



Plant-Based Cosmetics: A Review of Common Herbs and Their Benefits

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Received: 03-01-2026; Revised: 26-02-2026; Accepted: 05-03-2026; Published online: 20-03-2026.

ABSTRACT

Herbal cosmetics have, in fact, attracted significant global attention as people have become more concerned with their health and thus tend to seek natural, safer alternatives instead of synthetic beauty products. Since yore, plants have formed the basis of all skin, hair, and oral care; indeed, scientific studies performed recently have confirmed the traditional knowledge of plant usage. This article accounts for the growth of herbal cosmetic products, their origin, and the different regulatory scenarios in the global market. Besides, it identifies the phytochemicals such as flavonoids, tannins, terpenoids, and essential oils that exhibit antioxidant, anti-inflammatory, antimicrobial, and skin-protective activities. The article discusses major herbs commonly found in cosmetics like aloe vera, turmeric, jojoba, amla, neem, green tea, tulsi, and calendula, with a major focus on their properties and benefits. Besides, herbal anti-aging, brightening, cleansing, and hair-strengthening remedies receive particular attention. In general, herbal ingredients offer a vast range of cosmetic benefits, thus fulfilling the consumer's wish not only for efficient but also gentle and environment-friendly products. This paper highlights the importance of combining inherited herbal knowledge with up-to-date formulation techniques to produce safest and quality cosmetic products.

Keywords: Herbal cosmetics, cosmeceuticals, phytochemicals, natural ingredients, skincare herbs, hair-care herbs, oral-care herbs.

INTRODUCTION

Humans have used cosmetics for thousands of years for many purposes, including rituals, protection, and decoration. The word *cosmetic* comes from the Greek term *kosmetikos*, which relates to the art of beautifying.¹ Early cosmetic products were made from natural materials such as plants, oils, and pigments that not only improved appearance but also supported skin health.

Today, cosmetics are mainly used to clean, enhance, or change how the body looks. A related category, known as *cosmeceuticals*, lies between cosmetics and medicines. These products stay topical like regular cosmetics but also provide therapeutic benefits. The term was first introduced by Raymond Reed in 1961 and later refined by Dr. Albert Kligman, who described cosmeceuticals as products containing active ingredients that can improve the skin's biological functions.²

Interest in herbal cosmetics has grown rapidly because they are seen as safer, more natural, and environmentally friendly. Concerns about synthetic chemicals such as parabens, artificial colors, and BHA/BHT have encouraged consumers to look for plant-based alternatives.³ As a result, herbal cosmetic products are now widely used in skincare, haircare, oral care, and personal hygiene, forming a major and fast-growing part of the global beauty industry.⁴ This review summarizes current knowledge on the use of herbal ingredients in modern cosmetic science.

HISTORICAL EVOLUTION OF HERBAL COSMETICS

Humans have been using herbs for beauty and skincare for many centuries. In their quest to beautify themselves, the ancient Egyptians recorded the use of fragrant oils and

plant-based mixtures to condition the skin and make perfumes.⁵ Traditional Ayurvedic texts like the Charaka Samhita from India are filled with herbal remedies aimed at brightening the complexion as well as protecting the skin. Likewise, the Chinese and Greco-Roman peoples integrated herbs such as ginseng, rose, and olive oil into their daily routines for health and beauty.

During the medieval and early modern periods in Europe, the emphasis of cosmetic practices shifted toward the use of materials found in minerals and metals. Some of these early whitening products contained harmful substances that resulted in severe health issues, thus illustrating the dangers of certain synthetic or chemical-based mixtures. The advent of the industrial revolution in the 20th century marked the mass production of synthetic cosmetics. Nevertheless, safety concerns have driven many customers to revert to the use of plant-based products. At present, herbal cosmetics merge the wisdom of traditional herbal methods with the advancements in modern formulation science.

REGULATORY FRAMEWORK OF HERBAL COSMETICS

Regulation of herbal cosmetics varies considerably across countries due to the blurred boundary between cosmetics and drugs.

