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HERBAL MEDICINES: HOLISTIC APPROACH TO COSMECEUTICALS

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ABSTRACT

The idea of cosmetics dates back to prehistoric times. Cosmetics are used to purify, enhance, and encourage attractiveness. Pharmaceuticals and cosmetics are combined to create cosmeceuticals. These are cosmetic products that also have medical purposes. The scientists searched for a natural alternative because the chemical agents utilised in the production of cosmetics have unfavourable effects and/or toxicity. Herbal cosmetics were born as a result of this natural alternative. Herbal cosmetics have gained widespread popularity recently in the field of fashion and beauty because these are free from chemical agents and suitable for every individual. To further enhance their effectiveness, novel techniques in herbal cosmetics were developed which includes the use of novel carriers such as liposomes, phytosomes, niosomes, ethosomes, etc. In this review article, we will discuss novel techniques in herbal cosmetics and some common disorders that can be treated with herbal cosmeceuticals.

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INTRODUCTION

Herbal medicaments are made from plants and their extractives. Herbal formulation refers to a dosage form consisting of one or more herbs or processed herbs in specified quantities to provide definite nutritional, cosmetic and other health benefits that are meant for diagnosis and treatment of diseases and to alter the structure or physiology. Herbal medicine is the sign of modern medicine and drug development [1]. Herbal medicaments are prepared by subjecting whole plant, scrappy plants, plants parts to treatments such as extraction, expression, distillation, fractionation and purification. With advancements in improvements with analysis and quality control of herbal medicine, it has been emerged as safe treatment option. As it is natural and safe it provides solution to good health. Most of the world population is using herbal products primarily in developing countries. In India, there are many registered herbal industries as well as many unregistered herbal units. More than 70% of Indian population are still using non – allopathic medicaments. Herbal drugs is much less expensive than prescription medications. Research, testing, and marketing add significantly to the cost of prescribed medicines. Herbs are available without a prescription. Simple herbs, such as peppermint, Ocimum, ginger, turmeric, coriander, etc can be cultivated at home. Herbal medicaments are gaining much popularity as they are safe and natural[2].

Advantages [3,4]

- They cost less than allopathic medicaments.
- They are good for more than one condition.
- They have fewer side effects.
- There are many choices on how to use them.
- They do not require testing.

Disadvantage [5,6]

- Effects may be unpredictable.
- Lack of regulation.
- Takes longer time to show result.
- If you are on medicine some can cause adverse effects.
- Some herbs may have side effects.

SCOPE OF HERBAL MEDICAMENTS

Nutraceuticals

Nutraceuticals are oral dietary components naturally found in foods and believed to have a medical or health benefit [7]. Some examples are lycopene, choline, calcium etc. Nowadays, scientists and scholars are giving great attention in discovering the relation between nutrients and disease prevention. Data has been tabulated in Table 1. Most of the herbs used since ages have proved to be useful in prevention and treatment of disease.

Table 1: Herbs with health benefits.

S.No	Herbs	Biological source	Medicinal uses	Reference
1	Garlic	It consists of the fresh compound bulb of <i>Allium sativum</i> Linn. (Family Liliaceae).	Anti-inflammatory, ant gout, nervine tonic, antibacterial etc.	[8]
2	Turmeric	Obtained from dried rhizomes of <i>Curcuma longa</i> Linn. (Family Zingiberaceae).	Aromatic, anti-inflammatory, blood purifier, tonic, menstrual pains, liver disease etc.	[9]
3	Senna	It consists of dried leaflets of <i>Cassia angustifolia</i> Vahl (Family Leguminosae).	Purgative, weight loss etc.	[10]
4	Liquorice	Liquorice is the dried, peeled or unpeeled, roots, rhizomes or stolen of <i>Glycyrrhiza glabra</i> Linn. (Family Leguminosae).	Anti-inflammatory, antiulcer, in treatment of Addison's disease, also used in preparation of cough lozenges etc.	[11]
5	Ginger	It consists of the rhizomes of <i>Zingier officinalis</i> (Family Zingiberaceae).	Morning sickness, nausea, vomiting, stimulant, throat infection etc.	[12]

HERBS USED IN COSMETICS

1. Aloe Vera-

Aloe Vera used in the cosmetic industry for its moisturizing and anti-inflammatory properties.[13] It is used for various skin problems such as cuts, rashes, and, sunburn due to its healing power.[15] Aloe vera gel contains sterols, tannins, monopolysaccharides, saponin, vitamins, and minerals.[14,16] The interaction of glucomannan and gibberellin with the growth factor receptor increases the synthesis of collagen and hence promotes healing.[17] formulated aloe Vera gel for the management of wound healing and studied on the excision wound model and the result was found that Aloe Vera gel showed better wound healing and anti-inflammatory property.[18]

