



LIQUORICE AS A NATURAL SUNSCREEN: A COMPREHENSIVE REVIEW.

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Abstract

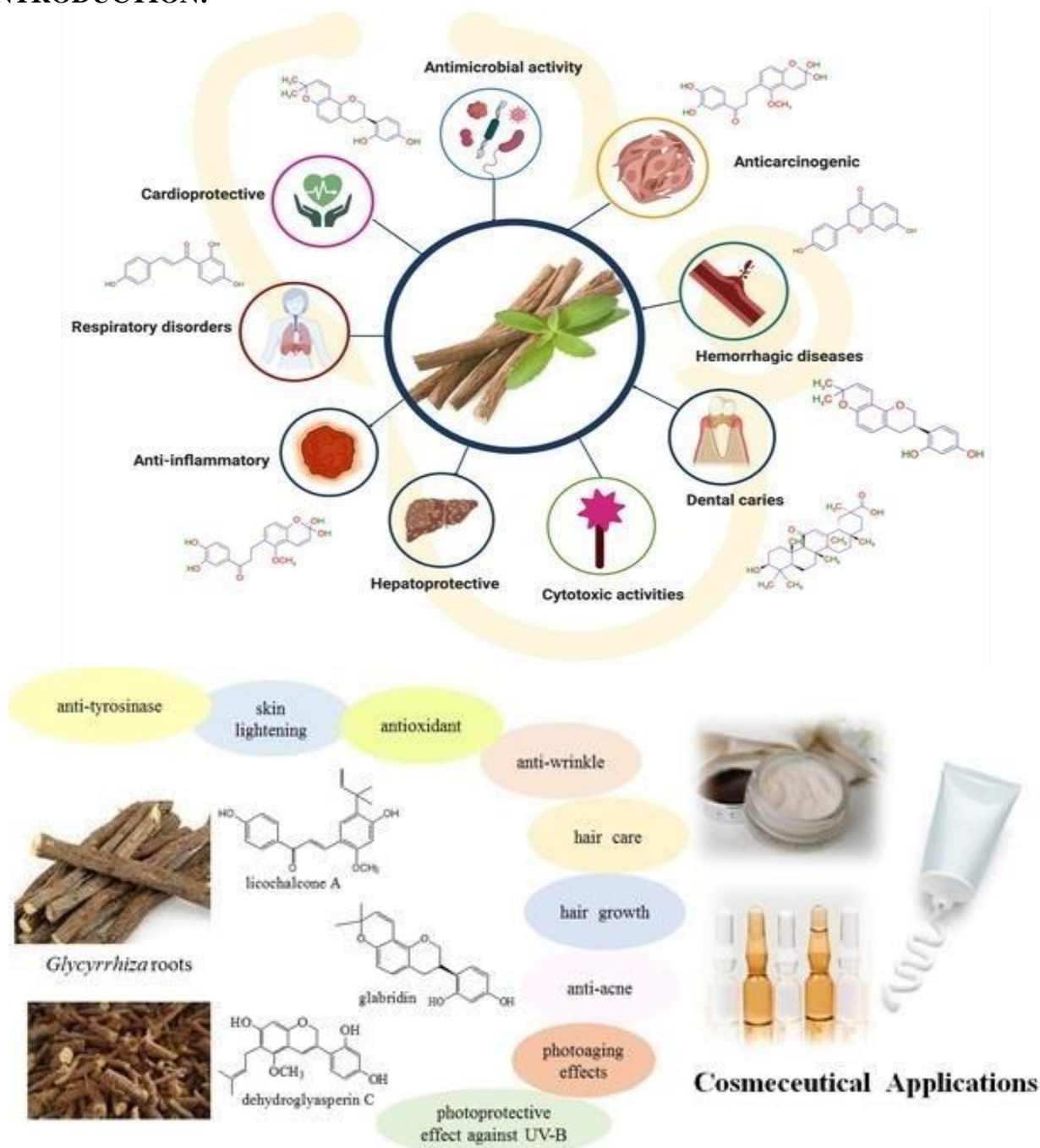
The use of natural plant extracts and compounds in cosmetics is gaining popularity.

