Herbs in Cosmeceuticals: Are They Safe and Effective?

Introduction

- Botanicals used for medicinal, flavoring, or fragrances are known as herbs.
- The guiding principle of herbal medicine is that the naturally occurring mixture of active compounds in plants is more effective and safer than individual molecules and man-made combinations of synthetic molecules.
- The natural composition is the comminuted, powdered, or galenic extracts of the whole or specific anatomic parts of the plant.
- Botanical medicines are focused more on the treatment of signs and symptoms of disease while improving total “body condition” than reversing the disease etiology.
- Herbal medicine plays a vital role in current healthcare by:
  I. providing alternatives to prescription medications,
  II. enhancing the therapeutic effects of other prescription medications,
  III. protecting against adverse reactions to allopathic therapy, and
  IV. providing treatment for diseases for which there is no current prescription therapy or only poorly effective or high-risk therapy.

Introduction

- The understanding of the function, metabolism, and interaction of these herbal medicines is often lacking.

  The specific scientific issues include documenting:

  I. complete characterization of the multiple active compounds in each plant source,

  II. activity and synergistic or additive interaction of each of these compounds and their metabolites,

  III. interaction of these active components with food, nutrients, nutritional supplements, and other medicines

  IV. how the potential toxicity of specific compounds is blunted.

- For example, there are castor beans in the source of ricin, one of the most poisonous compounds known to man, and azelaic acid, a nontoxic prescription dermatological medicine.

Processing botanicals

- Botanicals must undergo a significant amount of processing prior to incorporation into a cosmeceutical, which usually significantly affects the biologic activity of the herb.
- The most important factor for biological activity is the source of the plant material because each plant part may contain hundreds of different chemicals, ions, and molecules.
- Storage conditions before manufacture, and preparation of the herb and final product, as well as mixing with other herbs, are other factors that may substantially alter solubility, stability, biologic availability, pharmacokinetics, pharmacologic activity, and toxicity.
- Galenic extracts are made from leaves, roots, fruits, berries, stems, twigs, barks, and flowers by crushing, grinding, comminuting, boiling, distilling, pressing, drying, or exposing to solvents.
- Usually, the plant material is heated or processed to obtain essential oils or other distillates that can be easily added to a cosmetic formulation; however, this processing may destroy or adversely modify some of the physiologically active molecules.
- The results are oil, wax, juice, tincture, decoction, tea, infusion, and/or powders, which are then formulated into topical applications, including solutions, gels, lotions, creams, ointments, and pastes. Some of these preparations are further applied as fomentation, compress, or poultice.

Processing botanicals

- The concentration of the herb, its extract, and the active molecules affect therapeutic activity.
- Usually, in cosmeceuticals, the medicinal botanicals are added in very small, sub-therapeutic amounts for the marketing story.
- Most synthetic pharmaceuticals utilize a very low concentration to provide the desired effect. Few herbs are that potent, thus higher doses (01%) are needed.
- Herbal efficacy is challenged by the trans-stratum corneum delivery of mucocutaneous surfaces, which is usually difficult due to the herb's concentration and multiple active compounds with different solubility, polarity, and therapeutic concentration, as well as reactivity of different mucocutaneous receptors.

Definitions

- Antiphlogistic: Preventing and/or relieving inflammation
- Decoction: Liquid extract produced by simmering the plant part in water for over 20 minutes
- Fomentation: Liquid extract soaked cloth
- Poultice: Liquid extract combined with powdered herb applied directly to lesions while the mass is moist
- Galenic: Crude plant remedies

Specific herbs

Herbs utilized for skin care

❑ A-Hydrating, soothing, and cleansing

1-Allantoin and Comfrey

- Comfrey is approved by the Commission E to treat blunt injuries due to the activity of triterpene saponins, tannins, and silicic acid, as well as allantoin.
- Allantoin has been extracted from the comfrey root and leaves, but is now commercially manufactured. Allantoin is an antipholgistic, antioxidant, and soothing keratolytic that has antitrichomonal effects and induces cell proliferation.
- It is listed in the FDA over-the-counter monograph as a safe and effective skin protectant at 0.1% to 2.0%.
- Allantoin- and/or comfrey-based products are used to treat wounds, ulcers, burns, dermatitis, psoriasis, impetigo, and acne.
- When formulated with surfactant and benzalkonium chloride, it is an effective hand sanitizer and onychomycosis therapy.
- It is carcinogenic and contraindicated in pregnancy and lactation.
- Allantoin formulated with onion (Allium cepa) extract in a proprietary topical formulation improved the signs and symptoms of scars and keloids.

