Cosmetics Potential of Herbal Extracts

Prashant L Kole, Hemant R Jadhav, Prasad Thakurdesai and Anantha Naik Nagappa*

Pharmacy Group,
Birla Institute of Technology and Science,
Pilani- 333 031, Rajasthan, India
*Correspondent author; E-mail: anantha@bits-pilani.ac.in

Abstract

Cosmetology, the science of alteration of appearance, has been practiced since primordial times. In India, the concept of using herbs for beautification finds its origin in traditional medicine literature like Ayurveda. The cosmetic preparations were used for the purpose of worship and sensual enjoyment. Moreover, since centuries, the herbal extracts, as a whole or part thereof, have been used for various ailments of the skin, hair and for overall appearance. The market research shows upward trend in the herbal trade with the herbal cosmetic industry playing a major role in fuelling this worldwide demand for herbals. The recent interest of consumers in herbal cosmetics has been stimulated by the decline of faith in modern cosmetics, the belief that plant remedies were natural and thereby superior to man-made synthetic cosmetics, and the reference to successful historical use by different cultures. These reasons have contributed to the increased acceptance as well as manufacture of herbal cosmetics. Many herbs have been scientifically evaluated for their cosmetic potential. Some traditional plants like ***Trigonella foenum-graecum*** **Linn.**, ***Azadirachta indica*** **A. Juss.**, ***Mimosa tenuiflora*** **Benth.**, ***Aloe vera*** **Linn.**, etc. need special mention. The great void remains though for a systematic, thorough review of scientific data that provides a basis for the use of specific herbs and their efficacy as cosmetics. Similarly, there is a lack of scientific review of phytochemicals that are used in cosmetic preparations. This review attempts to fill-up this gap and emphasizes the need for safety evaluation of herbal cosmetics.

Keywords: Herbal cosmetics, Plant extracts, Therapeutic activities, Cosmeceuticals.

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Introduction

Beauty, the quality that gives pleasure to the senses, is perhaps the desire of every human being on earth. Some are born beautiful and some are infact made beautiful. Aesthetic appearance has always been a matter of prime importance. The word 'beauty' is not only related to women, as is often thought, but men also use cosmetic products. By the European Directive 93/35/EEC (European Commission), the 'cosmetic products' are defined as "any substance or preparation intended to be placed in contact with the various 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 and/or correcting body odours and/or protecting them or keeping them in good conditions"[1] . In *Charak-Samhita*, numerous herbs like *Nagkeshara* (***Mesua ferrea*** **Linn.**), *Padmaka* (***Prunus serotina*** **Ehrh.**), *Yashtimadhu* (***Glycyrrhiza glabra*** **Linn.**), *Manjistha* (***Rubia cordifolia*** **Linn.**), etc. were described for glowing the complexion and for other skin disorders. *Kushthagna Mahakashaya* denotes the compound

Embelia ribes

Glycyrrhiza glabra

Curcuma longa

formulation containing *Khadira* (***Acacia catechu* Willd.**), *Abhaya* (***Terminalia chebula* Retz.**), *Amalaki* (***Phyllanthus niruri* Hook.f.**), *Haridra* (***Curcuma longa* Linn.**), *Bhallataka* (***Semecarpus anacardium* Linn. f.**), *Saptaparna* (***Alstonia scholaris* R. Br.**), *Aragvadha* (***Centella asiatica* (Linn.) Urban**), *Karavira* (***Nerium indicum* Mill.**), *Vidanga* (***Embelia ribes* Burm.f.**) and *Jati* (***Glycyrrhiza glabra***) used as effective curative for skin disorders[4].

The knowledge of herbal cosmetics is represented now-a-days by both orally transmitted folk information and newer information generated by modern scientific studies. Herbal products like extracts; oils and powders have been used in cosmetics as either active moieties or as excipients.

