

Potential phytotherapy of atopic dermatitis, acne, psoriasis, vitiligo

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The purpose of this review was to compare and describe the available therapies in the treatment of atopic dermatitis, acne, psoriasis, and vitiligo. Traditional medicines have a long history of serving peoples all over the world. Steroids are often used for skin diseases. Steroids like cortisones ointments and creams have some side effects like permanent thinning of the skin, especially when applied to skin-folds such as under the breast, the armpit, and the groin. The exposition of human skin to sunlight and environmental pollution mainly results in the production of free radicals, which lead to deleterious oxidative effects. The later might cause skin diseases, malignancies such as melanoma, accelerated aging (i.e., wrinkles, lack of skin elasticity) as well as skin hyperpigmentation. This overview describes recent advances in phytotherapy of skin diseases based on the knowledge of folk medicine.

Keywords: Skin, Natural products, Atopic dermatitis, Acne, Psoriasis, Vitiligo

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Skin is the largest organ in human body. The skin plays an excessively significant role, providing a massive physical barricade against mechanical, chemical, thermal and microbial factors. The ultraviolet (UV) radiation of the sun arrived to earth, induced skin disorders, predominantly cutaneous malignancies, immunosuppression, wrinkles and aging. The skins are protected from exogenous and endogenous harmful agents by the use of medicines and cosmetic products to reinforce the normal structure, integrity, beauty and attractiveness of skin¹. The topical route has numerous advantages over other routes, including avoiding hepatic first pass effects, delivering drugs or phyto-constituents continuously, less side effects and improving patient compliance. However, *stratum corneum* is the main barrier of the skin, which prevents dehydration and hampers the penetration of various drugs and cosmetics. Various synthetic drugs are in practice as photo-protective agents however they have limited use because of their potential toxicity in humans and their ability to hinder in certain selected pathways of carcinogenesis. Botanicals are gaining popularity as ingredients in drugs and cosmetic

formulations because they can protect the skin against exogenous and endogenous harmful agents and can help remedy many skin conditions. Several botanicals have been shown to be anti-mutagenic, anti-carcinogenic and nontoxic and have the ability to exert striking inhibitory effects on a embarrassment of cellular events at various stages of carcinogenesis^{2,3}.

There is a need to develop natural product formulations that could combat the harmful effects of synthetic drugs as well as of both UV-A and UV-B radiations.

In this review, we describe four skin conditions (i.e., Atopic dermatitis) and their potential treatment with plants commonly used in traditional medicine.

I. Atopic dermatitis (AD)

Atopic dermatitis (AD) is a chronic inflammatory pruritic skin disease that shakes a large number of children and adults. Tacrolimus is a non-steroidal topical immunomodulator that was formulated definitely for the treatment of atopic dermatitis. The most common side effects of tacrolimus ointment are skin reactions at the site of application; include redness, burning and itching. Polidocanol is used topically as moisturizing agent (antipruritic) in

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atopic dermatitis. Adverse events of Polidocanol include mild burning or itching⁴. Topical glucocorticosteroids are still an important tool for the treatment of acute atopic dermatitis. The most frequent adverse effects of topical glucocorticosteroids include atrophy, striae, rosacea, perioral dermatitis, acne and purpura. Those that occur with lower frequency include hyper-trichosis, pigmentation alterations, delayed wound healing and exacerbation of skin infections. Systemic reactions such as hyperglycemia, glaucoma and adrenal insufficiency have also been reported to follow topical application of topical glucocorticosteroids⁵. The topical use of triclosan has been shown to be effective in significantly reducing skin colonization with *S. aureus* in patients with atopic dermatitis. Triclosan is not free of side effects and may result in local exacerbation of the disease by eliciting irritative secondary reactions, especially in high concentrations⁶. Systemic antibiotic treatment for atopic dermatitis is indicated for widespread bacterial secondary infections however they have high resistance rates⁷. Regardless of the effectiveness of oral cyclosporin in the treatment of AD, because of the likely side effects, mainly renal toxicity, the use of cyclosporin is limited to patients with severe refractory disease while blood pressure and laboratory parameters are required to be monitored closely⁸. The role of antihistamines, phototherapy and immunotherapy is limited in AD.

