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COSMECEUTICALS AND HERBAL DRUGS: PRACTICAL USES

Rajsekhar Saha*

RKDF College of Pharmacy, Hoshangabad Road, Misroad, Bhopal, Madhya Pradesh, India

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Correspondence to Author:

Rajsekhar Saha

RKDF College of Pharmacy, Hoshangabad Road, Misroad, Bhopal, Madhya Pradesh, India

ABSTRACT

Traditional remedies and preparation used for the treatment of skin, or the folk preparations used for healing skin diseases are known to be as Cosmeceuticals and cosmetics. The desire of gook looking and to be beautiful gave a huge market for the cosmetics. This is not a new tradition for human to look good; it has been a long ancient follow through for both the sexes to be presentable by beauty. For now, the desire of both the sexes to look younger than there age, to be fare and charming have directly increased the demand of herbal cosmetics as well as of the Cosmeceuticals in the market. The herbal formulations have been the first choice of the customers. For the reason of being less side effective and thought to be more potent than the synthetic formulations. There has been a long use of turmeric and sandalwood to be applied of face for fairness and freshness. As like many other herbs are used in daily life to be called as cosmetics and the preparation from them to be called as Cosmeceuticals. The above article is an effort to describe clearly both the terms and the relation between them.

INTRODUCTION: Cosmeceuticals term was first used by Raymond Reed founding member of U.S Society of Cosmetics Chemist at 1961. He actually used the word to explain the active and science based cosmetics [1, 2]. The above term was further coined used and popularized by Dr Albert Kligman in the year 1984 to refer the substances that exert both cosmetic and therapeutic benefits. With the increase of prescription from tretinoin used for anti wrinkle preparation the term "Cosmeceuticals" gained the ideology as a cosmetic that has or is purposed to have medical properties.

The cosmetic industry promotes there product using the above term to indicate products that effect the health of skin appearances. The definition cleverly describes the origin and the pharmacological activity of the above products. The above termed products have basically two uses, for example moisturizer used for the make-up claims to have sun protection.

Cosmeceuticals are as described earlier used for the nourishment and improvement of the skin and further act to avoid and cure various dermatological conditions. The Cosmeceuticals preparations consisting herbals are popular in consumer and are gaining much popularity day by day [3].

The reason behind this is being less toxic as it consists of herbal ingredients. The life style people bear today cause stress resulting to various dermatological issues such as aging, wrinkles, darkness of skin. These dermatological problems are treated by using antioxidants. The manufacture of Cosmeceuticals claims to have proven antioxidants in there preparation to treat above skin problems.

Categorizations of Cosmeceuticals: Cosmeceuticals are divided in certain products categories they are stated in **table 1**. In choosing an effective Cosmeceuticals regimen it is critical to match patients and their problems with the appropriate products. Most patients have multiple needs, and they should be matched with products that offer ingredients with multifunctional benefits [4].

TABLE 1: CATEGORIES OF COSMECEUTICALS

S. No.	Category
1.	Creams, emulsions, lotions, gels and oils for the skin (hands face, feet, etc.).
2.	Face masks (with the exception of chemical peeling products).
3.	Tinted bases (liquids, pastes, powders).
4.	Make-up powders, after-bath powders, hygienic powders, etc.
5.	Toilet soaps, deodorant soaps, etc.
6.	Perfumes, toilet waters and eau de Cologne.
7.	Bath and shower preparations (salts, foams, oils, gels, etc.).
8.	Depilatories.
9.	Deodorants and anti-perspirants.
10.	Hair care products: • Hair tints and bleaches, • Products for waving, straightening and fixing, • Setting products, • Cleansing products (lotions, powders, shampoos), • Conditioning products (lotions, creams, oils), • Hair dressing products (lotions, lacquers, brilliantines).
11.	Shaving products (creams, foams, lotions, etc.).
12.	Products for making-up and removing make-up from the face and the eyes.
13.	Products intended for application to the lips.
14.	Products for care of the teeth and the mouth.
15.	Products for nail care and make-up.
16.	Products for external intimate hygiene.
17.	Sunbathing products.
18.	Products for tanning without sun.
19.	Skin-whitening products.
20.	Anti-wrinkle products.