Herbal extracts used in cosmetics

Herbal extracts are primarily added to the cosmetic preparations due to several associated properties such as antioxidant properties. These antioxidant botanicals are generally classified into three categories depending upon the nature of their constituents as carotenoids, flavonoids and polyphenols. The carotenoids are structurally related to vitamin A and constitute various retinols like retinoic acid. Flavonoids, in addition to the antioxidant action, impart the UV protection and metal chelating properties. The polyphenolics is a large class and contains various molecules like rosemarinic acid (rosemary), hypericin (Saint John's Wort) and oleirupein (olive leaf) [5, 6]. Apart from these, the herbal extracts have also been used for the topical anti-inflammatory properties. These agents block the inflammatory changes that result during the cutaneous ageing and thus may be helpful in reversing the signs of ageing[7]. Table 1 enlists various herbal crude drugs with their parts used for cosmetic purposes. Some Indian medicinal plants, which have been studied in detail for their use in cosmetics, are being discussed here for further exploration.

Table 1 : List of crude drugs used for cosmetic purposes

S. No.	Name of the Plant	Common name	Part used	Active constituents Class	Uses
1	***Acacia concinna* DC.**	*Shikakai*	Pods	Saponin, Sugars	Shampoo, Soaps
2	***Acorus calamus* Linn.**	Sweet flag	Rhizome	Monoterpenes, Beta-asarone	Aromatic, Dusting powders, Skin lotions
3	***Allium sativum* Linn.**	Garlic	Bulbs	Allicin and Adenosine	Skin healing
4	***Azadirachta indica* A. Juss.**	Neem	Leaves	Limonoids, Tetranortriterpenoids	Toothpastes, Soaps, Shampoo
5	***Cereus grandiflorus* Mill.**	Cactus	Leaf	Saponins Saccharides	Moisturizing tightening of skin
6	***Cichorium intybus* Linn.**	Chicory	Seed	Sesquiterpene lactones	Skin of blemishes
7	***Citrullus vulgaris* Schrad.**	Water melon	Fruit	Saccharides, Carotenoids, Tannins	Sebum secretion
8	***Citrus medica* Linn.**	Lemon	Fruit	Flavonoids Triterpenoids	Whitening, astringent depigmentation
9	***Crocus sativus* Linn.**	Saffron	Stigma	Safranal, Carotenoid	Post bath massage
10	***Cucumis sativus* Linn.**	Cucumber	Fruit	Cucurbitacins	Moisturizing
11	***Foeniculum vulgare* Mill**	Fennel	Fruit	Saponins Saccharides Flavonoids	Deodorant

S. No.	Name of the Plant	Common name	Part used	Active constituents Class	Uses
12	***Lawsonia alba* Lam.**	Henna	Leaves	Hanno-tannic acid, Glucoside	Shampoo
13	***Malus pumila* Miller**	Apple	Fruit	Saccharides Flavonoids Triterpenoids	Moisturizing Anti-ageing
14	***Matricaria chamomilla* Linn.**	Chamomile	Flowers	Alpha-bisabolol, Choline	Hair tonic
15	***Mentha arvensis* Linn.**	Mint	Whole plant	Triterpenoids	Anti-perspiration
16	***Panax ginseng* Mey.**	Ginseng	Root	Saponins Saccharides Triterpenoids	Hair Strengthening Preparations
17	***Portulaca oleracea* Linn.**	Purslane	Whole plant	Saccharides Triterpenoids Tannins Saponins	Hair growth promotion, Moisturizing, Anti-dandruff
18	***Prunus armeniace* Linn.**	Peach	Fruit	Saccharides Saponins Triterpenoids	Anti-Ageing Creams, Anti-Kerati
19	***Pterocarpus santalinus* Linn. f.**	Red sandalwood	Bark	Santalins	Skin creams
20	***Pueraria lobata* Ohwi**	Arrot root Kudzu	Root	Flavonoids (Isoflavones) Saccharides Saponins	Astringent lotions
21	***Rheum coreanum* Nakai**	Rhubarb	Root	Flavonoids Triterpenoids	UV absorption Free radical scavenger
22	***Santalum album* Linn.**	Sandal wood	Bark, wood	Sesquiterpenes, Sesquiterpenols,	Skin lotions
23	***Triticum aestivum* Linn.**	Wheat germ	Germ	Vitamin E, Gliadin and Glutenin	Skin lotions

Garlic

Henna powder

***Trigonella foenum-graecum* Linn.** (Fenugreek)

Fenugreek

It has aphrodisiac, astringent, cooling, demulcent and emollient properties. It offers many dermatological solutions for complete skin and mucous membrane. The British Herbal Pharmacopoeia mentions demulcent, nutritive and exigenic properties of the plant. Cosmetic applications are in hair care, hair loss, hair growth, hair colouring, skin cleansing, skin toning and stimulation, and useful for facial skin care. Externally the seeds are emollient and accelerate the healing of suppurations and inflammations[8,9].