Botanical extracts produce healing, softening, rejuvenating and sunscreen effects and they are multifunctional in nature because they possess various properties, such as photoprotection, anti-aging, moisturizing, antioxidant, astringent, anti-irritant, and antimicrobial, which are correlated with each other. Natural compounds belong to chemical classes, such as polyphenols, monoterpenes, flavonoids, organosulfides and indoles⁹. In recent times, traditional medicine/natural products have been used to produce inspiring responses in atopic dermatitis and related dermatological disorders that have proved resistant to conventional treatments¹⁰. Noori studies the effect of a mixture of honey, olive oil and beeswax on 21 patients with atopic dermatitis (AD) and concluded that Honey mixture appears useful in the management of dermatitis¹¹. Osborn & Sinn in their review of prebiotics determined that there was "some suggestions that a prebiotic supplement added to infant feeds may prevent AD¹². Lee & Bielory demonstrated that Evening primrose oil and Borage oil are effective in

AD because of their high content of linolenic acid and omega-6 fatty acids. An herbal extract of hyperforin was compared with an emollient vehicle in a side-by-side comparison and found with decreased intensity of AD and there were no significant adverse effects¹³. Andrew *et al.* studied that a standardized mixture of Chinese herbs (PSE 222) has recently been demonstrated to be an effective treatment for chronic atopic dermatitis in placebo controlled trials¹⁴. Muhammad *et al.* studied the effect of licorice extract (*Glycyrrhiza glabra* L.) as topical preparation on 30 patients of atopic dermatitis. They disclosed that licorice extract could be considered as an effective agent for treatment of AD¹⁵. Sheehan *et al.* studied an herbal mixture, Zemaphyte[®] and found it effective for AD. They conducted a double-blind crossover study with patients randomized to receive Zemaphyte[®] or an inactivated herb placebo. They noted a significant improvement in itching, erythema, the ability to sleep and surface damage in the treatment group¹⁶. Patzelt & Ponce worked on Kamillosan[®] cream. Kamillosan[®] cream contains chamomile extract as the active ingredient, which established no chamomile related allergen potential and has been used for the topical therapy of AD. In a double blind randomized study carried out as a half side comparison, the cream was compared with hydrocortisone 0.5% cream, and with the vehicle cream as the placebo in patients suffering from medium degree AD. After a 2 week treatment, a mild advantage was confirmed when compared to hydrocortisone 0.5% and a marginal difference was found when compared to the placebo¹⁷. Higaski *et al.* studied another Chinese herbal formulation, *Shiunko*. *Shiunko* is a topical medication made from herbal extracts and is used to treat AD. In a placebo controlled study of 09 patients, *Shiunko* was effective in 4 patients when compared to petrolatum, but in only one patient when compared with 3.5% salt water. *Shiunko* has antibacterial effects on *Staphylococci* and this is the proposed mechanism of action¹⁸. Nam-Kwen Kim *et al.* are working on a Korean herbal formulation, *Hwangryunhaedoktang*. *Hwangryunhaedoktang* is among the most strongly preferred and widely used herbal medicines for Atopic Dermatitis in Korea. *Hwangryunhaedoktang* used in their trial is a brown, bitter herbal extract which is composed of four herbs: Powdered extract of *Scutellaria baicalensis* Georgi, powdered extract of *Gardenia jasminoides* J.Ellis, powdered extract of *Coptis chinensis* Franch. and powdered extract of *Phellodendron amurense* Rupr.¹⁹.

Various Japanese researchers worked on *Kampo*, a Japanese herbal medicine formulation. *Kampo* medicine in Japan has a long history and plays a role in the prevention and treatment of various inflammatory skin diseases, including AD. Indeed, appropriate therapy with *Kampo* herbal drugs has been proven to be effective in patients with AD who are resistant to basic treatment. *Kampo* is the combination of various plant extracts like *Gypsum fibrosum* L., *Anemarrhenae rhizome* L., *Glycyrrhizae radix* L., *Ginseng radix* L., *Oryzae fructus* (*Byakkokaninjinto*), *Cinnamomi cortex* L., *Paeoniae radix* L., *Moutan cortex* L., *Persicae semen* L., *Hoelen* (*Keishibukuryogan*), *Astragali radix* L., *Atractylodis, Lanceae rhizoma* L., *Bupleuri radix* L., *Ziziphi fructus* L., *Aurantii nobilis, Pericarpium, Cimicifugae rhizoma* L., and *Zingiberis rhizoma* (*Hochu-Ekki-to*), *Rehmanniae radix* L., *Paeoniae radix* L., *Cnidii rhizoma* L., *Atractylodis, Lanceae rhizoma, Angelicae radix* L., *Ginseng radix* L., *Hoelen*, and *Glycyrrhizae radix* L. (*Juzen-Taiho-to*)²⁰. Some parts of the plants used in folk medicines are described in Table 1.