These natural ingredients not only enhance the performance of cosmetics but also offer therapeutic benefits, known as cosmeceutical effects. The Glycyrrhiza genus, found in various regions worldwide and comprising over 30 species, is of particular interest. The roots and rhizomes of these plants are traditionally used in pharmaceuticals, functional foods, and supplements. Recently, there has been a growing interest in utilizing Glycyrrhiza extracts in cosmetic formulations, primarily for their skin-whitening properties. The beneficial effects of Glycyrrhiza extracts in cosmetics are largely attributed to specific compounds from the flavonoid class. This review focuses on the botany and chemistry of the main Glycyrrhiza species, such as *G. glabra*, *G. uralensis*, and *G. inflata*. It also explores their cosmeceutical benefits, including anti-aging, sun protection, hair care, and acne management. Within Glycyrrhiza extracts, three key flavonoids, namely licochalcone A, glabridin, and dehydroglyasperin C, have been extensively studied for their cosmetic effects.

Additionally, there are other promising molecules in licorice that may have valuable cosmeceutical properties. These findings suggest the need for further research to fully uncover their potential contributions to the cosmetics industry. This review article examines how liquorice, a traditional herb from India, can be a valuable addition to sun protection products. Liquorice has garnered attention for its impressive natural sun-blocking properties, thanks to its strong anti-inflammatory, antioxidant, and UV-absorption qualities. This article takes a deep dive into the scientific evidence supporting liquorice's effectiveness in safeguarding the skin against harmful UV rays, reducing sun-related damage, and slowing down the aging process. Additionally, we explore the obstacles and advantages of incorporating liquorice into sunscreen formulations and emphasize its potential as an eco-friendly and skin-friendly substitute for synthetic UV filters. In summary, this comprehensive review provides valuable insights into how liquorice can play a promising role in improving sun protection and maintaining healthy skin^[2].

Key words - Cosmeceutical, Natural plant extracts, Cosmetic formulations, Glycyrrhiza genus, Flavonoids, Skin-whitening, Anti-aging, Sun protection, Hair care, Acne management, Licochalcone A, Glabridin, Dehydroglyasperin C, Licorice, Sunscreen, UV protection, Anti-inflammatory, Antioxidan Eco-friendly, Skin health. ^[2]

INTRODUCTION:



[3]

Skin:

Skin is the largest organ in the human body and plays a crucial role in protecting the body from various external factors, such as pathogens, chemicals, and UV radiation. It also helps regulate body temperature and is involved in the sensation of touch. The skin consists of three primary layers: the epidermis, the dermis, and the subcutaneous tissue (also known as the hypodermis) [2].

1. Epidermis: The epidermis is the outermost layer of the skin and acts as a protective barrier. It consists of several sublayers, including the stratum corneum, stratum granulosum, stratum spinosum, and stratum basale. The stratum corneum, the topmost layer of the epidermis, is the most critical for protecting against sunburn and UV radiation. It contains dead skin cells called keratinocytes, which provide some protection against UV rays but are not entirely effective on their own. [4]
2. Dermis: Beneath the epidermis lies the dermis, a thicker layer of tissue that contains blood vessels,

nerves, sweat glands, and hair follicles. The dermis provides structural support to the skin and houses the cells responsible for producing collagen and elastin, which give the skin its strength and elasticity. While the dermis plays a role in skin health, it is not the primary layer involved in protecting against sunburn.^[4]

