


The Role Of Natural Antioxidants In Delaying Premature Skin Aging Process

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Article Info	ABSTRACT
<p>Keywords: Natural Antioxidants, Skin Aging, Free Radicals, Oxidative Stress.</p>	<p>The process of premature aging of the skin is an inevitable biological phenomenon, characterized by changes in the structure and function of the skin due to internal factors (intrinsic) such as genetics and external factors (extrinsic) such as exposure to UV rays, pollution, and free radicals. This study aims to analyze the role of natural antioxidants in delaying the process of premature aging of the skin through the mechanism of protection against oxidative damage caused by free radicals. This research method uses a qualitative approach with a descriptive method with data sources in the form of literature reviews by examining various relevant scientific studies related to the study. The results of this study indicate that consuming foods rich in natural antioxidants plays a significant role in slowing the process of premature aging of the skin. Antioxidants such as vitamin C, vitamin E, flavonoids, and polyphenols have been shown to be effective in fighting free radicals, reducing inflammation, and repairing damage caused by exposure to UV rays and pollution. Research also reveals that antioxidants can help maintain skin moisture, reduce fine lines and wrinkles, and brighten dull skin. These results emphasize the importance of choosing a diet rich in antioxidants to maintain skin health and delay premature aging, strengthening the argument that skin care based on natural nutritional intake can provide long-term benefits for skin appearance .</p>
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INTRODUCTION

The skin is the outermost and largest organ of the human body that plays a vital role in protecting the body from various external threats. With a weight of about 1/6 of the total human body weight, the skin functions as a physical barrier against harmful microorganisms, exposure to toxic substances, and ultraviolet (UV) radiation (Sari, 2015). The skin structure consisting of three main layers—epidermis, dermis, and hypodermis—allows the skin to perform various important functions. The epidermis, for example, acts as the main barrier against pathogen penetration, while the dermis contains collagen and elastin that provide strength and elasticity. In addition, the skin plays an important role in regulating water levels and body temperature through processes such as sweat evaporation and heat release, which helps maintain overall body homeostasis (Friatna et al., 2011).

Changes in the skin, whether due to internal factors such as natural aging or external factors such as pollution and UV exposure, can have an impact on a person's physical and psychological health (Prakoeswa & Sari, 2022). Healthy skin not only reflects physical health but also has a positive impact on an individual's emotional and social condition. Therefore, maintaining healthy skin through a healthy lifestyle, protection from external factors, and the use of appropriate care are important steps to support optimal skin function and improve overall well-being (Irainti & Pramono, 2022).

Skin aging is a natural process that cannot be avoided and is part of the human life cycle. This process occurs gradually with age, influenced by intrinsic factors such as genetics, hormones, and body metabolism, as well as extrinsic factors such as exposure to ultraviolet (UV) rays, pollution, lifestyle, and diet (Yusharyahya, 2021). Biologically, skin aging is characterized by a decrease in collagen and elastin production, which causes the skin to lose its elasticity and firmness. In addition, skin cell regeneration slows down, so the skin becomes thinner, drier, and more susceptible to damage. External factors, especially exposure to free radicals, can accelerate this process by increasing oxidative stress that damages the structure of skin cells (Dewiastuti & Hasanah, 2016).

However, in some cases, the aging process occurs faster than it should. This process is called premature aging. Premature aging of the skin is a complex process caused by intrinsic and extrinsic factors which can cause structural and functional changes in the skin (Rizkyah & Karimah, 2023). Premature aging of the skin can affect a person both physically, physiologically and psychologically. Signs of aging on the skin can be seen by the appearance of wrinkles or fine lines, especially on the face, in the corners of the eyes, forehead and around the lips. Understanding the skin aging process will provide insight into preventing, regenerating and delaying premature aging of the skin (Aizah, 2016).

Although skin aging is a natural process that cannot be stopped, certain steps can help slow it down significantly, so that the skin maintains its function and looks fresher even as you age. Proper skin care, such as regular cleansing, moisturizing, and applying serums or creams containing antioxidants, can protect the skin from free radical damage (Zalukhu et al., 2016). The use of sunscreen with appropriate SPF is a mandatory step to prevent the adverse effects of UV exposure that can accelerate collagen damage and cause hyperpigmentation (Setiabudi, 2013). In addition, implementing a healthy lifestyle, such as getting enough sleep, exercising regularly, and managing stress, plays an important role in maintaining healthy skin from within. Consuming nutrient-rich foods, such as fruits and vegetables that contain antioxidants, helps repair skin tissue and increase its elasticity (Setiabudi, 2013).