II. Acne

Acne vulgaris is the most common skin condition that affects adolescents and young adults of 11-30 yrs of age. Isotretinoin is a very effective medicine for the treatment of acne. However, its use is linked with many side effects. The most important one is its teratogenicity. Other side effects include mucocutaneous, ophthalmological, nervous, musculoskeletal, gastrointestinal, and pulmonary systems have been described²⁵. Topical amino-levulinic acid (ALA) is potentially useful for some patients with acne. The reported adverse effects of ALA included erythema, purpura and edema²⁶. Azelaic acid is a naturally occurring saturated di-carboxylic acid which, on topical application of 20% cream has been shown to be effective in the treatment of acne. Local cutaneous irritation, marked by erythema, pruritus, scaling and a burning sensation are the common adverse effects of azelaic acid²⁷. Adverse reactions of hydroquinone include irritant and allergic contact dermatitis and nail discoloration or changes in skin color. Post-inflammatory hyperpigmentation may occur from the contact dermatitis. Hydroquinone also needs antioxidants, such as vitamin C and retinoids, as well as alpha-hydroxy acids (AHA) to increase penetration and augment efficacy²⁸. Benzoyl peroxide sluces skin

pores. It may also stop bacteria from growing and causing acne pimples and cystic lesions. Side effects of benzyl peroxide for some people include dry or peeling skin, skin that feels warm, tingling or slight stinging, itching, blisters or a burning feeling, redness and Swelling. The use of oral/topical formulations of erythromycin, clarithromycin, clindamycin and doxycycline or minocycline are popular and effective treatments for mild to moderate acne vulgaris however they are associated with resistance gain in both skin *Propioni bacteria* and coagulase-negative *Staphylococci*²⁹.

Alan *et al.* studied topical gel of nicotinamide on 76 patients of acne and found that nicotinamide gel provides potent anti-inflammatory activity without the risk of inducing bacterial resistance and other side effects³⁰.

Alan M Dattner reported that Oregon grape root has synergistic antibacterial, anti-inflammatory, and bile-stimulating properties which make the crude extract useful in acne³¹. Table 2 describes the common and Hindi names, family, parts, chemical constituents and forms of generally used plants in folk medicine.

III. Psoriasis

Psoriasis causes red, flaky, crusty patches of skin covered with silvery scales on human skin. Lack of itching is a simple way to distinguish psoriasis from eczema, psoriasis does frequently itch and causes other symptoms. Severe psoriasis may be a socially crippling, even life-threatening disorder. Treatment options include Topical corticosteroids, Vitamin D analogues, Anthralin, Topical retinoids, Calcineurin inhibitors, Salicylic acid, Coal tar, Moisturizers, UVB phototherapy, Narrow band UVB therapy, Goeckerman therapy, Photochemotherapy or psoralen plus ultraviolet A (PUVA) and Excimer laser. Side effects may include lip inflammation, redness and blistering and hair loss. Some retinoids such as acitretin can cause severe birth defects; women must avoid pregnancy for at least three years after taking these medications. Your skin also can become resistant to various treatments over time³³.

Maurice *et al.* found that dietary supplementation with fish oil is effective in patients with psoriasis. Noori worked on natural honey, beeswax and olive oil in the form of a mixture recruiting 18 psoriasis patients and concluded that Honey mixture appears useful in the management of psoriasis³⁴. Paulsen *et al.* studied the effects of commercially available *Aloe vera* (L.) Burm.f. gel on 41 psoriasis patients and

found moderate effects in comparison to placebo³⁵. Tanweer *et al.* studied a hydrophilic cream containing 0.5% *Aloe vera* extract on psoriasis patients. According to this study, the results indicate that *Aloe vera* extract 0.5% in a hydrophilic cream was well tolerated and appeared to be quite effective. It was beneficial in enhancing resolution and improvement in the majority of study patients compared to the placebo, which suggests its possible use as an alternative treatment of psoriasis vulgaris³⁶.

According to Ivana *et al.* low energy (e.g. low caloric) diet could be important adjuvant factor in treatment and prevention of moderate non pustular psoriasis. As a supplementary source of energy alcohol consumption are to be avoided too the risk of psoriasis increased with increasing body mass index and was inversely related to consumption of carrots, tomatoes and fresh fruit when compared to control subjects with other skin disease^{41,42}. Table 1 describes the names and parts of commonly used plants in folk medicine.

