Preservatives
7.	Propylene glycol	30	Emulsifiers
8.	Suling Water	qs	Pembawa

The table above shows the composition of the anti-aging cream formulated using Crown of God (Phaleria macrocarpa) extract. The composition is expressed in percentage by weight to the total weight of the formulation (%b/b) and is accompanied by a description of each ingredient used. The following is an explanation for each ingredient in the anti-aging cream composition, among others 1) Mangiferin: The active ingredient contained in Dewa Crown extract. In this formulation, mangiferin is used in a concentration of 1-3% as the main active substance. 2) Stearic acid: An emulsifier that helps emulsify and maintain the Stableity of the formulation. Used in 10% concentration. 3) Cetyl alcohol: A thickener that gives a rich creamy texture and good consistency. Used in a concentration of 6%. 4) Liquid paraffin: An emollient that provides softness and smoothness to the skin. Used in a concentration of 6.6%. 5) Glycerin: Humectant that keeps the skin moist by attracting and retaining water. Used in 5% concentration. 6) Methyl paraben: A preservative used to prevent the growth of microorganisms that damage the formulation. Used in a concentration of 0.05%. 7) Propylene glycol: An emulsifier that helps to emulsify and maintain the Stableity of the formulation. Used in 30% concentration. 8) Distilled water: A carrier component used to achieve the desired consistency and concentration in the formulation. The table above provides information on the ingredients used in the formulation of anti-aging cream from Dewa Crown extract, as well as their percentage concentration. This information is important in the development and evaluation of cosmetic preparations to ensure effective and stable formulations.

Table 3. Composition of Anti-aging Cream from Narwastu Extract (Nardostachys jatamans)

No.	Material	Total (%b/b)	Description
1.	Nawastu Extract	0,5	Active Substance

2.	Stearic acid	1,2	Emulsifiers
3.	TEA	0,165	Emulsifiers
4.	Cetyl alcohol	0,1	Thickener
5.	Paraffin Oil	0,3	Emollients
6.	Moisturizing conditioner	1,2	Moisturizer
7.	Methyl paraben	0,018	Preservatives
8.	Propil paraben	0,002	Preservatives
9.	EDTA	0,010	Stableizer
10.	Rose water	0,4	Scent
11.	Suling Water	qs	Carrier

Source: [2]

The table above shows the composition of an anti-aging cream that uses narwastu (Nardostachys jatamans) extract as the main active substance. The composition of the cream consists of various ingredients with the amount expressed in percentage of weight (b/b). The following is an explanation of each ingredient in the table, among others 1) Narwastu Extract: This is the main active substance used in this anti-aging cream. Narwastu extract has properties that have the potential to reduce the signs of aging on the skin. 2) Stearic acid: Acts as an emulsifier in the cream, helping to create emulsion Stableity and improve the texture of the product. 3) TEA (Triethanolamine): A small amount of TEA is used as an additional emulsifier to aid in the formation of a stable emulsion. 4) Cetyl alcohol: Serves as a thickener, giving the cream the desired consistency. 5) Paraffin oil: As an emollient, paraffin oil helps moisturize the skin and maintain softness. 6) Moisturizing conditioner: This ingredient is used as an additional moisturizer to provide hydration and keep the skin soft. 7) Methyl parabens: This preservative is used in small amounts to prevent the growth of microorganisms and extend the shelf life of the product. 8) Propyl parabens: An additional preservative to provide further protection against the growth of microorganisms. 9) EDTA (Ethylene Diamine Tetraacetic Acid): Serves as a Stableizer by binding heavy metals in the preparation. 10) Rose water: Used as a flavoring, gives a refreshing aroma to the cream. And 11) Distilled Water: Being a carrier or diluent to achieve the desired consistency and facilitate the use of the cream.

Table 4. Composition of Antiaging Cream from Corn Hair Extract (Zea mays)

No.	Material	Total (%b/b)	Description
1.	Corn Fruit Extract	0%	Active Substance
2.	Propylene glycol	2,1	Emulsifiers
3.	Tween 80	4,5	Emulsifiers
4.	Span 80	5,5	Emulsifiers
5.	Sorbitol	20	Humectants
6.	Stearic acid	5	Emulsifiers
7.	VCO	20	Emollients
8.	Citric acid	0,7	Buffer
9	Asam Askorbat	0,06	Antioksidan
10.	TEA	2,45	Emulsifiers
11.	Methyl paraben	0,25	Preservatives
12.	Propil paraben	0,15	Preservatives
13.	Suling Water	qs	Pembawa