Practical application of Cosmeceuticals:

Melasma: Even skin pigmentation is considered to be a universal sign of youth and beauty. Pigmentary alterations seen in melasma are sharply demarcated, brown patches, typically located on the malar prominences and forehead.

Three clinically apparent patterns are centrofacial, malar, and mandibular (rare). Melasma is more frequent in higher skin types (III, IV, and V) and is especially prominent among Asian and Hispanic people. The pigment deposition in melasma is epidermal or dermal based, with most cases showing both.

Pigment Modifying Agents: Currently available pigment lightening products target individual stages of melanogenesis or block melanin transfer from melanocytes to keratinocytes.

TABLE 2: PIGMENT MODIFYING AGENTS

S. No.	Pigment modifying agents
1.	Hydroquinone
2.	Kojic acid
3.	Vitamins C and E
4.	Azelaic acid
5.	Ellagic acid (polyphenol)
6.	Pycnogenol
7.	Fatty acids (linoloic acid)
8.	Niacinamide (B3)
9.	Soy (STI)

Hydroquinone: Hydroquinone (HQ), benzene-1, 4-diol, is an inhibitor of melanogenesis by (1) inhibiting tyrosinase, and (2) a direct melanocyte cytotoxic effect. HQ is a poor substrate of tyrosinase, competing for tyrosine oxidation in active melanocytes. The

cytotoxic effect of HQ is mediated by reversible inhibition of DNA and RNA synthesis.

Azelaic acid: Azelaic acid is a naturally occurring, saturated 9- carbon dicarboxylic acid derived from Pityrosporum ovale.

It is a weak competitive inhibitor of tyrosinase. Azelaic acid also exhibits antiproliferative and cytotoxic effects on melanocytes via inhibition of thioredoxin reductase, an enzyme involved in mitochondrial oxidoreductase activation and DNA synthesis. Unlike HQ, azelaic acid seems to target only abnormally hyperactive melanocytes, and thus will not lighten skin with normally functioning melanocytes. Thus, the benefits of azelaic acid might extend beyond the realm of cosmetic medicine, as it may play a role in preventing development of, or in therapy for, lentigo maligna and lentigo maligna melanoma [5, 6].

Niacinamide: Niacinamide, also known as nicotinamide, is a water-soluble component of the vitamin B complex group. *In vivo*, nicotinamide is incorporated into nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP), coenzymes essential for enzymatic oxidation reduction reactions, including tissue mitochondrial respiration and lipid metabolism. Niacinamide inhibits melanine transfer to keratinocyte. Bissett and colleagues [7-10] showed that niacinamide reduced the appearance of hyperpigmented macules, fine lines and wrinkles, red blotchiness, skin sallowness, and increased skin elasticity.

In addition, niacinamide helped alleviate some of the symptoms of rosacea by increasing hydration, reducing transepidermal water loss, and improving the barrier function of the stratum corneum.

Kojic acid: Kojic acid, 5-hydroxymethyl-4H-pyrane-4-one, is a hydrophilic fungal derivative derived from Aspergillus and Penicillium species, exerting its biologic activity by inhibiting copper binding to tyrosinase. It is one of the most commonly used over-the counter skin lightening agents sold worldwide. Albeit Kojic acid was recently removed from the market in Japan due to its sensitizing properties.

Licorice extract: Licorice (Glycyrrhiza glabra, Glycyrrhiza inflate) extract has been used as a natural remedy for centuries for its anti-inflammatory and anti-irritant properties. Licorice extract derived from the root of Glycyrrhiza glabra, glabridin, has dual pigment modulating and anti-inflammatory properties. Active ingredients in licorice extract are the flavenoids, liquirtin and isoliquertin. Licorice extract leads to skin lightening primarily by dispersing melanin. In cultured B16 melanoma cells, glabridin inhibits tyrosinase activity without affecting DNA synthesis rates. Topical application of glabridin has been shown to reduce UVB induced pigmentation and erythema in the skin of guinea pigs. In vitro anti-inflammatory effects of glabridin relate to inhibition of superoxide production and activity of cyclooxygenase [11, 12].