United States

According to the U.S. Food, Drug and Cosmetic Act, a product is classified based on what it is meant to do. Cosmetics are used only to improve appearance, while drugs are meant to diagnose, treat, or prevent diseases. Some products, like anti-dandruff shampoos or moisturizers with SPF, can be considered both because they



have beautifying as well as therapeutic effects.⁶ The FDA does not officially recognize the term “cosmeceutical,” which creates uncertainty about how these products should be regulated.

European Union

The European Union has clear rules to protect consumers and ensure that cosmetic products are safe to use. As per EU Regulation 1223/2009, Article 2.1.a, ‘Cosmetic products definition’ means any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odours.⁷

Asia

Japan classifies certain herbal formulations as “quasi-drugs,” and Hong Kong recognizes “cosmetic-type drugs.” India follows the Drugs and Cosmetics Act (1940) and integrates standards under the Ministry of AYUSH for traditional herbal preparations.⁸

CLASSIFICATION OF HERBAL COSMETICS⁹

Table 1: Herbal cosmetics can be broadly categorized as follows:

Category	Examples of Products
Skin-Care Products	Cleansers, moisturizers, toners, sunscreens, fairness creams, acne-control products, anti-wrinkle formulations
Hair-Care Products	Shampoos, conditioners, growth-promoting oils, anti-dandruff products, natural dyes such as henna
Oral-Care Products	Toothpastes, Tooth powders, Mouthwashes, Gargles
Anti-Aging Products	Products with antioxidants, collagen-boosting herbs, rejuvenating plant extracts
Body Care and Hygiene	Body lotions, deodorants, soaps, perfumery items
Color Cosmetics	Lipsticks, foundations, eye makeup made with natural pigments

BIOACTIVE PHYTOCHEMICALS IN HERBAL COSMETICS

Bioactive phytochemicals mainly refer to plant, based compounds that naturally have medicinal or protective properties. In the context of herbal cosmetics, such compounds are fundamental to skin and hair wellness, hence they offer users antioxidants, anti-inflammatory effects, antimicrobial properties, and even UV protection. Flavonoids, tannins, alkaloids, terpenoids, phenolic acids, and essential oils are only some examples. Besides increasing the potency of the products, these phytochemicals also help in meeting the consumer demand for natural and safe cosmetic ingredients that is constantly increasing.

Flavonoids: Protect skin with antioxidant and anti-inflammatory effects.¹⁰ Found in Green tea (*Camellia sinensis*) and Ginkgo biloba.

Tannins: Act as natural astringents to tighten skin and control oil.¹¹ Found in Witch hazel (*Hamamelis virginiana*) and Pomegranate (*Punica granatum*).

Alkaloids: Help soothe skin and support healing.¹² Found in Turmeric (*Curcuma longa*) and Tea tree (*Melaleuca alternifolia*).

Terpenoids: Provide antimicrobial and calming effects.¹³ Found in Rosemary (*Rosmarinus officinalis*) and Lavender (*Lavandula angustifolia*).

Phenolic acids: Strong antioxidants that protect skin from UV and pollution.¹⁴ Found in Cranberry (*Vaccinium macrocarpon*) and Coffee (*Coffea arabica*).

Essential oils: Concentrated plant extracts that reduce redness, fight bacteria, and provide fragrance.¹⁵ Found in Peppermint (*Mentha piperita*) and Chamomile (*Matricaria chamomilla*).

Saponins: Natural foaming agents with cleansing, anti-inflammatory, and antioxidant properties; help in skin and hair care. Found in Soapnut (*Sapindus mukorossi*) and Licorice (*Glycyrrhiza glabra*).

Fatty Acids: Natural compounds that moisturize and nourish the skin, strengthen the skin barrier, and provide anti-inflammatory benefits.¹⁶ Found in Coconut (*Cocos nucifera*) and Shea butter (*Vitellaria paradoxa*).