Source: [3]

The table above illustrates the composition of the anti-aging cream that uses corn hair extract (Zea mays) as the main active ingredient. This table provides information about the number of ingredients used in the anti-aging cream formulation as well as a description of the function of each ingredient. The following is an explanation of the composition of anti-aging cream from corn hair extract, among others 1) Corn Fruit Extract: No percentage is listed, indicating that corn fruit extract is used as the active ingredient without a specific percentage. 2) Propylene glycol: Used as an emulsifier

with a percentage of 2.1%. Propylene glycol helps in emulsion formation and maintaining formulation Stableity. 3) Tween 80: Used as an emulsifier with a percentage of 4.5%. Tween 80 helps in merging the oil and water phases in the cream. 4) Span 80: Used as an emulsifier with a percentage of 5.5%. Span 80 also helps in the incorporation of oil and water phases in the cream. 5) Sorbitol: Used as a humectant with a percentage of 20%. Sorbitol helps in keeping the skin moisturized and prevents dryness. 6) Stearic acid: Used as an emulsifier with a percentage of 5%. Stearic acid helps in emulsion formation and keeps the formulation stable. 7) VCO (Virgin Coconut Oil): Used as an emollient with a percentage of 20%. VCO provides softness and smoothness to the skin. 8) Citric acid: Used as a buffer with a percentage of 0.7%. Citric acid helps maintain an appropriate pH in the formulation. 9) Ascorbic Acid: Used as an antioxidant at 0.06%. Ascorbic acid protects the skin from free radical damage. 10) TEA (Triethanolamine): Used as an emulsifier with a percentage of 2.45%. TEA helps in emulsion formation and maintains the Stableity of the formulation. 11) Methyl paraben: Used as a preservative with a percentage of 0.25%. Methyl paraben protects the formulation from unwanted growth of microorganisms. 12) Propyl paraben: Used as a preservative with a percentage of 0.15%. Propyl paraben also serves to protect the formulation from the growth of unwanted microorganisms. And 13) Distilled water: Used as a carrier (vehicle) and the amount is adjusted as needed to achieve the desired consistency in the cream.

Table 5. Composition of Antiaging Cream from Moringa Leaf Extract (Moringa oleifera)

No.	Material	Total (%b/b)	Description
1.	Purple Sweet Potato Extract	0,37	Active Substance
2.	Vaseline Album	6,2	Emulsifiers
3.	Mineral oil	13,8	Emollients
4.	Isopropil miristat	1,5	Enhancer
5.	Stearic acid	7,5	Emulsifiers
6.	Glyceryl monostearate	5	PenStable
7.	TEA	0,2	Emulsifiers
9	Xanthan gum	0,2	Thickener
10.	Methyl paraben	0,05	Preservatives
11.	Propyl paraben	0,1	Preservatives
12.	Suling Water	qs	Pembawa

Source: [4]

From the table above, it shows the composition of anti-aging cream containing Moringa (Moringa oleifera) leaf extract. The following is a detailed explanation of each ingredient used, among others 1) Purple Sweet Potato Extract: The active ingredient used in this cream. Purple sweet potato extract was added in a percentage of 0.37 by weight. 2) Vaselin Album: An emulsifier used to help mix ingredients that do not mix easily. In this cream, vaseline album was used as 6.2% of the total weight of the formulation. 3) Mineral oil: An emollient that provides softness and smoothness to the skin. Mineral oil was used as 13.8% in this formulation. 4) Isopropyl myristate: An enhancing ingredient that helps the absorption and penetration of active ingredients into the skin. In this cream, isopropyl myristate is used at 1.5%. 5) Stearic acid: An emulsifier that helps in forming a stable cream preparation. Stearic acid was used as 7.5% in this formulation. 6) Glyceryl monostearate: A Stableizer that helps in maintaining the Stableity of the cream. Glyceryl monostearate was used as 5%. 7) TEA (Triethanolamine): An emulsifier that helps in mixing ingredients that do not mix easily. In this cream, TEA was used at 0.2%. 8) Xanthan gum: A thickening agent that gives the cream a thick texture. Xanthan gum was used at 0.2%. 9) Methyl paraben: A preservative used to prevent the growth of microorganisms in the cream. Methyl paraben is used as much as 0.05%. 10) Propyl paraben: An additional preservative used to improve product sustainability. Propyl paraben is used as 0.1%. And 11) Distilled water: A carrier used to achieve the desired consistency in this cream formulation. The amount is customized (quantum satis).