2. Elder –

The source of elder is *Sambucus candensis* flowers, leaves, and berries are used for various cosmetic purposes. Leaf water of elder is used as a cooling and softening agent for skin. Berries boiled in vinegar or wine make a black hair dye. The flower is used to ease irritable skin.[13] It contains mainly polyphenols i.e. anthocyanins which show antioxidant property.[19] Rosa et al (2019) studied the antioxidant and tyrosinase inhibitory activity of *Sambucus nigra* which describes the anti-aging activity of elder.[20]

3. Henna-

Henna powder is used for dyeing of hair, and skin of hands and feet. It also gives a shiny texture to hair.[15] Lawsonia is responsible for dyeing property of gallic acid, sugar, henna, white resin, and tannins are other constituents.[16] Henna commercially used in the form of a paste, Lawsonia in the paste reaches the outermost layer of skin and gives a red-brown stain. It also shows antibacterial activity due to a combination of hydroxyl with the carbohydrates and protein in the bacterial wall.[21] Elague et al (2019) showed the antioxidant property of *Lawsonia inermis* essential oil.[22]

4. Neem-

Neem has antibacterial, antifungal properties that make the use of neem in the formulation/ production of lotion, toothpaste, shampoo, etc. It can also treat various skin related problems such as itchy skin, eczema, and psoriasis.[15] The main chemical constituents of neem are azadirachtin, nimbin, nimbidin, salolin, and nimbidin B.[14] Neem exerts an inhibitory effect on microbial growth by bacterial cell wall break down-regulates pro-inflammatory enzyme activity including cyclooxygenase (COX) and lipoxygenase (LOX) hence also shows anti-inflammatory action.[23] Sunday et al (2019) formulated a soap and cream containing secondary metabolites of *Azadirachta indica* and shows an inhibitory effect on pathogens like *E. Cloacae*, *L. Ivanoxii*, *S. aureus* and also showed antioxidant property.[24]

5. Amla-

Amla fruit is a rich source of vitamin C which makes it good for skincare. Oil obtained from the fruit is good for various hair and scalp problems.[15] Apart from vitamin C amla also contains mineral and amino acid. Other constituents are tannin, gallic acid, and albumin.[14] The protection against oxygen radicals is provided by tannins such as embilicanin -B, embilicanin -A, punigluconin, and pedunculagin. Recycling of the sugar moiety and conversion of polyphenol into medium and high molecular weight tannins are responsible for antioxidant activity.[25] Takashi Fujii et al (2008) showed that amla Extract stimulates the proliferation of fibroblasts and also induced production of procollagen.[26]

6. Roses-

Rosewater and oil are used as a moisturizing agent. Oil of rose has a high content of vitamin C and extremely hydrating properties. Rose oil contains alcohol i.e. citronellol, geraniol, nerol, and 2-phenylethanol.[27] Hydroalcoholic, ethanolic extracts, and essential oil show antioxidant activity.[28] G.ozkan et al (2004) shows the antioxidant property of *Rosa Damascena* using phosphomolybdenum method.[29]

NOVEL TECHNIQUES IN COSMETICS

Consumers around the world are more attracted to the products which state 'natural', 'free from animal products', 'organic', and 'no added artificial preservatives' on their label. [30] The novel delivery system of drugs has increased efficacy and reduced toxicity which resulted in consumers around the world expecting the same increased benefits and minimal side effects with the use of cosmetics. [31, 32] The novel delivery system involves the use of newer carriers to carry the active ingredient to the desired site. [33] The advantages of the novel delivery system are shown in figure 1. That is why formulators are developing cosmetics employing novel delivery systems.[34] Some novel techniques involved in cosmetics formulation are shown in figure 2. That is why formulators are developing cosmetics employing novel delivery systems.[34] Some novel techniques involved in cosmetics formulation are shown in figure 2.



Figure 1: Various formulations of novel delivery systems.

Novel delivery systems in cosmetics include liposomes,[35] nanoparticles,[36] nanospheres,[36] phytosomes,[37] marinosomes,[38] ethosomes,[38] colloidosomes,[38] Niosomes [39] and emulsions.[40] These newer delivery systems carry the active ingredient to the site where it is wanted, thereby increasing efficacy and reducing toxicity or undesirable effects. Most of these novel systems are amphiphilic and support both hydrophilic and lipophilic substances. List of novel formulations in cosmetics and their applications are given in table 2.