***Azadirachta indica* A. Juss.** (Neem)

Every part of Neem tree (bark, fruit, seed, flowers, leaves, gum and sap) is used for medicinal and cosmetic purposes. Its use has been indicated in boils, catarrhal affections, eczema and many other skin related disorders. Cosmetically, the chemical constituents of the neem are considered to be antiseptic and natural preservative. Limonoids and tetranortriterpenoids of the neem are used in the various cosmetic preparations like, toothpastes, soaps and shampoo[10, 11].

Neem kernels leaves and bark

***Mimosa tenuiflora* (Willd.) Poiret** (Mimosa)

It contains several tannins, lactones, flavonoids, saponins and numerous oligo-elements, which are antibacterial, astringent and UV protective. It is recommended for products with cutaneous regeneration activity, sun or after-sun protection products because of its healing, repairing and re-equilibrating properties. It is included in cosmetic products related to capillary resistance, improvement in peripheral microcirculation like dermatological applications, acne gels, etc. It is also used in astringent lotions[12].

***Aloe vera* Linn.** (Aloe)

It is also known as Lily of the desert or the Plant of Immortality. Its emollient, purgative and vulnerary properties have been reported. It is recommended for sunburn, minor burns, wrinkles, insect bites, skin irritations, minor cuts and scratches. Research has shown that the clear gel has a dramatic ability to heal wounds, ulcers and burns by putting a protective coating on the affected areas and speeds up the healing rate[13]. The inner portion of the leaf contains a hydrocolloid, which is composed of polyhexanoses and hexans such as xylose, arabinose and galactose. This mucilaginous gel obtained from the leaves of the the plant has long been used for its healing and cosmetic properties. The mucilaginous gel acts as a film and has a *p*H, which is directly compatible with that of the skin. One of the most valuable cosmetic properties of aloe gel is its ability to stimulate the circulation of the skin and remove the dead skin cells, so giving a fresher and younger appearance to the skin. It also clears away blemishes, protects the skin against infections and reduces wrinkles[14]. Aloe shampoo helps to combat dry and brittle hair[15]. The gel is also reported to contain salicylic acid, which has keratolytic and bacteriostatic properties. It is also cited as being a prophylactic for dry skin, which is prone to inflammation, because of its antiphlogistic, bacteriostatic and moisturizing qualities[16].

***Curcuma longa* Linn.** (Turmeric)

The paste of turmeric powder has been used as antiseptic and for skin nourishment since centuries. Curcumin, the active compound of turmeric, is a polyphenol used in skin care preparations. Its hydrogenated form, tetrahydrocurcumin, an off-white coloured compound, is preferred over curcumin because curcumin is a yellow colouring substance. It has dual function of being an antioxidant and to protect the lipids in moisturizers from becoming rancid. Curcumin also has anti-inflammatory activity by inhibiting leukotriene formation, inhibiting platelet aggregation and stabilizing neutrophilic lysosomal membranes[17, 18].

Herbal extracts in herbal cosmetics-pharmacological perspective

Various types of formulations are also been prepared for the same herbal cosmetic for the ease in use. The formulations like creams, ointments, lotions, suspensions, emulsions, powders, compacts, solutions, etc. can be employed based on the need. The herbal cosmetic involves use of crude drugs in many forms. Crude drug powder, infusion, decoction, tincture, extract or active phytoconstituent may be used for the formulation purpose. The most widely used form is herbal extracts. The herbal preparation may be used as an active constituent or as an excipient in the cosmetic formulation. Use of herbs as active constituent is described in the following section and are used in well-defined afflictions. The herbal excipients may be intended for use as bleaching agent (e.g. azalaic acid, kojic acid), moisturizing agent (e.g. olive oil, vegetable oil), emollient (e.g. olive oil) or as skin toner (e.g. onion, lime, cherry fruit, rosemary). These excipients may not have well definable benefits but are still used as they enhance the appearance of skin[19].