Table 6: Composition of Antiaging Cream from Raspberry Fruit Extract (Rubus idaeus) and Grape Seed Extract (Vitis vinifera).

No.	Material	Total (%b/b)	Description

1.	Raspberry fruit extract	2	Active Substance
2.	Grape seed extract	2	Active Substance
2.	Stearic acid	14	Emulsifiers
3.	Almond oil	0,5	Emollients
4.	NaOH	1	Emulsifiers
5.	TEA	0,5	Emulsifiers
6.	EDTA	5	Stableizer
7.	Glycerin	8	Humectants
11.	Methyl paraben	0,1	Preservatives
12	Scent	0,5	Scent
13.	Suling Water	qs	Carrier

Source: [5]

From the table above, it presents the composition of an anti-aging cream that uses Raspberry fruit extract (Rubus idaeus) and Grape seed extract (Vitis vinifera) as the main active substances. The following are details of the composition of the ingredients used in the cream, among others 1) Raspberry Fruit Extract: Used as 2% by weight to the total weight of the cream. This extract contains active substances that are known to have anti-aging properties and can provide benefits to the skin. 2) Grape Seed Extract: Also used at 2% by weight to the total weight of the cream. This extract also contains active substances that have antioxidant properties and can help fight signs of aging on the skin. 3) Stearic Acid: Used as an emulsifier in a concentration of 14%. Its function is to help mix the water phase and oil phase in the cream, thus creating a stable emulsion. 4) Almond oil: In a concentration of 0.5%, almond oil functions as an emollient that helps moisturize and soften the skin. 5) NaOH: Used in 1% concentration as an additional emulsifier to help form a good emulsion. 6) TEA: The amount is 0.5% and serves as an additional emulsifier to maintain emulsion Stableity. 7) EDTA: In a concentration of 5%, EDTA acts as a Stableizer that helps maintain the Stableity of the cream by binding metal ions that may affect the Stableity of the product. 8) Glycerin: Used as much as 8% and functions as a humectant, which is an ingredient that can attract and lock moisture in the skin. 9) Methyl paraben: Amounts to 0.1% and is used as a preservative to prevent the growth of microorganisms that can spoil the cream. 10) Fragrance: In a concentration of 0.5%, fragrance is added to give the cream a pleasant aroma. And 11) Distilled Water: The amount is adjusted (qs) to achieve the desired total weight, serves as a carrier to create the appropriate texture and dissolves the other ingredients.

Table 7. Composition of Antiaging Cream from Litchi Fruit Extract (Dimocarpus longan)

No.	Material	Total (%b/b)	Description
1.	Longan fruit extract	2,5	Active Substance
2.	Stearic acid	7	Emulsifiers
3.	Cetyl alcohol	3	Thickener
4.	Mineral oil	0,5	Emollients
5.	Glycerin	1	Humectants
6.	TEA	0,5	Emulsifiers
7.	Methyl paraben	5	Preservatives
8.	Suling Water	qs	Carrier

Source: [1]

From the table above, the results of the explanation of the composition of anti-aging cream from longan fruit extract (Dimocarpus longan) in Table 7 include 1) Longan Fruit Extract (Dimocarpus longan): The main component of this cream is longan fruit extract with a concentration of 2.5% based on total weight (b/w). Longan fruit extract is used as an active substance in anti-aging creams. 2) Stearic acid: Used as an emulsifier in the cream with a concentration of 7% w/w. Stearic acid helps maintain emulsion Stableity and gives a good texture to the cream. 3) Cetyl alcohol: Serves as a thickener in the cream with a concentration of 3% w/w. Cetyl alcohol helps to increase the viscosity of the cream and provides a cohesive texture. 4) Mineral oil: An emollient used in creams at a concentration of 0.5%

w/w. Mineral oil helps to keep the skin moisturized and gives the cream a soft texture. 5) Glycerin: Used as a humectant in the cream with a concentration of 1% w/w. Glycerin serves to attract and keep the skin moisturized. 6) TEA (Triethanolamine): Used as an emulsifier in the cream with a concentration of 0.5% w/w. TEA helps maintain emulsion Stableity and cream pH. 7) Methyl paraben: Used as a preservative in the cream with a concentration of 5% w/w. Methyl paraben plays a role in preventing the growth of microorganisms that can damage the cream. And 8) Distilled water: Used as a carrier to compose the cream with a sufficient amount (quantum satis).