Antioxidants are compounds that can fight the negative effects of free radicals—unstable molecules that can damage skin cells and accelerate the aging process. Free radicals are produced both from the body's metabolic processes and external exposure such as UV rays, pollution, and cigarette smoke (Simanjuntak, 2012). Antioxidants, such as vitamin C, vitamin E, beta-carotene, polyphenols, and flavonoids, work by neutralizing free radicals, thereby preventing damage to skin cells and tissues. In addition, antioxidants help stimulate collagen production, repair skin damage, and maintain the skin's natural elasticity

and moisture. By combining antioxidant-containing skin care with a healthy lifestyle, the impact of skin aging can be effectively minimized (Saras, 2023).

The purpose of this study was to analyze the role of natural antioxidants in slowing down the skin aging process by understanding their mechanism of action in protecting the skin from oxidative damage caused by free radicals. This study aims to provide a scientific understanding of the effectiveness of natural antioxidants, such as vitamin C, vitamin E, polyphenols, and flavonoids, found in various food sources and skin care products. The benefits of this study are to provide useful information for the general public, health practitioners, and the cosmetic industry about the importance of using natural antioxidants as part of a skin care strategy. In addition, the results of this study can be a reference for developing safer, more natural, and more effective skin care products in preventing and delaying premature aging, thereby supporting the health and quality of life of individuals holistically.

METHOD

The method used in this study is a qualitative method, which aims to understand the phenomenon in depth through descriptive data analysis. Qualitative methods produce data in the form of written or spoken words from people and observable behavior, which is then analyzed to gain a comprehensive understanding of the research topic (Sugiyono, 2011). In the context of this study, qualitative methods were chosen because of their ability to explain in detail the role of natural antioxidants in delaying the skin aging process. This study focuses on in-depth and targeted information gathering, so a qualitative approach is very relevant to explore the working mechanisms of natural antioxidants, their potential benefits, and the factors that influence their effectiveness in maintaining skin health.

The data collection technique in this study was carried out through literature studies, namely by analyzing relevant documents, such as scientific articles, research journals, and information from the mass media that discuss the topic of natural antioxidants and their relationship to skin aging. Literature studies allow researchers to access various sources that have been scientifically tested, so that the data obtained is more valid and accountable. In this study, the documents reviewed include previous studies on antioxidant compounds such as vitamin C, vitamin E, polyphenols, and flavonoids, as well as their mechanisms of action in fighting free radicals. With this approach, the study not only provides an in-depth theoretical explanation but also presents empirical data that supports the importance of using natural antioxidants in preventing and delaying premature aging of the skin.

RESULT AND DISCUSSION

Evawati (2010), Premature aging is a major problem, especially for women, because it can reduce self-confidence. This aging process is inevitable and can occur at any time, often with a faster duration than natural aging. Premature aging of the skin is generally characterized by the appearance of wrinkles or fine lines, dark spots, dry and itchy skin, and sagging facial skin. A more serious impact of premature aging is changes in skin color that can cause imbalance and decreased skin texture. These changes significantly affect

appearance, making a person look older than their actual age , and potentially affecting psychological and emotional well-being.

According to Shofia et al (2020) One of the main causes of premature aging is damage caused by free radicals, unstable molecules formed by environmental factors such as pollution, cigarette smoke , and especially exposure to ultraviolet (UV) rays from the sun. These free radicals attack the skin's collagen and elastin, two important proteins that function to maintain skin firmness and elasticity. When collagen and elastin break down, the skin loses its ability to maintain its firmness, leading to sagging and wrinkling. In addition, free radicals can also damage the dermal matrix, the deeper layer of skin, which plays an important role in maintaining skin hydration and elasticity.

According to Noormindhawati (2013), the physical characteristics of premature aging of the skin are very easy to recognize. First, the skin becomes loose and wrinkled due to decreased levels of collagen and elastin which are greatly reduced with age or due to excessive exposure to sunlight. Second, the appearance of age spots or black spots which are often found in areas of the skin that are often exposed to sunlight, such as the face, arms, and hands. These age spots appear due to the accumulation of melanin, a pigment produced by the skin to protect itself from UV exposure. Third, the skin becomes rough and its texture is uneven, this occurs due to damage to collagen and elastin which causes the skin to lose its softness. Fourth, enlarged skin pores are also characteristics of premature aging, which are caused by the accumulation of dead skin cells that inhibit the skin regeneration process and enlarge the pores. All of these signs indicate that premature aging is the result of cumulative damage and can be avoided or minimized with proper care, use of sunscreen, and a healthier lifestyle.