KEY HERBAL INGREDIENTS IN COSMETICS AND COSMECEUTICALS

SKINCARE HERBS

Aloe Vera (*Aloe barbadensis*)



Figure 1: Aloe Vera

Aloe vera is a popular plant in the Liliaceae family and its origin is traced back to southern Africa, where it naturally survives as a succulent with fleshy, spiny, edged leaves and flowers of red or yellow color (Fig. 1). The gel extracted from its inner leaf is extensively used in beauty products as it is inherently capable of calming, hydrating, and making the skin smooth. Among the ingredients of this gel are amino acids such as leucine and isoleucine, saponin glycosides that are efficient for cleansing, and vital vitamins (A, C, E, B, complex, choline, and folic acid) which altogether have a

powerful antioxidant effect. Besides, Aloe vera is rich in significant phytochemicals like anthraquinones, chromones, and gel polysaccharides which play a part in its anti, inflammatory, antimicrobial, and wound, healing characteristics. The mixture of these ingredients can be effective in relieving the itch, facilitating the healing of tissues, and assisting the healing process of minor burns, sunburns, and skin irritations. Apart from that, the plant has enjoyed internal use historically as a remedy for digestive disorders and to promote general health. Due to its capacity to soothe the skin, accelerate tissue repair, and provide moisturization on a very mild level, Aloe vera is still regarded as one of the most potent and commonly utilized herbal ingredients in today's cosmetic and pharmaceutical products.¹⁷

Turmeric (*Curcuma longa*)



Figure 2: Turmeric

Turmeric (*Curcuma longa*), a perennial plant of the family Zingiberaceae, is known to have been used in India for centuries not only as a medicine but also as a cosmetic ingredient, spice, and dye (Fig. 2). The rhizome is rich in various phytochemicals with biological activities, including curcumin, demethoxycurcumin, bisdemethoxycurcumin, turmerones, and zingiberene, which account for the plant's antiseptic, anti, inflammatory, antioxidant, analgesic, and antimicrobial properties. Traditionally, people used fresh turmeric juice topically to treat eruptions and skin infections, while turmeric pastes were considered helpful for scabs in smallpox and chickenpox. In Ayurveda, turmeric is renowned for the ability to bring a glow to the face, heal ulcers, relieve itching, and be effective in a number of skin disorders. Indian ladies have used turmeric blended with oil or sandalwood for a long time to get a natural golden glow, reduce unwanted hair growth and keep their skin healthy. Turmeric powder is also widely recognized for its role in wound healing and has been part of the cultural rituals where it plays infection, preventing roles even in wounds caused by contaminated metal objects. Recent research proves that turmeric is capable not only of shielding the skin from UVB rays but also of facilitating collagen production thus making it a valuable component in current skincare products. As a result of its wide, range therapeutic effects and profound cultural significance, turmeric remains an indispensable herb both in the realm of traditional medicine and in the field of modern cosmetic science.¹⁸

Jojoba oil (*Simmondsia chinensis*)

Jojoba oil comes from the seeds of *Simmondsia chinensis*, a desert shrub that is in the family Simmondsiaceae. Chemically, it consists mainly of long, chain wax esters that are liquid at room temperature, which gives it a very high stability and makes it easy to refine to get rid of the odor and color. Its make, up is very close to human sebum, the natural oil that serves as a protective and moisturizing barrier for both skin and hair. Since sebum production is reduced with age as well as by factors like sun exposure, pollution, and use of aggressive chemicals, the application of jojoba oil in cosmetics has become quite popular to rehydrate the skin and help it keep the natural pH balance. Also, because of its tolerance for oxidation and mild moisturizing properties, it is frequently utilized as a carrier oil in perfumes and specialty fragrances. Thus, jojoba oil is an excellent skincare and haircare ingredient.¹⁹

HAIR CARE HERBS

Amal (*Emblica officinalis*)