Herbs, which are used for their medicinal values in treatment of various systemic diseases, are also used for alteration of appearance. Various researchers have evaluated the herbal extracts for their cosmetic potential. Table 2 shows the list of various herbal extracts/ phytochemicals and the activities they have been screened for and Table 3 enlists phytochemicals isolated from various plant resources and screened for their cosmetic use.

Table 2 : List of herbal extracts/phytochemicals screened for skin care products

S. No.	Name of the extract/ phytochemical	Botanical name	Activity investigated
1	Alfalfa extract	***Medicago sativa* Linn.**	Antioxidant
2	***Aloe vera* extract glycoprotein**	***Aloe vera* Linn.**	Wound healing and as emollient, sun-screen
3	***Alpinia officinarum* root extract**	***Alpinia officinarum* Hance**	Antioxidant
4	Peanut extract	***Arachis hypogaea* Linn.**	Emollient and anti-inflammatory properties
5	Arbutin	***Arctostaphylos uva-ursi* Spreng.**	Melanin-inhibiting properties
6	Artichoke extract	***Cynara scolymus* Linn.**	Antioxidant
7	Azulene	***Matricaria recutita* Linn.**	Coloring agent, antioxidant and anti-inflammatory
8	Banana lily extract	***Nymphoides aquatica* (J.F. Gmelin) Kuntz**	Weak antioxidant
9	Bladderwrack extract	Seaweed	antioxidant, humectant
10	Blue elderberry extract	***Sambucus caerulea* Raf.**	Antioxidant
11	Calophyllum extract	***Calophyllum tacamahaca* Willd.**	Emollient and anti-mutagenic
12	Camellia oil	***Camellia sasanqua* Thunb.**	Emollient
13	Arracaha extract	***Arracacia xanthorrhiza* Bancr.**	Antioxidant
14	Celastrus extract	***Celastrus paniculatus* Willd.**	Antioxidant
15	Chestnut rose extract	***Rosa roxburghii* Sweet.**	Antioxidant
16	Kukui nut oil	***Aleurites moluccana* (Linn.) Willd.**	Emollient
17	Olive oil	***Olea europaea* Linn.**	Anti-ageing, Protection against UV-B damage
18	Palm oil	***Pachypodium lamerei* Drake**	Emollient, antioxidant
19	Phyllanthus extract	***Phyllanthus emblica* Linn.**	Antioxidant and anti-inflammatory properties
20	Rapeseed oil	***Brassica napus* Linn.**	Emollient, antioxidant
21	Rose hip oil	***Rosa moschata* Benth.**	Emollient, antioxidant
22	Rosemary extract	***Rosmarinus officinalis* Linn.**	Antioxidant
23	Salad burnet extract	***Sanguisorba officinalis* Linn.**	Antioxidant
24	Sea lettuce extract	***Ulva lactuca* Linn.**	Anti-inflammatory antioxidant

S. No.	Name of the extract/ phytochemical	Botanical name	Activity investigated
25	St. John's wort extract	***Hypericum perforatum* Linn.**	Antioxidant, anti-inflammatory
26	Tannin A	***Melaleuca alternifolia* Cheel**	Constricting properties on skin
27	Tea tree oil	***Melaleuca alternifolia* Cheel**	Antibacterial in blemishes
28	Thyme extract	***Thymus serpyllum* Linn.**	Potent antioxidant
29	Tomato extract (lycopene)	***Lycopersicon esculentum* Mill.**	Weak antioxidant
30	Reishi extract	***Ganoderma lucidum* (Fr.) P. Karst.**	Water-binding for skin
31	Bitter gourd extract	***Momordica charantia* Linn.**	Antioxidant
32	Turmeric extract	***Curcuma longa* Linn.**	Antioxidant