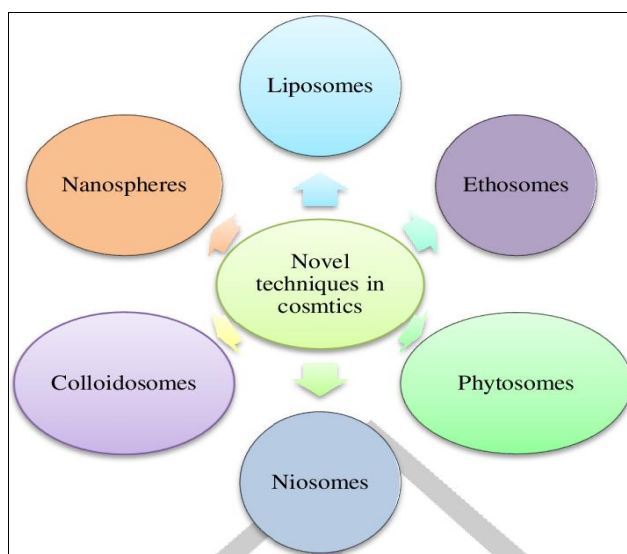


Figure 2: Novel strategies involved in cosmetics.

Niosome –

Niosome or non-ionic surfactant vesicles are the microscopic lamellar structure, having advantages like controlled and targeted delivery, penetration is enhanced.[41] Niosomes diffuse through the layer of stratum corneum. Niosomes causes loosening of the cell of stratum corneum and increases permeation of drug.[42] Niosomes improves the solubility, photostability and skin permeation ability of Quercetin.[43]

Ethosomes –

Ethosomes are lipid vesicles containing phospholipid, ethanol, and water. It increases permeation through the skin. Ethanol present in Ethosomes is acting as a permeation enhancer by increasing cell membrane fluidity.[44] The ethosomal gel can increase the penetration of EGCG from green tea leaves extract.[45]

Phytosomes –

Phytosomes are standardized extract complexed with a phospholipid, which hence improves bioavailability and increases activities. It having advantages like, good drug entrapment, improve percutaneous absorption of Cosmetics preparation.[46] PA2 Phytosomes containing proanthocyanidin is used for skin wrinkles, sericoside Phytosomes containing sericosides are used as a skin improver.[47]

Table 2: List of some novel formulations in cosmetics and their application.

S. No	Herbal extract	Formulation	Application	Reference
1	Aloe barbadensisjuice	Liposome	Moisturizer	[48]
2	Avocado, rosehip and carrot oil	Liposome	Antiwrinkle	[48]
3	Tyrosine and aloe vera	Liposome	Sunscreen	[48]
4	Ginkgo biloba	Phytosome	Beauty cream	[49]
5	Curcuma longa	Transferosome	Antiwrinkle	[50]

COSMECEUTICALS FOR COMMON DISORDERS

Cosmeceuticals are basically a cosmetic product with bioactive ingredients that is purported to have therapeutic action. Cosmeceuticals are able to penetrate the epidermis, the active principle are able to pass through the epidermis and act deep within the dermis. Whereas a cosmetic product is not able to treat specific disease directly, it can only protect, clean, maintain and change the appearance of the skin.[51] Some common disorders that can be treated with cosmeceuticals are listed in table 3 with their causes, sign and symptoms.

1. Aging

Skin is act as a barrier that protects the body from microorganism and loss of water. Young skin looks attractive and having a positive effect on people's behavior.[52] This is the reason that both men and women spend their money on cosmetics to look young and attractive. Skin aging is a biological process that is composed of various factors such as solar radiation, nutrition, air pollution, tobacco smoke, lack of sleep, stress, etc.[53] skin aging results in wrinkles, dullness, laxity, sagging, and roughness.[54] The aging of the skin is due to chronological changes or photoaging. Chronological changes are those which occur due to the passage of time. These changes are due to damage from the continuous formation of reactive oxygen species (ROS) generated during oxidative cell metabolism.[55] Photoaging is changing due to chronic exposure to sunlight. UV radiation induces ROS synthesis which results in mutagenesis and photoaging.[55] The ROS also activates hyaluronidase, collagenase, and elastase that degenerate extracellular matrix (ECM) which also contributes to skin aging.[56]Some of the herbs effective as anti-aging along with their mechanism of action are given in table 3. [57]

Table 3: Some herbs effective as anti-aging and their mechanism of action.

