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Antioxidant Potential in Atopic Dermatitis: A Systematic Review

Suyong Zhou[1*], Jinfang Zhang[1]

[1]Department of Dermatology, Hospital PLA, Beijing, China

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***Corresponding author:** Suyong Zhou

E-mail address: *zhou.yong@gmail.com*

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A B S T R A C T

Introduction: Various antioxidants have been investigated for their potential role in managing atopic dermatitis. These include vitamins such as vitamins E and C, minerals like selenium, plant-derived polyphenols like green tea and resveratrol, and natural compounds like curcumin. These antioxidants possess diverse mechanisms of action, ranging from scavenging free radicals to modulating inflammatory pathways, and have shown promising results in preclinical and clinical studies. This study aimed to conduct a systematic study of the antioxidant potential in atopic dermatitis. **Methods:** The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding the potential of antioxidants in atopic dermatitis. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations. **Results:** Antioxidant compounds such as vitamin E, vitamin C and flavonoids in each of the studies showed potential clinical improvement in atopic dermatitis patients. **Conclusion:** Antioxidant compounds have potential as supplementation for the management of atopic dermatitis.

1. Introduction

Atopic dermatitis, also known as eczema, is a chronic inflammatory skin condition characterized by dry, itchy, and inflamed patches of skin. It is a multifactorial condition influenced by genetic, environmental, and immunological factors. One of the key factors contributing to the development and progression of atopic dermatitis is oxidative stress. Oxidative stress occurs when there is an imbalance between the production of reactive oxygen species (ROS) or free radicals and the body's ability to detoxify or repair the damage caused by these harmful molecules. ROS can cause oxidative damage to skin cells, disrupt the skin barrier function, and trigger inflammatory responses, leading to the development and exacerbation of atopic dermatitis.[1-7]

Antioxidants play a critical role in atopic dermatitis management. Antioxidants are compounds that can neutralize free radicals, reduce oxidative stress, and protect the skin from damage. By scavenging free radicals, antioxidants help maintain the balance between oxidants and antioxidants in the body, promoting overall skin health and mitigating the symptoms of atopic dermatitis. The potential benefits of antioxidants in atopic dermatitis are multifaceted. Firstly, antioxidants can inhibit the production of pro-inflammatory molecules, such as cytokines and chemokines, thereby reducing inflammation in the skin. Secondly, antioxidants can strengthen the skin barrier function by promoting the synthesis of lipids, such as ceramides, which are crucial for maintaining skin hydration and preventing water loss. Lastly, antioxidants can help modulate the immune response, reducing hypersensitivity reactions and allergic responses associated with atopic dermatitis.[8-13]

Various antioxidants have been investigated for their potential role in managing atopic dermatitis. These include vitamins such as vitamins E and C,

minerals like selenium, plant-derived polyphenols like green tea and resveratrol, and natural compounds like curcumin. These antioxidants possess diverse mechanisms of action, ranging from scavenging free radicals to modulating inflammatory pathways, and have shown promising results in preclinical and clinical studies. Oxidative stress plays a significant role in the pathogenesis of atopic dermatitis, and antioxidants have emerged as potential therapeutic agents for managing this condition. By reducing oxidative stress, modulating inflammation, and enhancing the skin barrier function, antioxidants offer a promising avenue for alleviating the symptoms and improving the overall skin health of individuals with atopic dermatitis.[14-18] This study aimed to conduct a systematic study of the antioxidant potential in atopic dermatitis.

2. Methods

The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding the potential of antioxidants in atopic dermatitis. The search was performed using the terms: (1) "antioxidant" OR "flavonoid" OR" atopic dermatitis" OR" antioxidant effect on atopic dermatitis" AND (2) "antioxidant" OR "flavonoid." The literature is limited to clinical studies and published in English. The literature selection criteria are articles published in the form of original articles, an experimental model of atopic dermatitis, the control group only received liquid without therapeutic effect or no treatment, studies were conducted in a timeframe from 2013-2023, and the main outcome was the effect on atopic dermatitis. Meanwhile, the exclusion criteria were animal models in atopic dermatitis, the application of antioxidants with other treatments, the absence of a control group, and the duplication of publications. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations.