Arbutin and deoxyarbutin: Derived from the leaves of the Vaccinium vitisidaea, arbutin is a gluconopyranoside that inhibits tyrosinase. It also inhibits melanosome maturation without associated melanocyte toxicity.18Deoxyarbutin is a synthetically modified derivative of arbutin with enhanced pigment lightening properties [13].

Aloesin: Aloesis is a low-molecular-weight glycoprotein derived from the aloe vera plant. It functions through the competitive inhibition of tyrosinase at the dihydroxyphenylalanine (DOPA) oxidation site. Therapeutic application of aloesin is limited by its hydrophilic nature and inability to penetrate the skin [14- 16].

Vitamin C: Numerous studies have confirmed the beneficial effects of systemic (oral and intravenous [IV] administration) and topically applied ascorbic acid (vitamin C) in the treatment of melasma [17-19].

Retinoids: Retinoids are synthetic and natural compounds with structure and activity similar to that of vitamin A. Vitamin A exists as retinol (a vitamin A alcohol), retinal (a vitamin A aldehyde, and retinoic acid (a vitamin A acid). All these forms are inter convertible. Biologic activity of retinoids relates to their ability to activate RAR abg and RXR abg receptors, and increases from retinol to retinaldehyde to retinoic acid. Topical retinoid's ability to de pigment is based on its ability to disperse melanosomes, interfere with melanocyte- keratinocyte pigment transfer, and accelerate epidermal turnover and, subsequently, pigment loss. In addition, retinoids may inhibit

melanogenesis by inhibiting tyrosinase and DOPA chrome conversion factor [20-22].

Salicylic acid: Grimes reported moderate to significant improvement of melasma in 4 of 6 patients with skin types V and VI, treated with a series of 20% to 30% salicylic acid (SA) peels (every 2 weeks) plus HQ (administered for 2 weeks before initiation of SA series). The treatment protocol was well tolerated with no reported post inflammatory dyschromia. SA peels without pretreatment with HQ were associated with higher risk of hyper pigmentation [23].

Rosacea: Rosacea is a common, chronic skin disorder that primarily affects the central and convex areas of the face. The nose, cheeks, chin, forehead, and glabella are the most frequently affected sites. The disease has a variety of clinical manifestations ranging from flushing, persistent erythema, telangiectasias, papules, pustules, tissue hyperplasia, and sebaceous gland hyperplasia. Cosmeceuticals used for the treatment of above disorder as follows.

Licochalcone A (licorice extract): Licorice extract has marked anti-inflammatory properties. In in vitro studies, licochalcone A isolated from the roots of Glycyrrhiza inflate suppresses inflammation via indirect inhibition of the cyclooxygenase (COX) and lipoxygenase pathways. Licochalcone A in vivo decreases UVB-induced erythema, reduces proinflammatory cytokines, and UVB-induced prostaglandin E2 (PGE2) release by keratinocytes [24].

Azelaic acid: Topical azelaic acid is an FDA approved treatment of rosacea and acne vulgaris and is useful for Acne - induced PIH [25].

Aloe Vera: Aloe Vera has been widely used in traditional medicine to accelerate healing of wounds and burns. The active ingredients of aloe vera include SA (antimicrobial and anti-inflammatory properties via inhibition of thromboxane and prostaglandin synthesis), magnesium lactate (antipruritic properties via inhibition of histidine decarboxylase), and gel polysaccharides (anti-inflammatory activity by immunomodulation) [26].

Chamomile: Chamomile (Matricaria recutita) has long been used in traditional folk medicine for the treatment of skin irritation and atopic dermatitis. The active components of chamomile include a-bis-abolol, a-bis-abolol oxide A and B, and matricin, all of which are potent inhibitors of COX and lipoxygenase pathways. Chamomile also contains the flavonoids apigenin, luteolin, and quercetin, all potent inhibitors of histamine release [27].