Figure 3: Amla

Amla, or Indian gooseberry as it is widely known, is the fruit of a small leafy tree called *Emblica officinalis*, which belongs to the family Euphorbiaceae and grows naturally in India (Fig. 3). The fruit is remarkable for its extremely high content of vitamin C besides containing tannins and minerals like iron, phosphorus, and calcium. Together, these nutrients work to moisturize the hair, fortify the scalp, and help the natural hair pigmentation. Amla seed and pulp oil is one of the popular traditional medicinal products for decreasing hair loss, avoiding greying of hair at an early age, and keeping the scalp in good condition. Apart from cosmetic uses, amla is also a part of many traditional medicine recipes, including remedies for the eyes and some children's diseases.²⁰

Brahmi (*Bacopa monnieri*)



Figure 4: Brahmi

Brahmi has been a popular Ayurvedic herb that has been used for skin and hair care in various ways (Fig. 4). A Brahmi face pack can enhance the complexion and nourish the skin making it healthier and fresher. Brahmi is popularly known to bring out the natural shine in hair, strengthen hair roots, and also combat problems like dandruff and lice. Since Brahmi possesses a mild cleansing property, it is often a part of herbal shampoo and old cosmetic products. Due to its multiple uses, Brahmi has become a favorite component in natural beauty recipes.²¹

Bhringraj (*Eclipta alba*)

Bhringraj is an ancient Ayurvedic herb mainly known for its role to aid a robust and healthy hair growth. It is commonly incorporated in hair oils and herbal products not only to stimulate hair growth, but also to prevent hair fall and premature greying. Bhringraj feeds the scalp, enhances the quality of hair, and imparts a natural gloss. Given its calming and renewing effects, it is amongst the major components of numerous natural hair care ranges, which primarily focus on re-vitalizing and healing the scalp.²²

Shikakai (*Acacia concinna*)

Shikakai is an herbal cleanser that is widely famous for its versatility in hair care and beauty worldwide. This plant, which has a shrub-like habit, can be found growing in warm climate regions. It produces pods that are rich in saponins, these saponins are responsible for a gentle cleansing effect.

Shikakai acts as a natural cleanser by gently removing excess oil, dirt, dandruff, and lice, while also maintaining the scalp's natural moisture level. Besides that, its fruits and powder are loaded with active ingredients such as alkaloids, tannins, flavonoids, and glycosides that are beneficial to hair growth and hair finishing. Being gentle and non-irritating, Shikakai is commonly found in the composition of herbal shampoos and is considered a natural substitute for chemical-based cleansers.²³

ORAL CARE HERBS

Clove (*Syzygium aromaticum*)

Among the various herbs used for oral care, clove easily ranks first because of its powerful antimicrobial, analgesic, and antiseptic effects. The major phytochemical, eugenol, is very effective in desensitizing dental pain, calming gingival inflammation, and controlling oral infections.

Besides, clove oil use can thwart the development of bacteria that cause plaque, thereby making it a helpful aid for cavity prevention and breath freshness. Because of its properties to numb pain, diminish swelling, and enhance oral hygiene, it is often found in the formulation of toothpaste, mouthwash, and dental gel. Historically, the practice was to recommend chewing clove buds for dental pain relief and gum health care, which demonstrates the herbal dental beauty care tradition around it.²⁴

Neem (*Azadirachta indica*)



Figure 5: Neem

Neem is a tree often referred to as the "wonder tree" for being a major source of natural medicine since ancient times (Fig. 5). It plays a key role in dental care, among other things. The leaves are packed with powerful antibacterial, antifungal, and anti-inflammatory agents that effectively limit the development of harmful bacteria in the oral cavity. The usage of neem twigs for dental hygiene has been prevalent in India for ages as the twigs naturally clean the teeth, make the gums strong, and prevent tooth decay. Nowadays, extracts of neem are the major components of natural toothpastes and mouthwashes in which such extracts are used for controlling plaque formation, reducing gum inflammation, and getting rid of bad breath. The efficacy of neem in cleansing the oral cavity, combating microbial infections, and maintaining the health of the gums has made this plant one of the leading ingredients in naturally based dental care products.²⁵