3. Results and Discussion

Vitamin E

Vitamin E plays an important role in the management of atopic dermatitis. Vitamin E is a powerful antioxidant, which means it can protect the body's cells from damage caused by free radicals. In atopic dermatitis, oxidative stress can play a role in skin inflammation and damage. Vitamin E helps protect the skin from oxidative damage and can reduce inflammation associated with this condition. Vitamin E has hydrating and calming properties that can help with the dry, itchy skin that often occurs in atopic dermatitis. In some cases, a lack of vitamin E can affect the skin's barrier function, which can exacerbate symptoms. Vitamin E supplements or the use of skin care products that contain vitamin E can help maintain skin integrity and reduce skin symptoms associated with this condition.[19-21]

Atopic dermatitis often causes damage to the surface layers of the skin. Vitamin E can help repair this damage by promoting cell regeneration and increasing skin moisture. In several studies, topical use of vitamin E has been shown to help improve skin conditions in atopic dermatitis sufferers. Vitamin E also has anti-inflammatory properties that can help reduce inflammation in the skin affected by atopic dermatitis. This can help reduce the redness, swelling, and itching associated with this condition.[22]

Studies have been conducted to evaluate the role of vitamin E in atopic dermatitis. Although results vary, several studies support the potential benefits of vitamin E in the management of this condition. The study involved 33 patients with atopic dermatitis, where the study subjects received vitamin E supplements for 8 weeks. The results showed significant improvement in skin parameters, including a reduction in severity, itching, redness, and dry skin.[23]