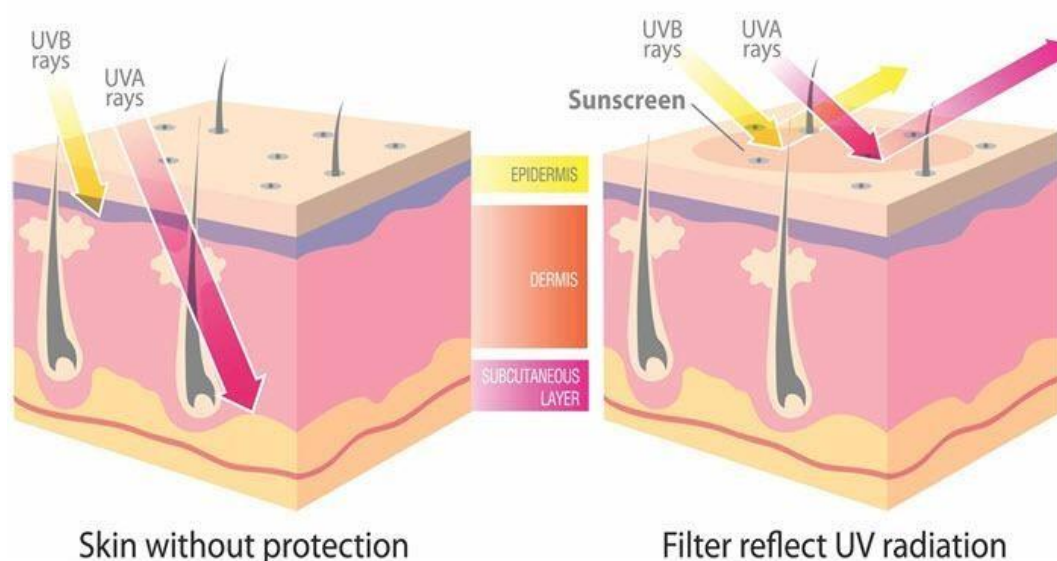
3. Subcutaneous Tissue (Hypodermis): The subcutaneous tissue, or hypodermis, is the deepest layer of the skin. It consists of fat cells (adipocytes) that help regulate body temperature and provide insulation. While the hypodermis has important functions, it is not directly involved in protecting against sunburn.^[4]

The layer of the skin primarily responsible for protecting against sunburn and UV radiation is the epidermis, specifically the stratum corneum within the epidermis. This layer contains a protein called keratin, which provides some defense against UV rays, but it is not foolproof. Prolonged or intense sun exposure can damage the skin's protective mechanisms, leading to sunburn and increasing the risk of skin cancer.^[4]

In pharmacy language, it is important to understand that the epidermis, specifically the stratum corneum, serves as the primary barrier against the harmful effects of UV radiation.

This barrier function is crucial in preventing sunburn and UV-induced skin damage. It is why sunscreen products, often sold in pharmacies, are formulated to provide an additional protective layer to the skin.^[3] Sunscreens typically contain active ingredients such as zinc oxide or titanium dioxide, which act as physical blockers, as well as chemical filters like avobenzone or octisalate, which absorb and dissipate UV radiation. These products are applied topically to enhance the skin's natural defense mechanisms against UV rays, reducing the risk of sunburn and skin damage.

UV penetration into the layers of the skin



Sunscreen Properties of Liquorice:

At the heart of liquorice's sun protection capabilities lies a compound known as glycyrrhizin, which is abundant within its root. Glycyrrhizin has been found to exhibit natural UV (ultraviolet) radiation-blocking properties.^[4] When applied topically, glycyrrhizin creates a protective shield on the skin's surface. This shield operates by either deflecting or absorbing a portion of the incoming UV radiation, thus mitigating its potential to penetrate and harm the underlying skin layers.

Furthermore, liquorice harbors an array of bioactive compounds, including flavonoids and glabridin, which contribute to its sun-defying effects.^[4] These compounds are endowed with antioxidant and anti-inflammatory attributes. In the presence of UV radiation, skin often undergoes oxidative stress, leading to cellular damage and inflammation. Liquorice's flavonoids and glabridin come to the rescue

by neutralizing these harmful oxidative agents and reducing the ensuing inflammation. In this multifaceted manner, liquorice stands as a natural sentinel against the ravaging effects of the sun's rays.