Feverfew: Feverfew (*Tanacetum parthenium*) is a nonsteroidal anti-inflammatory agent with marked anti irritant and antioxidant properties. Anti-inflammatory properties of feverfew include inhibition of proinflammatory cytokine (tumor necrosis factor a [TNFa], interferon-g [INF-g], interleukin-2 [IL-2], IL-4) release, decrease in nuclear factor kB (NFkB) mediated gene transcription, inhibition of neutrophil chemotaxis, and inhibition of adhesion molecule expression. One drawback of topical application of feverfew is a high potential for topical sensitization and irritation. Newly developed purified feverfew extract (Feverfew, PFE) retains the anti-inflammatory properties of feverfew with minimal skin sensitization [28].

Oatmeal: Oatmeal is one of a limited number of natural compounds recognized and regulated by the FDA. Colloidal oatmeal, dehulled oats ground to a fine powder, is recognized by the FDA as a skin protectant that, in addition to providing temporary skin protection, relieves minor pruritus and irritation caused by eczema, rashes, poison ivy, and other contact allergens and insect bites.

Colloidal oatmeal has a combination of components and properties well suited for the treatment of inflammatory skin conditions. It cleanses, moisturizes, provides barrier protection, and exhibits anti-inflammatory activity. The antioxidant constituents of oats are avenanthramides, which are polyphenolic compounds. Isolated avenanthramides reduce proinflammatory cytokines (IL-8) and transcription factors (NF-kB) in cultured human keratinocytes, reduce histamine- induced pruritus in humans, and decrease UVB-induced erythema [29, 30].

Pycnogenol: Pycnogenol is a standardized extract from French maritime pine bark (Pinus pinaster). The extract's active ingredients include proanthocyanidins, shown to have photoprotective, antimicrobial, antioxidant, anti-inflammatory, and anticarcinogenic effects. Its anti-inflammatory properties may include

the inhibition of INF-g and downregulation of expression of interstitial cell adhesion molecule 1 (ICAM-1) on the surface of keratinocytes. Pycnogenol also converts the vitamin C radical to its active form and raises levels of glutathione and other free-radical scavengers [31- 33].

Lycopene: Lycopene, a carotinoid, exhibits considerable reductive potential and antioxidant activity. When applied topically before UVA exposure, it prevents apoptosis, reduces inflammation, and diminishes expression of enzymes implicated in carcinogenesis. In addition, lycopene has the ability to regenerate vitamin E (a-tocopherol). The clinical usefulness of lycopene still remains to be proved. In a clinical trial of 10 volunteers, 6% topical lycopene cream reduced UV-induced erythema to a greater extent than a topical mixture of vitamin C and vitamin E [34, 53].

Silymarin: Silymarin, a polyphenolic flavonoid from the milk thistle plant, Silybum marianum, inhibits lipoprotein oxidation and acts as a free-radical scavenger. In animal models, silymarin showed chemoprotective and anticarcinogenic acitivity. It reduced UVB radiation-induced erythema, edema, and keratinocyte apoptosis through the inhibition of inflammatory cytokines and pyrimidine dimmers [37- 38].

Quercetin: Found in many fruits and vegetables, the flavonoid quercetin has antioxidant and anti-inflammatory properties. Its anti-inflammatory activity results from inhibition of the enzymatic actions of lipooxygenase and COX-2, and from blocking histamine release. Quercetin also enhances tumor cell apoptosis. In a mouse model, quercetin reduced UVA-induced oxidative stress. In vitro quercetin inhibited growth of melanoma cells [39, 40].

Allantoin: Allantoin derived from the comfrey root has anti-inflammatory and antioxidant effects. It has been shown to repair cutaneous photo damage and reduce inflammation following UVR exposure [41].

Photoaging (Rhytids and Dyschromia): In the treatment of aging skin, a new generation of cosmeceuticals offers clinical benefits. Ultrapotent antioxidants, stem cell modulators, and antisense DNA technologies are advancing our clinical understanding of the intrinsic and extrinsic aging processes, offering targeted strategies for slowing down or reversing the signs of aging. The aging process has intrinsic and extrinsic bases. These two clinically and biologically independent and distinct processes affect skin structure and function. Intrinsic or innate aging is a naturally occurring process that occurs from slow, but progressive and irreversible, tissue degeneration. *Telomere* shortening and metabolic oxidative damage with free reactive oxygen species (ROS) generation all play a role in the innate aging process [42].