Dewiastuti & Hssanah (2016), Premature aging of the skin can be triggered by various factors, both external and internal. One of the main causes is the lack of sunscreen use. Exposure to ultraviolet (UV) rays from the sun can damage collagen and elastin, two important proteins that keep skin firm and elastic. Excessive UV rays can cause skin cell damage which accelerates the appearance of wrinkles, dark spots, and sagging skin. Therefore, proper use of sunscreen is very important to protect the skin from the harmful effects of sunlight and prevent premature aging. In addition, smoking activity also contributes greatly to skin aging. Smoking causes blood vessels to narrow, reducing blood flow to the skin, and reducing the supply of oxygen and nutrients needed to maintain healthy skin. As a result, the skin becomes drier, more prone to wrinkles, and loses its elasticity. The chemicals in cigarettes, such as nicotine and carbon monoxide, also damage the skin's collagen and elastin, accelerating the aging process. Another factor that plays a role in premature aging is the lack of skin care from an early age . Skin that is not properly cared for will lose its moisture and firmness more quickly. An unhealthy lifestyle, such as lack of sleep, stress, and poor diet, can worsen skin conditions and accelerate the aging process. Therefore, it is important to start caring for your skin early by maintaining moisture, using appropriate care products, and adopting a healthy lifestyle so that your skin maintains its elasticity and health as you age.

Susanti et al (2022), One effective way to prevent premature aging is to consume foods rich in antioxidants. Antioxidants play an important role in fighting free radicals that can enter the body through various sources, such as cigarette smoke, air pollution, and exposure to ultraviolet (UV) rays. Free radicals are unstable molecules that can damage body cells, including skin cells. When skin cells are exposed to free radicals over a long period of time, damage to collagen and elastin occurs, resulting in skin becoming drier, wrinkled, and losing its elasticity. Therefore, intake of antioxidants from food or supplements can help neutralize these free radicals and reduce their damaging effects on the skin, thereby delaying the appearance of premature signs of aging.

Ibroham et al (2022), Natural antioxidants found in various types of foods, such as fruits, vegetables, nuts, and spices, can provide significant protection for skin health. Several well-known antioxidants such as vitamin C, vitamin E, polyphenols, and flavonoids have been shown to have properties that can protect the skin from damage caused by UV exposure, which is one of the main causes of skin aging. Vitamin C, for example, functions to repair and rejuvenate the skin by increasing collagen production, while vitamin E helps maintain moisture and repair skin damage. By consuming foods rich in antioxidants, the body can strengthen its natural defenses against free radicals, keep the skin healthy, and slow down the aging process, thus maintaining the appearance of the skin fresh and radiant even though we get older.

Kurniasih (2019), Antioxidants can be obtained from various food sources and supplements, which are rich in compounds that are useful for fighting free radicals in the body. Some foods that are rich in antioxidants include fruits such as oranges, strawberries, kiwis, and berries, as well as vegetables such as peppers, broccoli, cabbage, and tomatoes. Oranges and strawberries are rich in vitamin C, which functions as a powerful antioxidant to protect the skin from damage caused by UV exposure and increase collagen production. Kiwis also contain vitamin C and polyphenols that help repair damaged skin cells, while peppers and broccoli contain vitamins A and C that help maintain skin moisture and elasticity.

In addition, almonds, sunflower seeds, avocados, and spinach are also excellent sources of antioxidants. Almonds and sunflower seeds are rich in vitamin E, which works to protect skin cells from oxidative damage, repair skin damage, and increase skin moisture. Avocados contain vitamin E and healthy fats that help maintain skin moisture and improve skin texture. Spinach is rich in lutein, a type of carotenoid that is useful for maintaining eye health and protecting the skin from UV radiation. Carrots, sweet potatoes, and pumpkins contain beta-carotene, which is a provitamin A that is important for skin health, helping to repair cell damage and protect the skin from UV damage. In more detail, the author will summarize the role of natural antioxidants in preventing premature aging of the skin.