Licorice (*Glycyrrhiza glabra*)

Licorice (*Glycyrrhiza glabra*) was one of the plants most widely used in the traditional medicine and the link of licorice to oral care has attracted much scientific attention in recent years. The root is a source of several bioactive compounds, mainly flavonoids like liquiritin, isoliquiritin, and glabridin, a very well-known compound that together possess anti-inflammatory and antimicrobial properties. These compounds moderate the inflammatory response by oral tissues through reducing oxidative stress and by inhibiting the key enzymes involved in inflammatory pathways. Besides, glabridin was found to be able to prevent the development of oral pathogens that are responsible for the formation of plaque and periodontal diseases. Because of these benefits, extracts of licorice are more and more used in herbal toothpastes, gels, and mouth rinses to help relieve gum inflammation, decrease microbial colonization, and maintain overall oral health. Its natural sweet flavor also improves the taste of the product without being cariogenic, thus making licorice a versatile ingredient that is gaining importance in oral care formulations.²⁶

ANTI-AGING HERBS

Rhodiola rosea

Rhodiola rosea, which belong to the Crassulaceae family, has been used for a long time in traditional medicine in different parts of Europe and Asia as an adaptogenic herb. Besides being known as golden root, rose root or arctic root, it is a rare plant that grows at cold and high, altitude places and has been considered the best in the herb world for increasing the body's physical capacity, resistance to stress from the environment, and the general level of health and energy. Its root extracts have been widely used by local people to fight tiredness, stay mentally healthy, and to help those who suffer from the lack of oxygen at high altitudes, anemia, and some functional disturbances of the nervous and digestive systems. Major pharmacological properties of R. rosea are related to the variety of phenolic substances, such as flavonoids, cinnamyl alcohol derivatives, rosavin and salidroside, that not only have a highly effective antioxidant property but also modulate the response to stress in a very impressive way. These important chemical components are the ones that give the plant its character of a natural herbal remedy and an adaptogen, which is one of the reasons why it is increasingly being used in modern herbal products to promote both physical and mental performance.²⁷

Ginkgo (*Ginkgo biloba*)

Ginkgo is one of the oldest tree species still alive today that belongs to the family Ginkgoaceae. For centuries, the use of China's and Japan's traditional medicine saw products from leaves and seeds being used for circulatory insufficiency, cognitive decline and mood disturbances, especially of old people. Nowadays, the interest of phytotherapy is focused on standardized leaf extracts, which contain mainly flavone glycosides such as quercetin and kaempferol derivatives and terpene lactones. These compounds play a role in maintaining the microcirculation by allowing the capillaries to be more flexible and also by promoting better delivery of oxygen particularly to the brain and eyes thus potentially being protective against the development of conditions such as macular degeneration. Besides the vascular effect, G. biloba has significant antioxidant and neuroprotective properties which, among other things, help by lessening oxidative stress and thus maintaining neural function. Due to this combination of vascular, cognitive, and cytoprotective properties, Ginkgo is still one of the most popular herbal products worldwide.²⁸

Carrot (*Daucus carota*)

Carrot is a member of the family Apiaceae, has long been recognized for its nutritional and therapeutic value, primarily due to its high content of provitamin A carotenoids. The characteristic orange pigment of the root is attributed to β -carotene, accompanied by smaller amounts of α - and γ -carotene, which serve as important precursors of vitamin A in humans. Carrot seed oil, obtained from the dried seeds of the plant, is widely incorporated into cosmetic formulations for its anti-aging and skin-

revitalizing properties. The oil is reported to stimulate the formation of new epidermal cells, support tissue repair, and reduce the appearance of wrinkles, making it beneficial in rejuvenating and toning mature or environmentally damaged skin. Owing to its nutritive profile and regenerative activity, *Daucus carota* continues to be valued as a natural ingredient in dermatological and cosmetic applications.²⁹