Specific herbs

Herbs utilized for skin care

❑ A-Hydrating, soothing, and cleansing

2-Aloe

- Aloe is used in asian medicine for the therapy of fungal and other infections, infestations, tumors, and other skin diseases.
- The aloe substance released from comminuted leaves contains mucopolysaccharides, glucommamman including betamannan, allantoin, anthracenes such as aloin and emodin.
- Aloe is antibacterial to Staphylococcus aureus, Helicobacter pylori, and dermatophyte fungus.
- It is viricidal to herpes simplex and varicella zoster and is clinically effective in treating genital herpes.
- It also increases collagen biosynthesis and degradation in granulation tissue.
- Aloe vera applied topically is accepted therapy for radiation and stasis dermatitis and ulcers, frostbite, burns, fungal and bacterial infections, cold sores, pruritis, pain, psoriasis, and contact irritant dermatitis.
- The health risks of aloe are cutaneous eruptions and mutagenicity. It is contraindicated in pregnancy and lactation

Specific herbs

Herbs utilized for skin care

❑ A-Hydrating, soothing, and cleansing

3-Black Seed

- This herb has traditionally been utilized forskin conditions, and cancer treatment and has an immune stimulant effect.
- Black seed has antioxidant, antiphlogistic, antibacterial, and antihelminthic effects

4-Avocado

- The oil from this food heals wounds, treats sclerosis, and has long been used in products for skin aging.
- The oil primarily consists of monounsaturated lipids.

5-Oregon Grape

- This herb is traditionally used for psoriasis therapy and as a disinfectant.
- It can induce pruritus, contact irritant, and allergic dermatitis.
- This herb is administered in powder, cream, and ointment

6- Sesame

- This herb is used in folk medicine to treat crusts and as a massage oil. It has limited risk of sensitization.

7- Papaya

- This foodstuff enhances the resolution of bruises and wounds.
- It is also used for cosmeceuticals to modify the appearance of scars.
- The juice from the unripe fruit is primarily papain, a mixture of proteinases, lipases, and phosphatases that additionally have anti-ulcerative, antimicrobial, and antihelminthic effects.

Herbs utilized for skin care

❑ B-Anti-oxidant and brightening

1-Pomegranate

- This herb was used in ancient Egypt for inflammation of the skin, mucosa, and joints, contain a more potent antioxidant mixture than grapeseed.
- The major constituents are tannins (25–28%). Topical and oral administration of this herb induced photoprotection to UVB in a human clinical trial.
- Topically applied, pomegranate can induce contact urticaria/angiodema and conjunctivitis. It is administered as a decoction.

2-Licorice

- The extracts of this herb are incorporated into cosmeceuticals to improve skin brightness, but are used in Asian medicine for wounds and carbuncle therapy.
- It is also anti-estrogenic, antistaphylococcal, antiprotozoal, anti-fungal, anti-yeast, antioxidant, anti-inflammatory, antiplatelet, anti-thrombin, anti-cancer, and sebostatic effects.
- Licorice is administered by comminuted drug, powder, juice, decoction, and tea for infusions.
- This herb is contraindicated in pregnancy, lactation, hepato-, and renal toxicity, and cardiac disease

Herbs utilized for skin care

❑ B-Anti-oxidant and brightening

3-Grape Seed / Pycnogenol

- GS applied topically improved cutaneous photoprotection to UVB, inhibits histamine synthesis, promotes wound healing, reduces apoptosis induced by chemotherapy, reduces vascular engorgement, is cytotoxic to adenocarcinoma, and inhibits streptococcus.
- GS protects DNA against oxidation more effectively than vitamins C and E and stabilizes collagen and elastin by inhibiting MMPs.
- The standardized pinebark extract is patent protected Pycnogenal (PYC), which has been the generic term for proanthocyanidins.
- Topically applied PYC reduces sunburn, immunosuppression, and tumor formation by UV light while raising the minimal erythema dose in mice.
- PYC, administered orally reduced the area of severity of melasma within 30 days.
- A topical formulation consisting of grape seed, jojoba, lavender, rosemary, and thyme was to treat alopecia areata.

Herbs utilized for skin care

❑ B-Anti-oxidant and brightening

4-Kojic acid

- Kojic acid is a natural compound derived from fungi, a byproduct of fermenting rice (like in sake) or soy, not a synthetic chemical.
- Kojic acid is a popular skincare ingredient used to brighten skin and fade dark spots like hyperpigmentation, melasma, and sun damage by inhibiting melanin production, working similarly to hydroquinone but often gentler.
- It's found in soaps, serums, and creams, also offering anti-aging, antifungal, and antibacterial benefits, but can increase sun sensitivity and cause irritation, so patch testing and daily sunscreen are crucia.

5-Arbutin

- Arbutin is a natural skin-brightening compound found in plants like bearberry, used in cosmetics to fade dark spots, hyperpigmentation, and uneven skin tone by inhibiting melanin production, acting as a gentler, less toxic alternative to hydroquinone.
- It's a hydroquinone-sugar molecule (a glycoside) that works by blocking the tyrosinase enzyme, reducing pigment formation, and can come as alpha-arbutin (more potent) or beta-arbutin (natural form).
- While generally safe, it requires consistent sun protection and may cause mild irritation in some, with proper formulation crucial for effectiveness.

Herbs utilized for Acne

1-Neem

- This medicinal botanical is used in Asian medicine to treat inflammatory diseases, infestations, wounds, and leprosy.
- It has documented anti-inflammatory, antihelminthic, antipyretic, antiphlogistic, and insecticide activity due to its triterpenes, tannins, and volatile oils.
- Neem is administered as a decoction, tincture, or ointment. It was formulated in a paste with curcumin to treat 814 children with scabies.