1. Reduces fine lines and wrinkles

Natural antioxidants play a vital role in reducing fine lines and wrinkles on the skin by fighting free radical damage. Free radicals produced by sun exposure, pollution, and oxidative stress can damage collagen and elastin, two key proteins responsible for keeping the skin firm and elastic. Damaged collagen causes the skin to lose its structure and

firmness, which ultimately accelerates the appearance of wrinkles and fine lines, especially in the most exposed areas of the face. Antioxidants such as vitamins C and E work by reducing this oxidative damage, repairing and stimulating new collagen production, and protecting the skin from further damage.

In addition, natural antioxidants also have the ability to increase skin hydration, which is very important in maintaining skin elasticity and preventing the appearance of fine lines. For example, vitamin E, found abundantly in nuts and seeds, helps restore skin moisture and protect it from dehydration, which can worsen the appearance of wrinkles. Vitamin C, which is found in abundance in fruits such as oranges and strawberries, also works to increase collagen production, which gives strength to the skin and helps slow the appearance of wrinkles. By regularly consuming foods rich in antioxidants, the skin can remain hydrated, elastic, and protected from damage that accelerates the appearance of premature signs of aging.

2. Reduces dark spots

Natural antioxidants also play a role in reducing dark spots on the skin, which often appear due to ultraviolet (UV) exposure and aging. Dark spots, also known as age spots or sun spots, occur when skin cells produce too much melanin in response to sun exposure. Although melanin functions to protect the skin from UV damage, this overproduction can cause pigment to build up in certain areas of the skin, resulting in dark spots. Antioxidants such as vitamins C and E can help reduce the formation of dark spots by reducing inflammation and repairing damage caused by free radicals. Vitamin C, in particular, has the ability to whiten skin and lighten dark spots by inhibiting excessive melanin production.

In addition, antioxidants also support faster skin regeneration processes, allowing the skin to repair itself and reduce the appearance of dark spots. Some antioxidant-rich foods, such as berries, tomatoes, and carrots, contain compounds that protect the skin from further damage from sun exposure. Beta-carotene, found in carrots and pumpkin, has anti-inflammatory effects and protects the skin from UV damage that can worsen dark spots. By consuming foods rich in antioxidants, the skin can have stronger protection against the main causes of dark spots and support skin healing and recovery, making the skin appear brighter and more even.

3. Reduce acne

Natural antioxidants can also help reduce acne by fighting inflammation, which is often the main cause of acne. Acne usually occurs when the skin's pores become clogged with oil, dirt, and dead skin cells, which then triggers inflammation and infection. Free radicals, produced by external factors such as pollution, UV rays, and stress, can worsen this inflammation, accelerating the onset of acne. Antioxidants, especially vitamins C and E, have anti-inflammatory properties that can calm inflammation in the skin, reducing the redness and swelling often seen in acne. By consuming antioxidant-rich foods, the skin can gain protection from the factors that cause acne and speed up the healing process.

In addition, some antioxidants such as zinc and beta-carotene also have positive effects on skin health related to acne. Zinc, which is found in abundance in nuts and seeds, plays an important role in regulating excess oil production in the skin, which is often the

cause of acne. Beta-carotene, found in carrots, pumpkin, and other orange vegetables, works to improve skin texture and fight infections that can trigger acne. By consuming these antioxidant-rich foods regularly, the skin can avoid excessive inflammation and help maintain the balance of oil production, thereby reducing the possibility of acne.

4. Maintain skin moisture

Natural antioxidants also play an important role in maintaining skin moisture, which is essential to prevent dryness and irritation. Well-hydrated skin will be more elastic, look healthy, and be protected from various skin problems, including premature aging. Free radicals caused by UV exposure, pollution, and other environmental factors can damage the skin's protective layer, leading to moisture loss. Antioxidants such as vitamin E have the ability to increase skin moisture by repairing the skin's natural moisture barrier, so the skin stays hydrated longer. Vitamin E works by reducing oxidative damage to skin cells, maintaining moisture, and protecting the skin from damaging environmental effects.

Besides vitamin E, vitamin C also plays an important role in maintaining skin moisture by stimulating collagen production. Healthy collagen helps maintain skin structure and prevents moisture loss. In addition, antioxidant compounds such as flavonoids contained in berries, green tea, and nuts can also help improve blood circulation in the skin, which supports the supply of oxygen and nutrients needed to maintain skin moisture. By consuming foods rich in antioxidants, the skin is not only protected from free radical damage, but also gets support to retain moisture which is very important for maintaining long-term skin health.