Table 8. Composition of Antiaging Cream from Purple Sweet Potato Leaf Extract (Ipomoea batatas)

No.	Material	Total (%b/b)	Description
1.	Ekstrak Daun Kelor	3	Active Substance
2.	Stearic acid	15	Emulsifiers
3.	Cetyl alcohol	6	Thickener
4.	NaOH	0,7	Emulsifiers
5.	Propylene glycol	3	Emulsifiers
6.	Glycerin	5	Humectants
7.	Methyl paraben	0,3	Preservatives
8.	Propil paraben	0,06	Preservatives

Source: [6]

From the table above, it shows the composition of antiaging cream containing purple sweet potato (Ipomoea batatas) leaf extract. The following is an explanation of each number in the table, among others 1) Moringa Leaf Extract (3%): Is an active substance derived from moringa leaf extract. This extract has potential as antiaging and provides skin benefits. 2) Stearic Acid (15%): Is an emulsifying agent that helps to mix the oil and water phases in the cream, thus obtaining a stable consistency. 3) Cetyl alcohol (6%): Is a thickening agent that helps increase the viscosity of the cream. 4) NaOH (0.7%): Is an emulsifying agent used to Stableize the emulsion in the cream. 5) Propylene glycol (3%): Is an emulsifying agent that helps mix the oil and water phases in the cream. 6) Glycerin (5%): Is a humectant that helps keep the skin moisturized by attracting and binding water to the skin surface. 7) Methyl paraben (0.3%): Is a preservative used to prevent the growth of microorganisms in the cream. And 8) Propyl paraben (0.06%): Is a preservative used to prevent the growth of microorganisms in the cream.

Table 9. Composition of Antiaging Cream from Rambutan Extract (Nephelium lappaceum)

No.	Material	Total (%b/b)	Description
1.	Rambutan Fruit Extract	3%	Active Substance
2.	Stearic acid	10	Emulsifiers
3.	Cetyl alcohol	6	Thickener
4.	Parafin Cair	6.6	Emollients
5.	Glycerin	5	Humectants
6.	Methyl paraben	0,018	Preservatives
7.	Propylene glycol	0,002	Emulsifiers
8.	Suling Water	qs	Carrier

Source: [7]

From the table above, the following is an explanation of the composition of antiaging cream from rambutan extract (Nephelium lappaceum), among others 1) Rambutan Fruit Extract: The main component with an amount of 3% (by weight) in the cream. It is an active substance derived from rambutan fruit extraction and has anti-aging potential. 2) Stearic Acid: Found in an amount of 10% in this cream. It functions as an emulsifier, helping to mix the oil and water phases in the cream to form a stable emulsion. 3) Cetyl alcohol: Found in the amount of 6%. Serves as a thickener in the cream formulation, giving it a thick texture and good consistency. 4) Liquid Paraffin: Used in an amount of 6.6%. Acts as an emollient, which imparts soft and moisturizing properties to the skin. 5) Glycerin: Is a humectant present in the amount of 5%. It functions to keep the skin moisturized by attracting and

retaining water in it. 6) Methyl paraben: Added in the amount of 0.018% as a preservative in the cream to prevent the growth of unwanted microorganisms. 7) Propylene glycol: Present in the amount of 0.002%. Acts as an emulsifier and can also provide a moisturizing effect on the skin. And 8) Distilled water: Used in sufficient quantities as needed (qs), as a carrier and completes the composition of the cream formulation.

Table 10: Composition of Antiaging Cream from Papaya Extract (Nephelium lappaceum)

No.	Material	Total (%b/b)	Description
1.	Stearic acid	7	Emulsifiers
2.	Cetyl alcohol	2	Thickener
3.	Mineral Oil	20	Emollients
4.	Propyl paraben	0,05	Preservatives
5.	Glycerin	10	Humectants
6.	Methyl paraben	0,05	Preservatives
7.	Tween 80	2	Emulsifiers
8.	TEA	2	Emulsifiers
10.	Oleum Rosae	0,005	Scent
11.	Aquades ad	100	Carrier

Source: Al Amin et al., 2018.