ANTIOXIDANT HERBS

Green Tea (*Camellia sinensis*)

Green tea, a product of unfermented leaves from *Camellia sinensis* (Theaceae), contains large quantities of strong polyphenolic catechins, especially EGCG, which is the most plentiful and biologically effective. These substances have been demonstrated to be very powerful antioxidants, with their capacity even being reported to be higher than that of vitamin E. Besides helping skin cells to be less prone to oxidative damage, they also have a role in inflammation moderation. Moreover, green tea extracts and individual catechins have been demonstrated via in vitro studies to be capable of blocking chemical as well as UVA, and UVB, induced transformations leading to cancer. For green tea to be an effective skin protector against environmental assaults and ultraviolet radiation, it can be either ingested or applied directly to the skin. In either case, it delivers a wide range of benefits in terms of medicinal dermatology.³⁰

Calendula (*Calendula officinalis*)



Figure 6: Calendula

Calendula (*Calendula officinalis*) or marigold, as it is commonly known, is a member of the Asteraceae family (Fig. 6). Because of its calming, anti-inflammatory, and tissue repair features, it is frequently a component of dermatological and cosmetic products. Topical suspensions, tinctures, and extracts of the herb have been used in folk medicine for the treatment of acne, inflammation, and control of minor bleeding, as well as the soothing of irritated mucous membranes. The plants healing capacity is evidenced by its strong antioxidant effects and the presence of its key essential oil components such as, thujene, α -pinene, 1, 8, cineole, dihydrotagetone, and T, muurolol. While overall clinical research is still very scarce, a number of trials have shown that calendula can offer significant benefits especially in the case of skin damage caused by radiation. In a prospective study, 254 patients undergoing radiotherapy were randomly assigned.

It was found that patients using a 4% calendula ointment had significantly fewer cases of radiation dermatitis Grade 2, experienced less pain, and had fewer treatment interruptions than those treated with trolamine alone.³¹

ANTIMICROBIAL HERBS

Tulsi (*Ocimum sanctum*)



Figure 7: Tulsi

Tulsi, or holy basil as it is commonly known, is deeply loved throughout India (Fig. 7). Besides medicine, it plays a very important role in cultural and religious traditions. In fact, the herb's popularity as a panacea is mainly due to its antimicrobial efficacy although it has many other medicinal activities. Tulsi leaves are loaded with various phytochemicals like eugenol, ursolic acid, rosmarinic acid, and flavonoids, therefore, it can effectively destroy a large number of disease, causing bacteria and fungi as well. Tulsi has been found to have strong inhibitory effect on such pathogens as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida* species by different researchers, thus it can be considered a natural antimicrobial treatment. When used for the skin, its antibacterial and anti-inflammatory actions not only prevent the multiplication of acne, causing bacteria but also lessen skin redness and speed up the healing of small wounds. Its antiviral, antioxidant, and immune enhancing properties make the plant even more beneficial and justify the extensive use of Tulsi for different respiratory, inflammatory and dermatological problems.³²

Thyme (*Thymus vulgaris*)

Thyme is an aromatic herb belonging to the Lamiaceae family that has been a major component of traditional medicine for centuries because of its antimicrobial and healing properties. Extracted essential oil of this herb has a high concentration of phytochemicals such as thymol, carvacrol, p-cymene, and linalool, which are mainly responsible for the oil's antibacterial, antifungal, and antioxidant activities. Studies have demonstrated that thyme has potent antimicrobial effects against such pathogens as *Staphylococcus aureus*, *Cutibacterium acnes*, *Escherichia coli*, *Pseudomonas aeruginosa*, and different fungi and can, therefore, be regarded as a natural source of infection control. In cosmetic and dermatological usage, thyme is mostly referring as an ingredient that can eradicate bacteria responsible for acne, reduce skin

inflammation, and assist the recovery of damaged skin. Apart from its antimicrobial properties, thyme also protects the skin from damage caused by reactive oxygen species and regulates immune functions, thus it is a valuable plant, based ingredient for the treatment of acne, skin infections, and other inflammatory disorders.³³