Table 1—Plants used for AD, psoriasis and vitiligo in folk medicines

Atopic dermatitis (AD)

Plant name	Parts used	Reference
<i>Hamamelis virginiana</i> L.	bark, twigs, and leaves	[21]
<i>Polemonium reptans</i> L.	Root	
<i>Taraxacum campyloides</i> G.E.Haglund syn. <i>Taraxacum officinale</i> (L.) Weber ex F.H.Wigg.	Shrub	
<i>Senna alata</i> (L.) Roxb. syn <i>Cassia alata</i> L.	Leaves	[22]
<i>Stellaria media</i> (L.) Vill.	Flowers	[23,24]
<i>Avena sativa</i> L.	Weed	
<i>Calendula officinalis</i> L.	Flowers	
<i>Arctium lappa</i> L.	weed	
<i>Aloe vera</i> (L.) Burm.f. syn <i>Aloe barbadensis</i> Mill.	Leaves	
<i>Silybum marianum</i> (L.) Gaertn.	Seeds	
<i>Equisetum arvense</i> L.	Leaves, flowers	
<i>Azadirachta indica</i> A.Juss.	Leaves	
<i>Lavandula angustifolia</i> Mill.	Leaves	
<i>Althea officinalis</i> L.	Leaves	
<i>Hydrastis Canadensis</i> L.	Leaves	
<i>Urtica dioica</i> L.	Leaves	
Psoriasis		
<i>Senna tora</i> (L.) Roxb. syn <i>Cassia tora</i> L.	Seeds	[37]
<i>Momordica charantia</i> L.	Seeds	
<i>Calendula officinalis</i> L.	Flowers	
<i>Wrightia tinctoria</i> R.Br	Bark	[38]
<i>Rubia cordifolia</i> L.	Root	[39]
<i>Coptis chinensis</i> Franch.	Realgar and rhizome	
<i>Berberis aquifolium</i> Pursh syn <i>Mahonia aquifolium</i> (Pursh) Nutt.	Root and leaves	[40]
Vitiligo		
<i>Plumbago indica</i> L.	Root and bark	[43]
<i>Cullen corylifolium</i> (L.) Medik. Syn <i>Psoralea corylifolia</i> L.	Seeds, root, leaves	
<i>Semecarpus anacardium</i> L. f.	Nuts, oil, flowers	
<i>Terminalia bellerica</i> (Gaertn.) Roxb.	Fruit and seed	
<i>Nigella sativa</i> L.	seeds and oil	
<i>Ginkgo biloba</i> L.	Leaves	
<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y.Hong syn <i>Picrorhiza scrophulariiflora</i> Pennell	Seeds	
<i>Zingiber officinale</i> Roscoe	tincture, tea, tablet, capsule	
<i>Ammi visnaga</i> (L.) Lam.	tincture, internally and externally	
<i>Tribulus terrestris</i> L.	Fruit powder	
<i>Azadirachta indica</i> A.Juss	Leaves	
<i>Ammi majus</i> L.	Fruits	
<i>Withania somnifera</i> (L.) Dunal (Aswagandha)	Roots	[45]