From the table above, the composition of antiaging cream from papaya (Nephelium lappaceum) extract includes 1) Stearic acid (7%): Used as an emulsifier, which is an ingredient that helps mix the water phase and oil phase in the cream. 2) Cetyl alcohol (2%): Serves as a thickener, giving the cream a thicker texture. 3) Mineral Oil (20%): Is an emollient, which is an ingredient that gives a soft and slippery feel to the skin. Mineral oil is often used in skin care products to moisturize and protect the skin. 4) Propyl paraben (0.05%): Used as a preservative to prevent the growth of microorganisms in cream preparations. 5) Glycerin (10%): Is a humectant, an ingredient that maintains skin moisture by attracting and retaining water on the skin surface. 6) Methyl paraben (0.05%): Used as a preservative, similar in function to propyl paraben to maintain product Stableity.7) Tween 80 (2%): Is an emulsifier, helps to mix the water phase and oil phase in the cream. 8) TEA (2%): Also an emulsifier, plays a role in mixing the water phase and oil phase. 9) Oleum Rosae (0.005%): Is a fragrance that gives aroma to the cream. And 10) Aquades ad 100: Is a carrier or solvent, in this case water is used as the main base in making cream.

Table 11. Results of Physicochemical Evaluation of Antiaging Cream from Various Extracts

Parameters	Siri Leaf	Crown of God	Narwastu	Ramut Maize	Moringa Leaf	Raspberry Fruit	Litchi Fruit	Sweet Potato Leaf	Rambutan	Papaya
Emulsion Type	m/a	m/a	m/a	m/a	m/a	m/a	m/a	m/a	m/a	m/a
pH	6,2	4,8-5,6	5,5-6,62	6.5	-	6	4,30-5,20	6,18-6,66	4,30-5,20	4,5-6,8
Appearance	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Homogeneity	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Taste test	Emollients and slick	Good	Emollients and slick	Emollients and slick	Emollients and slick	Emollients and slick	Emollients and slick	Emollients and slick	Emollients and slick	Emollients and slick
Spreadability	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Remova	Easy to	Easy	Easy to	Easy to	-	Easy to	Easy to	Easy to	Easy to	Easy

Parameters	Siri Leaf	Crown of God	Narwastu	Ramut Maize	Moringa Leaf	Raspberry Fruit	Litchi Fruit	Sweet Potato Leaf	Rambutan	Papaya
l test	remove with water	to remove with water	remove with water	remove with water		remove with water	remove with water	remove with water	remove with water	to remove with water
Stableity Test	Stable	Stable for 3 months	Stable	Stable	-	-	Stable for 2 months	Stable	Stable	Stable

From the evaluation results of the table above, it can be seen that all cream preparations have an m/a emulsion type, good appearance, good homogeneity, and good spreadability. The pH of the cream preparations varied between 4.8 to 6.8, with some formulations having a narrower pH range. Taste tests showed that all creams had emollient and slippery characteristics. The cream preparations were also easily removed with water, making it easier for users to use and clean the product. The Stableity of the cream preparations has also been evaluated, and most of the formulations showed good Stableity over the specified study period of 2 to 3 months. However, there was one formulation for which no Stableity test was performed in the data provided. The results of this physicochemical evaluation provide important information about the quality and characteristics of anti-aging cream preparations using m/a emulsions. However, further information such as effectiveness in reducing signs of aging needs to be obtained through further research or clinical evaluation. Skin ages, especially in areas that are frequently exposed to direct sunlight. This skin aging process occurs naturally with age, but excessive sun exposure can accelerate the aging process. Prolonged and repeated sun exposure can cause damage to skin structures such as collagen and elastin. Collagen is a protein that gives skin strength and firmness, while elastin gives skin elasticity. When collagen and elastin are damaged, the skin becomes thinner, loses its firmness, and becomes more prone to irritation. In addition, sun exposure can also cause free radicals to form on the skin. Free radicals are unstable molecules that can damage cellular structures. The accumulation of damage from these free radicals also contributes to skin aging. As we age, the skin layer naturally becomes thinner as collagen and elastin production decreases. This process can cause the skin to become more fragile and prone to irritation. Thinner skin also tends to have a slower ability to regenerate, resulting in slower repair of skin damage. To prevent and reduce the effects of skin aging caused by sun exposure, it is important to protect the skin by using sunscreen or skincare products with an appropriate SPF (sun protection factor). In addition, maintaining skin hydration, avoiding direct sun exposure during the hottest hours, and using protection such as hats or clothing with ultraviolet (UV) protection can also help reduce damage and irritation to skin prone to aging [9].