Garlic (*Allium sativum*)

Garlic (*Allium sativum*) is one of the most widely used medicinal plants in the world. It is particularly noted for its potent antimicrobial, anti-inflammatory, and antioxidant effects. Its health enhancing properties can be largely explained by the presence of sulfur containing compounds, especially allicin, ajoene, and different allyl sulfides, which provide a wide range of activity against many pathogenic bacteria, fungi, and viruses. Garlic has been experimentally proven to inhibit a wide range of bacterial agents such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, as well as fungal pathogens like *Candida albicans* and even bacteria responsible for acne, *Cutibacterium acnes*, thus reaffirming its status as a natural antimicrobial substance. On top of its immediate antimicrobial effects, garlic is also capable of reducing oxidative stress, regulating the body's immune system, and downregulating inflammatory processes, thereby increasing the efficacy of skin infections, acne, and other inflammatory diseases. Its extensive use in folk medicine for ages, along with accumulating scientific data, highlight garlic as a powerful, plant derived therapy that is effective against a range of microbial and skin related problems.³⁴

DEPIGMENTING AND BRIGHTENING HERBS

Kojic Acid

Kojic acid is a natural substance that is produced by certain species of *Aspergillus* and *Penicillium* fungi. Due to its depigmenting and skin brightening effects, the compound has gained worldwide recognition. Basically, it inhibits tyrosinase, which is the enzyme responsible for melanin production, hence limiting the synthesis of melanin and flattening the skin tone. Thus, kojic acid is the common ingredient in formulations that are used to treat melasma, age spots, post-inflammatory and dull complexion problems. Besides, its antioxidant property acts as a second layer of defense against the production of excess melanin by limiting oxidative stress. Although it has been proven as a beneficial ingredient in skin brightening treatments, the utilization of kojic acid still needs the help of the right percentage and skin conditioning agents for a healthy skin barrier, ensuring minimal irritation.³⁵

Azelaic Acid

Azelaic acid (a naturally occurring dicarboxylic acid) is present in grains such as wheat, barley, and rye and is used extensively in dermatology because of its remarkable depigmenting, anti-inflammatory, and antimicrobial actions. The main factor by which it works to brighten skin is by inhibiting tyrosinase, which results in less melanin being produced and consequently less melasma, post-

inflammatory hyperpigmentation, and skin tone disparity. Alongside its pigment, regulating effect, azelaic acid is capable of reducing Cutibacterium acnes and Staphylococcus epidermidis. This feature makes the acid very helpful for acne, related discoloration. Besides, because it can promote the loosening and shedding of the outer skin layer, it also plays a role in opening up pores and renewing the surface of the skin. For these reasons that azelaic acid has both pigment, correcting and anti, acne properties, it is therefore a very popular ingredient in topical gels and creams that are aimed at lightening the skin tone while at the same time taking care of inflammation and blemish marks.³⁷

CONCLUSION

Because of the safety, cultural acceptance, and environmental benefits, herbal cosmetics represent one of the fastest, growing sectors in the beauty and personal, care industry. People have used plants for beauty and skin and hair health for thousands of years, and now scientific research unveils the rationale of many of the traditional methods. Aloe vera, turmeric, amla, neem, green tea, tulsi, and calendula, for instance, contain potent phytochemicals with antioxidant, antimicrobial, anti, inflammatory, and skin revitalizing effects. They are suitable for skincare, haircare, oral hygiene, and anti, aging, among other uses. While the regulations for herbal cosmetics differ globally, the natural product market keeps growing. Tapping into traditional wisdom, scientific proof, and innovative formulations will be key to making safe, efficacious, and environmentally friendly herbal cosmetic products.

Source of Support: The author(s) received no financial support for the research, authorship, and/or publication of this article

Conflict of Interest: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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