5. Brighten skin

Natural antioxidants play a vital role in brightening the skin by reducing inflammation and preventing free radical damage that can lead to uneven skin pigmentation. Free radicals caused by sun exposure and pollution can damage skin cells and accelerate the overproduction of melanin, which then leads to the appearance of dark spots, blemishes, or dull skin. Vitamin C, a well-known antioxidant, works by inhibiting melanin production, providing a brightening effect on the skin and evening out skin tone. In addition, vitamin C also helps repair damage to the skin layers, reducing signs of aging and making the skin look brighter and more radiant.

In addition to vitamin C, flavonoid compounds found in fruits such as strawberries, oranges, and grapes also have the ability to brighten the skin. Flavonoids help improve blood circulation and oxygenation in the skin, allowing the skin to get better nutrition and produce a fresher and brighter appearance. By fighting damage caused by UV rays and pollution, these antioxidants help the skin recover and speed up the process of cell regeneration. Consuming foods rich in antioxidants regularly can help repair and rejuvenate the skin from within, giving a natural brightening effect and protecting the skin from damaging environmental factors, so that the skin looks more radiant and healthy.

6. Helps reduce inflammation

Natural antioxidants play an important role in helping to reduce inflammation in the skin, which is often the cause of various skin problems, including acne, redness, and irritation. Free radicals produced by UV exposure, pollution, or stress can trigger

inflammation in the skin, leading to inflammatory reactions that damage skin tissue and worsen skin conditions. Antioxidants like vitamins C and E have powerful anti-inflammatory properties, which help to calm inflammation and reduce redness in the skin. Vitamin C, for example, not only acts as a skin brightener but also speeds up the healing process of inflamed skin, as well as increasing the skin's resistance to external factors that can cause irritation.

Additionally, flavonoids and polyphenols found in foods such as green tea, berries, and grapes also have anti-inflammatory effects that can help reduce skin inflammation. Green tea, for example, contains epigallocatechin gallate (EGCG), which is known to reduce inflammation and improve overall skin health. By consuming these antioxidant-rich foods, the body can fight inflammation more effectively, speed up skin recovery from damage, and prevent the development of skin conditions caused by chronic inflammation. These antioxidants help maintain balance in the skin and support long-term skin health, so that the skin remains healthy and free from inflammatory problems that can worsen the appearance of the skin.

7. Repairing sun damage

Excessive sun exposure can cause damage to the skin, such as the formation of dark spots, wrinkles, and increased production of free radicals that damage the skin structure. Natural antioxidants play an important role in repairing UV damage by fighting free radicals produced from sun exposure. Vitamin C, for example, has the ability to repair and rejuvenate skin damaged by UV rays by increasing the production of collagen and elastin, two important components that keep skin supple and strong. In addition, vitamin E also functions as a protector for the skin, reducing inflammation caused by UV exposure and accelerating the healing process of injured skin.

In addition to vitamins C and E, flavonoid compounds found in various fruits and vegetables can also repair skin damage caused by sunlight. Flavonoids function to fight inflammation and reduce oxidative damage that can cause premature aging. One example of an effective compound is the polyphenols contained in green tea, which help repair skin DNA damage caused by UV rays. Regularly consuming antioxidant-rich foods can help repair and protect skin from sun damage, keep skin healthy, and reduce the risk of skin cancer. These antioxidants provide additional protection for the skin, keeping it looking youthful and protected from the harmful effects of UV rays.

CONCLUSION

Natural antioxidants play a very important role in maintaining healthy skin and delaying the premature aging process. These antioxidants work by fighting free radicals that can damage skin cells, reducing inflammation, and repairing damage caused by external factors such as UV exposure and pollution. By consuming foods rich in antioxidants, such as fruits, vegetables, and nuts, skin can stay hydrated, bright, and protected from damage that can lead to premature aging. Vitamins C, E, flavonoids, and polyphenols are some examples of antioxidants that have been shown to be effective in preventing and repairing skin damage caused by damaging environmental factors. Although skin aging is a natural process, the

role of antioxidants in slowing down the onset of premature aging is significant. Using foods and supplements rich in natural antioxidants can help maintain skin moisture, reduce wrinkles and fine lines, and brighten dull skin. By harnessing the power of antioxidants, we can not only repair damaged skin conditions but also prolong the healthy life of the skin, keeping its appearance fresh and youthful. Therefore, including antioxidants in your daily diet is an effective step in caring for and protecting your skin from various problems that can arise due to premature aging.

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