Historical Significance of Liquorice:

Liquorice's journey through history is laden with cultural and medicinal significance. Its usage spans millennia and has been embraced by diverse civilizations for its myriad properties. The very name "Glycyrrhiza" roots itself in Greek etymology, where "glykys" signifies "sweet" and "rhiza" translates to "root." This nomenclature underscores the plant's noteworthiness, both for its sweet-tasting nature and its root-based source.

The historical use of liquorice in skincare and traditional medicine is replete with anecdotes of its efficacy. Ancient civilizations, including the Egyptians and the Chinese, cherished it for its versatile properties. In these cultures, liquorice was esteemed not only for its culinary value but also for its medicinal virtues, notably in the domain of skincare. It was harnessed to alleviate various skin maladies and inflammation, implicitly providing a degree of protection against the detrimental effects of solar radiation.

In the annals of Ayurvedic medicine, the traditional healthcare system of India, liquorice found a prominent role. Here, it was employed as a skin tonic and recognized for its potent anti-inflammatory attributes. Moreover, Ayurvedic practitioners utilized liquorice to treat an array of skin conditions, indirectly shielding individuals from sun-induced skin damage.

However, it is vital to underscore that while liquorice offers valuable natural sun protection, it should not serve as the sole defense against the sun's harmful rays.^[3] Contemporary skincare practices advocate the use of dedicated sunscreen products, equipped with specific UV filters and SPF (Sun Protection Factor) ratings, to provide comprehensive protection against UV radiation. Nevertheless, the integration of liquorice into modern skincare formulations represents a harmonious union of tradition and science, offering a complementary and natural approach to bolster sun protection and maintain the health and vitality of the skin. In this convergence of ancient wisdom and modern innovation, liquorice emerges as a symbol of nature's enduring gifts to the realm of human well-being.

Mechanism of Action of Liquorice as a Sunscreen Liquorice, scientifically known as *Glycyrrhiza glabra*, offers a natural form of sun protection owing to its unique chemical constituents and mechanisms of action. In this brief essay, we explore how liquorice functions as a sunscreen and the key chemical components responsible for its photoprotective effects.

Chemical Constituents of Liquorice:

- 1. Glycyrrhizin:** Glycyrrhizin is the star player in liquorice's sun-blocking capabilities. It's a compound found in liquorice root that possesses natural UV-absorbing properties. When applied topically, glycyrrhizin forms a protective layer on the skin's surface. This layer acts as a barrier, intercepting and absorbing a portion of the incoming UV radiation before it can penetrate the skin.
- 2. Flavonoids:** Liquorice also contains flavonoids, such as liquiritin and isoliquiritin, which have antioxidant properties. These compounds help neutralize harmful free radicals generated by UV radiation. By reducing oxidative stress in the skin, flavonoids contribute to the prevention of UV-induced damage and inflammation.^[4]

Mechanism of Sunscreen Action:

Liquorice operates as a sunscreen through a dual-action mechanism:

- 1. Physical Barrier:** When applied to the skin, glycyrrhizin forms a physical barrier that reflects and absorbs UV radiation. This protective layer helps to shield the skin's deeper layers from the harmful effects of UV rays. It's similar in principle to the way in which traditional sunscreens with mineral ingredients like zinc oxide create a physical barrier.
- 2. Antioxidant Defense:** The flavonoids present in liquorice act as antioxidants. They counteract the damaging effects of UV-induced oxidative stress. UV radiation can generate free radicals in the skin, which can lead to cellular damage and inflammation. Liquorice's flavonoids help neutralize

these free radicals, reducing the risk of skin damage.^[4]

In summary, liquorice serves as a natural sunscreen primarily due to its key chemical constituents, including glycyrrhizin and flavonoids. Glycyrrhizin forms a protective barrier on the skin's surface, deflecting and absorbing UV radiation, while flavonoids combat the oxidative stress caused by UV exposure.^[7] While liquorice can provide some level of sun protection, it should not replace dedicated sunscreen products with certified SPF (Sun Protection Factor) ratings for prolonged or intense sun exposure. Nevertheless, the incorporation of liquorice into skincare formulations offers a valuable and complementary approach to enhancing natural photoprotection and supporting skin health.

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