S. No	Herb	Biological source	Mechanisms	Reference
1	Wild carrot	Daccus carota	Free radical scavenging activity	[57]
2	Amla	Emblica officinalis	Promotingpro-collagen production	[58]
3	Liquorice	Glycyrrhiza glabra	Inhibit hyaluronidase	[58]
4	Aloe	Aloebarbadensis	Stimulate the synthesis of essential matrix component as collagen hyaluronic acid	[59]
5	Cinnamomum	Cinnamomum zeylanicum	Contains a good amount of phenolic Antioxidant	[60]

2. Dry skin

Dry skin is a dysfunction of the uppermost layer of the skin; stratum corneum of the epidermis. It can occur at any age but mostly occurs in older people. Individuals with dry skin have rough, scaly, and less flexible skin which is tight to touch. The exact cause of dry skin is not fully understood but it may occur due to lack of water in stratum corneum, inadequate lipid synthesis, abnormal keratinization, and/or advancing age.[60] Chemical agents that can be used for treating dry skin are petroleum jelly, humectants like glycerol, urea, α -hydroxy acids, and pyrrolidone carboxylic acid.[61] There are various herbs available which can be used in cosmetics for treating dry skin; these are coconut oil,[62] sunflower oil,[62] jojoba oil,[63] olive oil[63] and aloe vera.[64] Some of the herbs effective in dry skin along with their mechanism of action are given in table 4.

Table 4: Some herbs effective in dry skin and their mechanism of action.

S. No	Herb	Biological source	Mechanisms	Reference
1	Coconut oil	Cocos nucifera	It is an excellent skin moisturizer and softener. It is rich in glycerides of lower chain fatty acids.	[64]
2	Sunflower oil	Helianthus annuus	It is considered as non-comedogenic and has skin smoothing properties. It contains waxes, tocopherols, and carotenoids.	[65]
3	Jajoba oil	Simmondsiachinenesis	It is identical to human sebum. It is a skin replenisher.	[65]
4	Olive oil	Olea europaea	It is a fatty acid penetration enhancer. It also contains tocopherols.	[66]
5	Aloe vera	Aloe barbadensis	It heals, softens, and moisturizes the skin. It contains saponin glycosides and vitamins A, C, E, B.	[66]

3. Dandruff

Dandruff is a common scalp problem having white flakes and itchy scalp due to excessive shedding of dead skin cells. Normally dandruff results from the over secretion of oil from the glands known as seborrhea.[67] The fungus *Malassezia* is responsible for dandruff formation, it breaks down sebum to oleic acid which then reaches the top layer of skin and causes increase skin cell turnover, hence results in Dandruff flakes.[68] Dandruff can be treated by inhibiting the formation of dandruff cells in the horny layer of skin. The agent-free the scalp from grease,dirt, oil, and lipids which not provide a suitable condition for *Malassezia* to grow, this stops the formation of oleic acid and prevents the increase in skin cell turnover thus getting rid of dandruff.[69] Some of the herbs shown anti-dandruff characteristics are given in table 5.

Table 5: List of some herbs studied for the anti-dandruff property.

Author	Herbal formulations/extract	Result	Reference
MeenaDeviha <i>et al</i>	Extracts of <i>evolvulsalsinoides</i> , <i>AzadirachtaIndica</i> , <i>Hibiscus inermis</i> , <i>murrayokenigi</i> .	Plant extracts show inhibitory effect on fungus <i>Malassezia furfur</i> and show significant Antidandruff activity.	[70]
Sawarkaret <i>al</i>	Formulate herbal shampoo containing rosemary leaf oil, lemon oil, tea tree oil, peppermint oil along with base Anti-dandruff ingredients like climbazole and triclosan.	Clinical study reveals the Anti-dandruff shampoo is effective and reduces the dandruff fungi in scalp.	[71]
Revansiddappa <i>et.al</i>	Formulate and evaluate Polyherbal shampoo containing Ritha,Liquorice, Bengal gram, Brahmi, Green gram,Pomegranate, <i>Hibiscus</i> , <i>marigold</i> , lemon.	The Antifungal action of the formulation may be due to pomegranate and green gram and shows Antidandruff activity.	[72]
Krishnamorthy <i>et al</i>	Formulated Dano - a Polyherbal hair oil having extracts of <i>wrightiatinctoria</i> (<i>indrajev</i>), <i>cassia alata</i> (<i>damari</i>) and bitter fraction of <i>Azadirachta Indica</i> (<i>neem</i>).	Growth of <i>p. ovale</i> is inhibited and dano is very effective in the management of dandruff.	[73]

4. Wrinkle

Wrinkles are visible crease or folds in the skin and are classified as fine and coarse Wrinkles based on the width and depth of the wrinkle. Wrinkle can be caused by various factors such as aging, facial expressions, hormonal balance, ultraviolet light exposure, and smoking, which leads to elasticity loss, crease, epidermal thinning, and lines in the skin.[74] Some of the herbs effective in dry skin along with their mechanism of action are given in table 6.