Antioxidants: Antioxidants have long been used in the cosmetic industry for their multifaceted benefits, offering antiaging and anti-inflammatory properties. In addition, antioxidants confer a degree of photoprotection and anticarcinogenesis by quenching free-radical species generated by cellular metabolism and direct exposure to UV radiation. They also block UV-induced inflammatory pathways.

LIST OF ANTIOXIDANTS USED IN COSMETICS

- Tea
- Coffee berry
- Vitamin C, vitamin E, and ferulic acid
- Yquem
- Idebenone
- Vine shoot
- Soy

Sunscreens: Broad-spectrum UVA and UVB sunscreens are the cornerstone of photoaging therapy. UVR causes several acute effects in the skin, including photosynthesis of vitamin D, immediate pigment darkening, delayed tanning, sunburn, epidermal thickening, and numerous immunologic effects, from altered antigen presentation to release of immunosuppressive factors. UVA radiation plays a key role, because only a small percentage of UVB penetrates into the superficial papillary dermis.94,95 The mechanism of UVR mediated dermal damage includes [43, 44]:

1. Decreased collagen I and III synthesis

2. Increased collagen degradation by transforming growth factor-b (TGF-b) and activator protein A
3. Infiltration of inflammatory cells, predominately neutrophils, into the dermis.
4. Release of ROS from neutrophils.

Avobenzone, a dibenzoylmethane, absorbs in the UVA I (340-400 nm) range. However, its use is limited by its relative instability. Estimates suggest that all avobenzone is inactivated after 5 hours of sun exposure, equivalent to 50 J of solar energy. Stability of the avobenzone is markedly increased by combining with oxybenzone and 2, 6-diethylhexylnaphthalate in commercially available Helioplex (Neutrogena). Another agent offering long-lasting short-wave UVA protection and photostabilization of avobenzone is ecamsule, commercially available as Mexoryl (L'Oreal, France).

Retinoids: The biologic properties of retinoids include free radical scavenging and antioxidant activity, increasing fibroblast proliferation, modulation of cellular proliferation and differentiation, increased collagen and hyaluronate synthesis, and decreased matrix metalloproteinase mediated extracellular matrix degradation. Retinoids are therefore ideal for the treatment of photoaging. Numerous studies have confirmed the clinical efficacy of various retinoids [45- 50].

Collagen Repair: The use of signaling peptides, growth factors (GF) and cytokines in collagen repair and clinical rejuvenation has emerged as an exciting new antiaging treatment option. Advances in basic research into wound healing, with the identification of key wound healing mediators, prompted translational clinical research on repair and remodeling of dermal infrastructure.

Treatments Used For Collagen Repair:
Cosmeceuticals used for treatments:

1. Growth factors (GF)
   - Heparin-binding epidermal growth factor like growth factor
   - Fibroblastic growth factor (FGF)
   - Platelet-derived growth factor (PDGF)
   - Insulin-like growth factor 1 (IGF-1)
   - TGF-β1 andβ2
   - TGF-b3
   - IL-1α and –β
   - TNF α
2. Peptides
   - Signal peptides
   - Neuropeptides
   - Carrier peptides

CONCLUSION: The present article focuses on the potential of herbal used for cosmetic purposes. Herbal cosmetics have been increased to many folds in personal care system and there is a great demand for the herbal cosmetics. Personal care industry is currently more concentrated on these herbal-based cosmetics as now- a-days it is a fast growing segment with a vast scope of manifold expansion in coming years.

The use of bioactive ingredients in cosmetics influence biological functions of skin and provide nutrients necessary for the healthy skin or hair. But before the use of these compounds in any cosmetic, the standardization of herbal therapies is required. This is due to complexity of sources, complexity of isolating the active components & being able to study them in a well controlled setting.

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