Skin aging is the result of an interaction between intrinsic and extrinsic factors. Extrinsic factors, such as ultraviolet (UV) radiation, excessive alcohol consumption, tobacco abuse and environmental pollution, can accelerate the skin aging process. Exposure to ultraviolet (UV) light, especially ultraviolet A (UVA) and ultraviolet B (UVB), can damage collagen and elastin in the skin, causing wrinkles, loss of firmness, and hyperpigmentation. Excessive alcohol consumption can lead to dehydration and inflammation, which negatively affects skin health and appearance. Tobacco abuse contains substances that damage collagen and elastin, which can result in dull, wrinkled and inelastic skin. Environmental pollution, such as air pollution, can cause inflammation and oxidative damage to the skin. Besides extrinsic factors, there are also intrinsic factors that affect skin aging. Genetic factors play an important role in determining the speed and manner in which skin aging occurs. Some individuals may have a genetic susceptibility to skin damage or a faster decline in collagen and elastin production. Hormonal factors also affect skin aging, such as hormonal changes during menopause that can lead to a decrease

in skin firmness and elasticity. In addition, racial factors can also affect skin characteristics and susceptibility to aging. Temperature can also affect skin health. Exposure to extreme temperatures, both hot and cold, can dry out the skin and cause irritation. Air pollution and toxic substances in the environment can also cause damage to the skin, accelerating the aging process. In order to maintain healthy skin and slow down the aging process, it is important to protect the skin from the sun by using sunscreen, reduce alcohol consumption, avoid tobacco, keep the environment clean, and apply proper skincare. In addition, a healthy lifestyle that includes a balanced diet, regular exercise, and adequate sleep can also contribute to healthy and beautiful skin [8].

According to Ramadhiani et al. (2022) skin aging is characterized by several changes that include irregular pigmentation, increased wrinkles, loss of elasticity, and skin that becomes dry and rough. Irregular pigmentation changes, such as hyperpigmentation or dark spots, are one of the signs of skin aging. This occurs due to uneven melanin production in the skin, which can be caused by UV exposure, oxidative damage, or hormonal changes. Increased wrinkles are another symptom of skin aging. The skin loses its elasticity as we age, as collagen and elastin in the skin undergo decreased production and deterioration. As a result, the skin becomes less elastic and prone to wrinkle formation. Skin that becomes dry and rough is also a feature of aging. The production of natural oils in the skin, which help keep the skin moisturized, tends to decrease with age. As a result, skin can become dry, rough and lose its natural glow. To combat these changes, proper skincare can involve using cosmetic products that contain ingredients that moisturize and improve skin elasticity, such as peptides, retinol, hyaluronic acid and antioxidants. In addition, it is also important to protect the skin from sun exposure by applying sunscreen daily and adopting a healthy lifestyle that includes a balanced diet, adequate hydration, quality sleep, and avoiding smoking and excessive alcohol consumption. Using natural compounds as antioxidants in skin protection has become popular in reducing the effects of aging. Natural antioxidant compounds derived from plants have the potential to prevent and reduce skin damage due to oxidative stress. Oxidative stress occurs when the balance between the production of free radicals and the body's ability to fight them is disrupted. Free radicals damage skin cells and cause oxidative damage, which can contribute to the skin aging process. Natural antioxidants, such as polyphenols, flavonoids, vitamin C, vitamin E, and carotenoids, can fight free radicals and protect skin cells from oxidative damage. When used topically in the form of skincare products, these compounds can help minimize the damaging effects on the skin and prevent pathological or physiological conditions associated with oxidative stress. The use of natural antioxidants in topical applications also provides other benefits such as improving skin hydration, increasing skin elasticity, reducing inflammation, and improving the appearance of skin damaged by sun exposure and other environmental factors. It is important to note that the use of natural antioxidants in skincare products not only provides additional protection against skin aging, but it is also important to adopt an overall healthy lifestyle, including a balanced diet, regular exercise, adequate sleep, and protecting the skin from direct sun exposure by using sunscreen [16]. Topical use of antioxidants can be done through various cosmetic dosage forms, including gels, creams, powders, ointments, and lotions. However, in this review article, the focus will be on anti-aging creams containing active substances from plant extracts [11]. Cream preparations have the advantage of providing moisture and protecting the skin from environmental damage, and can contain active ingredients that are beneficial to the skin. Anti-aging creams containing antioxidants from plant extracts aim to provide protection from free radicals, reduce oxidative damage, and minimize signs of aging on the skin. The formulation of anti-aging creams containing active ingredients from plant extracts may involve the selection of active ingredients that have strong antioxidant properties, such as polyphenols, flavonoids, or other compounds with proven antioxidant activity. In addition, formulation also involves the selection of binders, emulsifiers, and other additives necessary to create a stable and easy-to-use cream preparation. Physicochemical evaluation of cream preparations includes assessing the physical Stableity and consistency of the cream, color, pH, viscosity, and the penetration and absorption ability of the cream by the skin. The results of this evaluation can provide important information about the quality and performance of anti-aging cream preparations containing active substances from plant extracts.