Table 6: Herbs used for treating wrinkles.

S. No	Herbs	Biological source	Mechanisms	Reference
1	Aloe vera	Aloe barbadensis	Aloin A and B having property to inhibit the activity of collagenase	[75]
2	Cucumber	Curcumis sativum	Maintains elasticity of the skin	[75]
3	Black tea	Camellia sinesis	Anti- hyaluronidase activity	[75]
4	Rosemary	Salvia Rosmarinus	It neutralizes free radical by mimicking the action of superoxide dismutase	[75]
5	Wheat	Triticum aestivum	it increases the synthesis of collagen fibers in the dermis	[75]

5. Body odor

Body odor is an unpleasant odor that arises from sweat. The secretion from the sweat is odorless and changes into malodor due to microbial biotransformation. Staphylococcus epidermidis and Corynebacterium species change odorless sweat into volatile odor molecules. Deodorants work by inhibiting the growth of these bacteria which degrades sweat. Common antibacterials available in the market such as aluminum salts and triclosan have effective antibacterial activity but increases the risk of dermatitis, breast cancer, and Alzheimer's disease.[76] Herbs that are proven effective as an antimicrobial agent to prevent body odor are Salvia officinalis, Arctopusmonacanthus, Caesalpinia mimosoides, Camellia sinensis, and Chaenomelesspeciose.[77] Some of the herbs with deodorant property are given in table 7.

Table 7: List of some herbs studied for the deodorant property.

S. No	Herbs	Study	Result	Reference
1	Methanolic extract of salvia officinalis	Antibacterial and deodorancy	Deodorant containing 200, 400, and 600 µg/mL of sage extract reduced axillary malodor significantly	[76]
2	Methanolic extract of roots of arctopus species	Antimicrobial against S. epidermidis	MIC against S. epidermidis was found to be 20-50 ppm	[78]
3	Whole plant extract of caesalpiniamimosoides	Antimicrobial against S. epidermidis	MIC against S. epidermidis was found to be 3130 ppm	[79]

6. Acne

Acne is an infectious disease that is characterized by scaly red skin, blackheads, papules, and whiteheads and sometimes scarring. It can be inflammatory and non-inflammatory based on severity. Medical treatment includes oral and topical antibiotics and hormone therapy.[80] Herbal treatment of acne includes the use of Aloe vera, Azadirachta indica, Curcuma longa, and Hemidesmusincidus. [81] Some of the herbs with anti-acne property are given in table 8.

Table 8: Some herbs effective against acne and their mechanism of action.

S. No	Herbs	Biological source	Mechanisms	Reference
1	Aloe vera	Aloe barbadensis	Anti-inflammatory	[81]
2	Neem	Azadirachta indica	Anti-inflammatory	[81]
3	Turmeric	Curcuma longa	Antibacterial, anti-inflammatory	[81]

CONCLUSION AND FUTURE PROSPECTS

Natural herbs are rich in vitamins, minerals, and antioxidants and due to its low side effect, herbs are used continuously for beautifying purposes by mankind. Herbal cosmetics are made by adding one or more herb in a permissible Cosmetic base. Plants part such as leaves, roots, flowers, and fruits are used for Cosmetics purposes. Herbal cosmetics can be used for beautifying purposes such as skin whitening, moisturizer, soothing, etc or can be used for treating various disorders such as aging, sunburn, acne, dry skin, body odor, etc. Herbal drugs contain a lot of therapeutic potentials that should be analysed using application of novel drug delivery technology. This review gives information about advancement, need and applications of novel drug delivery system in herbal medicine. Herbal drugs have plenty of therapeutic potential. Therefore, applications of novel drug delivery systems to phytoconstituents can lead to enhanced bioavailability, increased solubility and permeability, thereby reducing the dose and hence, side effects. Number of plant constituents have exhibited enhanced therapeutic effect at similar or less dose when incorporated into novel drug delivery systems as conventional extracts. Hence, there is great potential and benefits in development of novel drug delivery system for herbal drugs.

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