2-Lemon Balm

- This herb has antibacterial, antiviral, antioxidant, and anti-hormonal effects. Lemon balm has one reported case of contact irritation.
- It is administered as powder, tea, and infusion.
- A 1% cream applied five times a day in 116 patients in a doubleblinded trial for Herpes Simplex documented complete clearing by day 8 in 96%.

3- Jojoba

- The galenic formulations of this herb are used in many products as an antioxidant thickener and to exfoliate skin for treatment of acne, psoriasis, sunburn, chapped skin, hair restorer, and wounds, although it is not approved for any cutaneous indication.

Herbs utilized for Acne

4-Tea Tree

- This essential oil has become one of the most commonly used non-prescription remedies for mucocutaneous disorders.
- They reduce histamine-induced edema and wheal volume in type I hypersensitivity reactions.
- TTO is cytolytic to epithelial cells and fibroblasts, so it should not be used for burns.
- Photodamaged TTO is a stronger sensitizer and has induced erythema multiforme with topical application. Thus, the use of TTO in cosmeceuticals for sun-exposed tissue is not scientifically sound.

5-Curcumin Derived from Turmeric

- This herb is not approved for dermatologic conditions but is used in Asian medicine for cutaneous inflammation, bruising, bites, pruritis, wounds, fungal infections, and ulcers.
- This extract provides the yellow color and much of the flavour for curry in foods. Curcumin may color cosmeceuticals claiming to be free of artificial ingredients.
- Tetrahydrocurcumin is a white powder that protects cosmeceutical formulations with an antioxidant effect that appears superior to tocopherol.
- Curcumin is contraindicated in pregnancy due to its abortifacient effect.

Herbs utilized for hair care

1-Olive

- The ancient Greeks had many uses for this plant and its byproducts.
- Olive oil has traditionally been used to treat burns, dermatitis, psoriasis, rosacea, and xerosis. When applied to murine skin following: UVB exposure resulted in significantly fewer tumors developing.
- This herb is a weak irritant. An increasing number of cosmeceuticals incorporate olive oil into the formulation.

2-Garlic

- Garlic is a proven oral and topical broad-spectrum antimicrobial against grampositive and gram-negative bacteria with potency comparable to many antibiotics.
- The anti-yeast activity is comparable to nystatin, and the antifungal activity compares to seven other medicines, including gentian violet.
- Garlic has antiviral activity against influenza B and herpes hominis I.
- Garlic is also a major source of vitamins A, B-1, and C. Virtually odorless garlic-based products are being marketed.
- The adverse reactions due to topical garlic are contact irritant and allergic dermatitis, and the distinctive halitosis. Avoid garlic while breastfeeding.
- It is administered in capsules, tablets, powder, and oil, 0.4% ajoene cream.

Herbs utilized for hair care

3-Gingko (Ginkgo biloba)

- The efficacy of this herb for human dementia and peripheral occlusive arterial disease therapy is well documented.
- The mechanisms of action include antioxidant, stimulating fibroblasts, preventing lipid peroxidation, stabilizing membranes, reducing neutrophil infiltration, and protecting against ischemia. The major health hazard encompasses spontaneous hemorrhage, including intracranial.
- Others include adverse effects on oocytes and cutaneous allergic reactions.
- Gingko is administered as a liquid extract for infusion and powder for tablets and capsules.

4-Onion

- This herb is approved for mucosal inflammation therapy and to reduce the tendency toward infection. In Asian medicine, it treats wounds, fungal, bacterial, and helminthic infections.
- This herb inhibits gram-negative bacteria and thrombocytes and has anti-allergic effects. Onion rarely produces contact irritant reactions.
- In a study for the treatment of patchy alopecia areata of 23 patients, regrowth of terminal coarse hairs started after two weeks of treatment with crude onion juice.

Herbs utilized for hair care

5-Ginseng

- This is a widely used oral herb that has recently entered cosmeceutical products without dermatologic studies or historical use in mucocutaneous disorders.
- The efficacy of oral ginseng against systemic viruses is documented. Red ginseng applied topically appeared to inhibit chemically induced skin tumors in mice.
- Ginseng is contraindicated in pregnancy, lactation, cardiac disease, and diabetes. Unfortunately, 25% of 133 patients using ginseng for two years developed skin reactions.
- These also indicate ginseng abuse syndrome.
- Topical application to the face has induced postmenopausal vaginal bleeding.

6-Rosemary

- This medicinal botanical soothes mucocutaneous tissue, leading to its formulation into cosmeceuticals. It also has antimicrobial, antiviral, and antioxidant effects.
- Rosemary applied topically inhibited chemically induced murine epithelial tumors.
- This herb is contraindicated in pregnancy and has a mild risk of sensitization.

7-Apple

- Extracts of this foodstuff have been used for years in cosmeceuticals for fruit acids, particularly malic, ascorbic acid, and pectin.
- Procyanidin B-2 is a protein kinase C inhibiting tannin recently demonstrated to promote hair cell growth.