Based on a review of data sources, several herbs were identified as having potential as anti-aging agents, including: Betel, Crown of God, Narwastu, Rambutan, Corn, Sweet potato, Moringa, Raspberries, Grapes, Litchi and Papaya. Furthermore, the results of the review data sources also include the formulation of cream preparations from various extracts that can be used for anti-aging purposes. In addition, physicochemical evaluation of anti-aging creams was also carried out, and the results of this evaluation are presented in table 11. The physicochemical evaluation may include parameters such as physical Stableity, consistency, color, pH, viscosity, as well as the ability of penetration and absorption by the skin. With the data from these tables, this review article provides useful information on the potential of plants as anti-aging agents, the formulations of cream preparations that can be used, and the results of physicochemical evaluations that are relevant in the development of anti-aging cream preparations containing active substances from plant extracts.

All creams formulated in this review are categorized as m/a emulsion creams. An m/a emulsion cream is a type of cream in which the outer phase is water (aqua) and the inner phase is oil (olea). This emulsion is made by combining two insoluble phases, water and oil, with the help of an emulsifier to create emulsion Stableity. M/a emulsion creams usually have a soft and light texture, making it easy to absorb into the skin. By having an oil phase in it, these creams can provide the moisture and nutrients needed by the skin. At the same time, the water phase provides a cooling and refreshing effect. The choice of m/a emulsion cream formulation in the development of anti-aging cream preparations containing active substances from plant extracts can provide benefits that suit the needs of the skin, such as maintaining skin moisture, disguising fine lines, and improving skin elasticity. Thus, the selection of m/a emulsion cream type in the formulation of this anti-aging cream preparation can provide a comfortable usage experience and provide the expected benefits in anti-aging skin care. M/a emulsion cream has several advantages that make it a good choice in anti-aging cream formulations. Here are some of the key advantages of m/a emulsion creams: 1) Ease of Water Washability: M/a emulsion creams are easily washed off with water. After use, these creams can be removed easily with just water without leaving any sticky residue on the skin. 2) Non-Sticky: The m/a emulsion cream has a light and non-sticky texture when applied to the skin. This provides comfort in use and makes it more favorable to users. 3) Leaves No Stain on Clothes: Due to their water-washable nature, m/a emulsion creams are less likely to leave stains on clothes or fabrics. This is very advantageous, especially if the cream is used on skin areas that are directly exposed to clothing. 4) Good Release Properties of Drug Ingredients: M/a emulsion creams have good drug substance release properties. When the drug substance is applied on the skin, the water in the cream evaporates and increases the concentration of water-soluble drug substance. This can increase the absorption of the drug substance through the skin tissue. With the combination of these advantages, m/a emulsion cream is a good choice for anti-aging cream preparations. In anti-aging skin care, these creams not only provide cosmetic benefits such as moisture and comfortable texture, but also enable optimal absorption of the drug ingredients contained in the formulation [17].

The pH measurement of the formulated cream preparation as a whole shows that the pH of the cream is qualified with a range suitable for the skin, namely 4.5-6.8. This pH range is recommended as a suitable pH in cosmetic cream formulations for the skin [18]. However, it should be noted that the pH value for formulation F5 with the active ingredient Moringa leaf extract is not known in the data provided, so it cannot be ascertained whether the preparation meets the criteria for a good formula in terms of pH. Further evaluation needs to be done to ensure the suitability of the preparation with the desired pH parameters. Furthermore, the appearance test results show that all formulated cream preparations have a good appearance, where there is no color change when tested with the dye method according to the formula that has been made, which is still m/a. This indicates that the creams maintain the desired color and are in accordance with the predetermined formulation. Discoloration of creams can be an indication of unwanted chemical reactions or changes in ingredient composition. However, in this case, since no color change occurred in the formulated creams, it can be concluded that the formulation used has produced creams with good color Stableity. Good appearance of cream preparations is an important factor in the acceptance and use of cosmetic products by consumers. With no color change in the cream, consumers can feel more confident and comfortable when using it.