Table 3 : List of phytochemicals having cosmetic potential

S. No.	Phytochemical	Source	Uses
1	Arbutin	***Arctostaphylos uva-ursi* Spreng.**	Skin whitening, melanin-inhibiting
2	Azulene	***Matricaria recutita* Linn.**	Colouring agent, antioxidant and anti-inflammatory
3	Carnosic acid	***Rosmarinus officinalis* Linn.**	Antioxidant
4	Glycyrrhizin	***Glycyrrhiza glabra* Linn.**	Reduces skin discolorations
5	Glycyrrhitinic acid	***Glycyrrhiza glabra***	Anti-inflammatory
6	Nordihydro-guaiaretic acid	***Larrea tridentate* Coult.**	Anticancer and sunscreen
7	Pycnogenol	***Malus sylvestris* Hort.= *Malus pumila* Mill.**	Antioxidant
8	Rutin	***Afrormosia laxiflora* Harms**	Antioxidant and emollient
9	Squalene	***Bucida spinosa* Jennings**	Emollient, antioxidant and immunostimulant

Some herbs like Chamomile inhibit the release of histamine and has anti-inflammatory properties; ginseng stimulates the biosynthesis of proteins, RNA, and lipids. ***Ginkgo biloba* Linn.** extract was found to locally induce superoxide dismutase (SOD) and catalase enzyme activity in the epidermis after topical application and turmeric has anti-inflammatory activity by inhibiting leukotriene formation, inhibiting platelet aggregation and stabilizing neutrophilic lysosomal membranes. Glycyrrhizin found in licorice roots inhibits proinflammatory activities of prostaglandins and leukotrienes. Thus, the herbs can be used for following therapeutic activities:

a. *Antioxidant properties*: It is the primary reason for use of herbs in cosmetics. Several polyphenolics and flavonoids have been employed in cosmetics for their antioxidant and UV blocking potential. Tetrahydrocurcumin has also been used extensively for its antioxidant properties[6].

b. *Anti-inflammatory properties*: These agents are thought to reverse the cutaneous changes associated with ageing. Allantoin has been widely used for this purpose. It promotes the photo-induced damage, induces cell proliferation and reduces the radiation-induced inflammation. ***Aloe vera*** has been used in various skin cosmetics for its anti-inflammatory and emollient properties[7].

c. *Topical anaesthetics and anti-pruritics*: A variety of toiletry cosmetic products, such as hand and scalp lotions, foot preparations, and after shave products, employ specific local anaesthetic agents to relieve local discomfort and to reduce pruritis. These anaesthetic agents can also be found in formulations used in diaper dermatitis, sunburn and *acne vulgaris*. Most commonly used compounds are menthol obtained from mint and capsaicin obtained from *Capsicum* species. Menthol affects the nerve endings to provide a cooling antipruritic action whereas topical application of capsaicin is thought to deplete substance P from local sensory nerve terminals. The substance P is responsible for dermatological inflammation associated with allergens and UV radiation[19].

d. *Anticellulites*: Lipolysis or fat breakdown may have effect on the cellulites. The alkaloids of Tea like caffeine, theophylline, via their beta-adrenergic stimulatory action may induce the fat breakdown[19].

e. *Hair loss treatment*: Azelaic acid is a saturated dicarboxylic acid found naturally in wheat, rye and barley. It affects the hornification process of the epidermal cells and helps to normalize the keratinization of cells in the skin and hair[5].

Although the term herbal extract inherently purports to have beneficial and benign properties, these extracts may have adverse reactions in individuals. For example, they can be a possible source of allergenicity in patients presenting with contact dermatitis[21]. We, therefore, suggest that the regulatory authorities should attend the issue of ensuring quality and safety of herbal cosmetic products immediately before embarking on the more arduous task of ensuring efficacy.

Conclusion

The present review focuses on the potential of herbal extracts for cosmetic purposes. It also makes an attempt to give scientific account of use of herbal extracts in cosmetics. The addition of herbal extracts for therapeutic or for excipient purpose requires better understanding of the modern ingredients and herbal extracts. More sophisticated formulations containing herbal extracts are expected to appear in the future as cosmetics. The present trend towards cosmetics with therapeutic potency will continue and several newer herbs will find place in cosmetic world. Newer challenges will be presented to the regulatory authorities and Governments needs to make laws regarding assessment of efficacy and safety. In the end, the newer research will result in herbal cosmetics of superior quality and efficacy to offer to consumers.

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