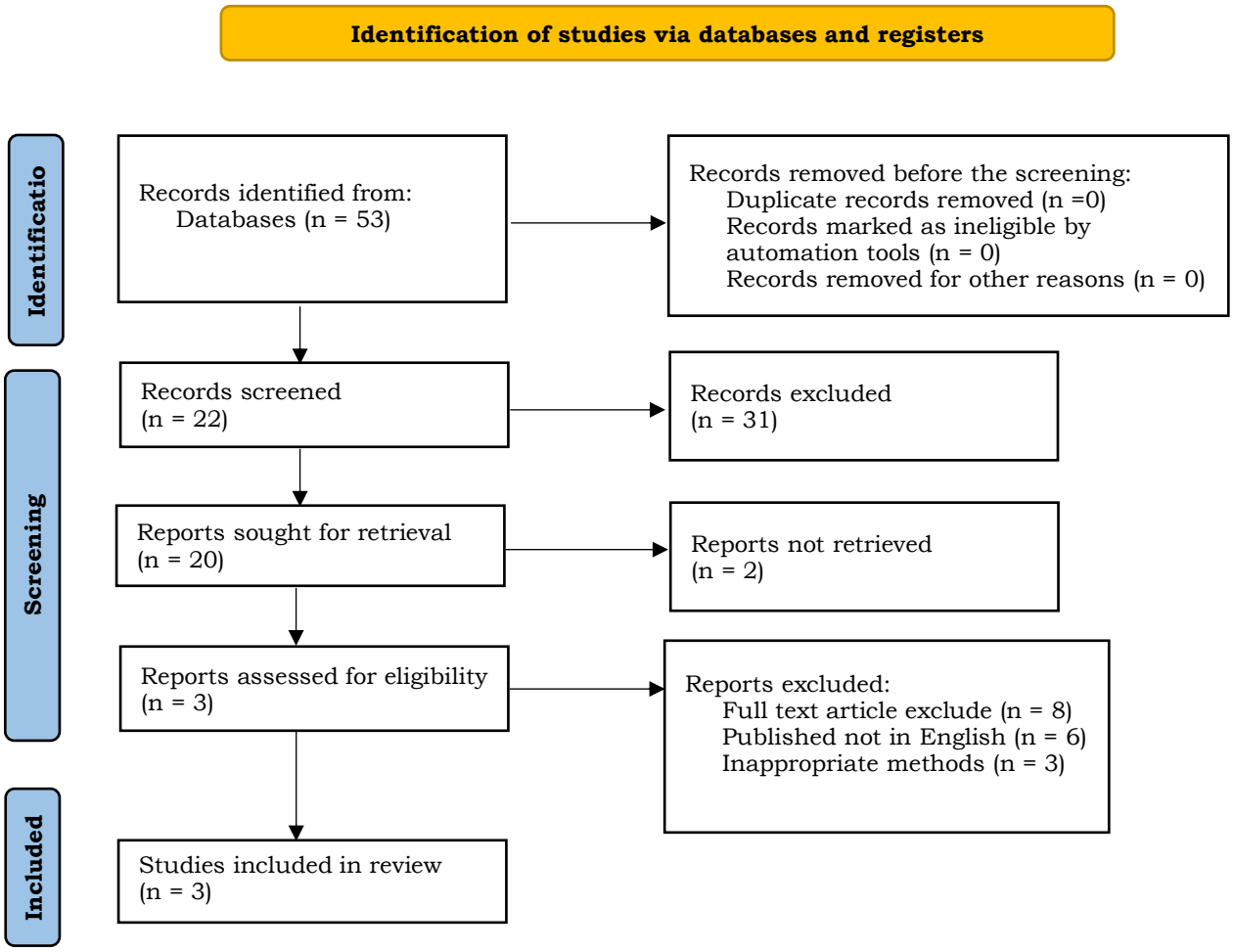

Figure 1. Research PRISMA diagram.

Vitamin C

Vitamin C may also play an important role in the management of atopic dermatitis. Like vitamin E, vitamin C is also a powerful antioxidant. This means that vitamin C can protect skin cells from damage caused by free radicals and oxidative stress. In atopic dermatitis, oxidative stress can cause inflammation and damage to the skin. Vitamin C helps protect the skin from oxidative damage and can reduce inflammation associated with this condition.[24]

Vitamin C is important in the production of collagen, which is the main component in the structure of the skin. Collagen helps maintain skin strength, elasticity, and density. In atopic dermatitis, skin conditions that are broken or dry often occur. Vitamin C can assist in the production of new collagen, which can help repair and strengthen impaired skin barrier function. Vitamin C also has an anti-inflammatory effect which can help reduce inflammation in skin affected by atopic dermatitis. This can help relieve the redness, swelling, and itching that often occurs with this condition. Vitamin C is necessary for the optimal function of the immune system. In atopic dermatitis, disturbances in the immune system can contribute to inflammation and skin irritation. By strengthening the immune system, vitamin C can help reduce the severity of symptoms and improve the body's response to these conditions.[25]

Studies have been conducted to evaluate the role of vitamin C in atopic dermatitis. A study involving 60 adult patients with atopic dermatitis. The study subjects received topical treatment with a cream containing vitamin C for 8 weeks. The results showed a significant reduction in symptoms, including itching, redness, and excessive sweating of the skin in patients with atopic dermatitis.[26]

Flavonoid

Flavonoids are a group of naturally occurring compounds found in a variety of foods, such as fruit, vegetables, tea, and grains. Flavonoids have been extensively studied for their strong antioxidant, anti-inflammatory and immunomodulatory properties. Flavonoids have strong antioxidant properties and

may help protect skin cells from oxidative damage associated with atopic dermatitis. Oxidative stress can cause inflammation and damage to the skin, and flavonoids can help fight free radicals that contribute to these conditions.[27]

Flavonoids have been shown to have anti-inflammatory properties, which can help reduce inflammation in skin affected by atopic dermatitis. This can help relieve the redness, swelling, and itching that often occurs with this condition. Flavonoids may also affect the immune system by regulating the immune response. In atopic dermatitis, a compromised immune response can trigger inflammation and worsen symptoms. Flavonoids can help regulate this abnormal immune response, thereby providing benefits in the management of atopic dermatitis. Some flavonoids have a protective effect on the skin from excessive exposure to ultraviolet (UV) sunlight. Exposure to UV rays can trigger inflammation and skin damage in atopic dermatitis sufferers. Flavonoids can help protect the skin from damage caused by UV rays.[28]

The research that has been conducted to explore the potential of flavonoids in atopic dermatitis is still quite limited. The aim of this study was to evaluate the effect of an herbal supplement containing chamomile flower extract (which contains flavonoids) in adult patients with atopic dermatitis. The results show that the supplement can help reduce the severity of symptoms, including itching and skin redness in atopic dermatitis patients.[29]

4. Conclusion

Antioxidant compounds have potential as a supplement in the management of atopic dermatitis. Although further research still needs to be done to evaluate the potential risks that may occur due to the use of supplementation with these antioxidant compounds.

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