In addition, the homogeneity test results showed that all formulated creams had good homogeneity. This can be confirmed through visual and tactile inspection of the cream preparations. Visual inspection is done to check if the cream has a uniform appearance and there are no visible coarse particles or sediment. If the cream looks visually homogeneous, it means that the distribution of extracts in the cream occurs evenly. A tactile examination is done by applying the cream to the skin and feeling its texture and consistency. If the cream feels smooth, soft, and there is no significant difference in texture when applied, then it can be said that the distribution of extracts in the cream is also homogeneous. With good homogeneity and homogeneous distribution of extracts, cream preparations can provide consistent and effective results when used. It is important to ensure that the active ingredients of the extracts are evenly distributed throughout the cream, thus providing the same benefits at each application of the cream.

The taste test results showed that all the formulated creams felt emollient (soft) and smooth when applied to the skin. This emollient and smooth feeling is achieved through the use of certain excipients, especially emollients, in the cream formulation. In the Mahkota Dewa formulation, the emollient used is liquid paraffin. Siri Leaf uses mineral oil, Narwastu uses paraffin oil, Ramut Jagung uses VCO (virgin coconut oil), Moringa Leaf uses mineral oil, Raspberry Fruit uses almond oil, Litchi Fruit uses mineral oil, Sweet Potato Leaf uses moisturizing ingredients such as glycerin and propylene glycol, Rambutan and Papaya use liquid paraffin. The emollient substances in face creams soften the skin by filling the spaces between the skin layers with oil droplets. When the cream is applied to the skin, it feels soft and slippery. With this emollient and slippery feeling, using the cream will feel more comfortable and give a pleasant sensation to the skin. In addition, the emollient content can also help keep the skin moisturized, so that the skin remains hydrated and protected. The removal test results show that all the formulated creams have good removability, where they can be easily washed off by water. This can be explained by the type of cream formulation used, which is m/a (oil in water) cream. M/a creams have an outer phase of water and an inner phase of oil. This property allows the cream to emulsify well with water and wash off easily when exposed to water. When the cream is applied to the skin and then rinsed off with water, the oil phase in the cream will emulsify with water and dissolve, so the cream can be easily removed and rinsed off by water. This advantage makes the use of the cream practical and convenient, because after use, the cream can be easily washed off with water without leaving a sticky or difficult-to-remove residue.

All these physicochemical parameters were well maintained during the accelerated Stableity study period including emulsion type, pH, appearance, homogeneity, taste test, spreadability, removal test, as well as Stableity test. Physicochemical Stableity testing was only conducted on a few formulas from the 10 ingredient extractions. Based on the test results, these formulas can be categorized as physicochemically stable formulas. However, for the other formulas that did not go through Stableity testing, their physicochemical Stableity was assessed based on predetermined parameters, such as emulsion type, pH, appearance, homogeneity, taste test, and removal test. Although physicochemical Stableity testing was not performed explicitly on these formulas, these parameters can give an indication of the physicochemical Stableity of the formula. In this case, the other formulas are said to be physicochemically stable based on the parameters that have been determined. Although physicochemical Stableity testing was not performed on the formulas, the parameters provide confidence that the formulas meet the desired physicochemical Stableity criteria. Physicochemical Stableity testing is an important step in cosmetic development to ensure that formulas remain stable during their shelf life. Although the tests are conducted on a subset of formulas, the parameters determined can provide useful information in evaluating the physicochemical Stableity of other formulas. However, to ensure overall physicochemical Stableity, it is recommended to conduct more extensive physicochemical Stableity testing for all formulas.

4. CONCLUSION

Based on the results and discussion above, it can be concluded that all the creams formulated in this study showed good and stable physicochemical conditions. This can be seen from the absence of signs of damage to the emulsion dosage form in the cream and no significant changes in the

physicochemical properties during the stability test. This good physicochemical consistency shows that the formula used in the development of this cream preparation is able to maintain the integrity and quality of the product over a certain period of time. The success in achieving physicochemical stability provides good potential for further development in the formulation of creams containing active substances from plant extracts. The use of natural active substances from plant extracts has been shown to have good anti-aging and skin protection effects. By using a stable physicochemical formula, this cream can provide optimal benefits for the skin and effective protection against signs of aging. Even though this study showed success in physicochemical stability, it is important to carry out further research to test the effectiveness and safety of using this cream on human skin. More in-depth clinical trials can provide stronger evidence regarding the benefits and safety of using this product, so that it can be a safe and effective solution for anti-aging skin care. Thus, the development of cream formulations based on the results of this review can be a promising first step in the cosmetic industry to meet the increasing consumer demand for natural and effective skin care products.

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