Table 2—Plants used for acne in folk medicines³²

Common name	Hindi name	Family	Parts used	Useful forms	Chemical constituents
Holy Basil	<i>Tulsi</i>	Lamiaceae	Leaf	Oil	Linolenic Acid
Red Sandalwood	<i>Raktachandana</i>	Fabaceae	Leaf, Stem, Bark	Powder	Flavanoids
Sandalwood	<i>Chandan</i>	Santalaceae	Wood	Oil	Alpha and Beta santalols
Ceylon Leadwort	<i>Chitrak</i>	Plumbaginaceae	Root	Powder	Plumbagin
Pea	<i>Matter</i>	Leguminosae	Seed	Crushed Seeds	Protein, lecithins
Camphor	<i>Kapur</i>	Lauraceae	Leaf	Oil	Cineole, lignans
Pumpkin	<i>Chappan Kaddu</i>	Cucurbitaceae	Seed, Root	Oil, Extract	Linoleic acid
Caste Tree	<i>Nirgundi</i>	Verbenaceae	Leaf	Juice	Casticin
Dandelion	<i>Karan Phool</i>	Asteraceae	Root, Leaf	Tea	Sesquiterpene lactones
Black Walnut	<i>Akhrot</i>	Juglandaceae	Leaf, Bark, Fruit	Tincture, Decoction	Ellagitannins
Wild Pansy	<i>Banafshah</i>	Violaceae	Flower, Root	Compress	Salicylates, rutin
Neem	<i>Nim</i>	Meliceae	Whole Plant	Oil, Powder	Quercetin, nimbidin
Purple Cone Flower	<i>Cone Flower</i>	Compositae	Root, Rhizome	Tincture, Paste	Cichoric acid, echinacoside
Onion	<i>Pyaz</i>	Alliaceae/Liliaceae	Bulb	Poultices	Allicin, Quercetin, kampferol
Mugwort	<i>Nagdana</i>	Asteraceae	Leaf	Oil	1,6-cineole, monoterpene alcohols fractions
Soapwort	Unknown	Caryophliaceae	Leaf, Stem, Root	Decoction	Saponins
Chamomile	<i>Chameli</i>	Compositae	Flower, Stalk	Extract, Oil, Compress	Flavanoids
Sented Geranium	<i>Geranium</i>	Geraniaceae	Leaf	Oil	Linalol, geraniol
Tea Tree	<i>Tea Tree</i>	Myrtaceae	Leaf	Oil	Terpinen-4-ol
Caster	<i>Iranda</i>	Euphorbiaceae	Seed	Oil	Ricinoleic acid
Licorice	<i>Mulethi</i>	Fabaceae	Root, Rhizome	Extract	Glycyrrhizin
Burdock	<i>Burdock</i>	Asteraceae	Root, Leaf	Extract	Arctiopicrin
Oregon Grape	<i>Chitra</i>	Berberidaceae	Rhizome	Extract	Berberamine, Barberine
Golden Seal	<i>Indian Turmic</i>	Renunculaceae	Root	Extract	Barberine
Calendula	<i>Zergul</i>	Asteraceae	Flower	Infusion	Triterpenoids, flavonoids
Coleus	<i>Pathar Chur</i>	Lamiaceae	Root	Oil, Extract	Forskolin
Lesser Galangal	<i>Kencur/Rasna</i>	Zingiberaceae	Root	Extract	Galangin, Quercetin
Turmeric	<i>Haldi</i>	Zingiberaceae	Rhizome, Root	Extract, Powder	Tetrahydrocurcuminoids
Black Pepper	<i>Kalimirch</i>	Piperaceae	Fruit	Oil, Extract	Tetrahydropiperine
Eucalyptus	<i>Nilgiri</i>	Myrtaceae	Leaf	Oil	1,8-Cineole
Papaya	<i>Papita</i>	Caricaceae	Fruit, Seed, Pell	Juice	Papain
Witch Hazel	<i>Unknown</i>	Hamamelidaceae	Leaf	Extract	Flavonoids
Black Cumin	<i>Kalwanji</i>	Renunculaceae	Flower, Seed	Extract	Thymoquinone
Lavender	<i>Dharu</i>	Lamiaceae	Spike, Flower	Oil	Alpha-pinene, linalool
Clove	<i>Laung</i>	Myrtaceae	Bud	Oil	Eugenol
Rose wood	<i>Rose wood</i>	Lauraceae	Wood	Oil	(-)-Linalool
Coconut	<i>Nariyal</i>	Arecaceae	Nut	Oil	Lauric acid, capric acid, Vit E
Evening Primrose	<i>Ban Long</i>	Onagraceae	Seed	Oil	Gamma-linolenic acids
Arnica	<i>Arnica</i>	Asteraceae	Flower	Powder	Sesquiterpene lactones
Thyme	Unknown	Lamiaceae	Aerial Parts	Oil	Linalool thymol

IV. Vitiligo

Vitiligo is a comparatively common dermatologic disease. Vitiligo is characterized by depigmented white patches on the skin due to the loss of functioning melanocytes. A typical example has been shown in Fig. 1. Sometimes hair and eyes may also lose color. The exact cause of vitiligo remains unknown, although an autoimmune pathogenesis seems most

likely. Complete treatment is yet unclear, allopathic drugs are only suppressive therapy not curative. A number of new alternative therapies show significant potential.

Treatment of vitiligo is unclear and annoying, both the patient and the physician. Many modalities have been and continue to be used. The following therapies are under practice: Topical corticosteroids, topical



Fig. 1—An example of occupational vitiligo

immunomodulators; phototherapy and monochromatic excimer laser or light⁴³. Reversible hypopigmentation of normal skin is a well-known side effect of prolonged potent steroid application. Other adverse effects of topical steroids include irritation, rosacea-like dermatosis, atrophy, telangiectasia and hypertrichosis⁴⁴.

Khaleel *et al.* worked on medicinal plants used for vitiligo by an Indian tribe. This study was carried out during 2011-2012. Twenty one plant species belonging to 21 genera and 15 families were found to be used specifically in the treatment of vitiligo⁴⁵. Table 1 describes some herbs which have been investigated by researchers.

Conclusion

Research throughout the globe suggests that significant numbers of people are involved with various forms of alternative medicine. However, the reasons for such use, at present, poorly understood and need clinical trials. The majority of alternative medicine users appear to be doing so not so much as a result of being dissatisfied with allopathic medicine (conventional medicines) but largely because they find these alternatives to be more compatible with their own values, dogmas, philosophical orientations toward health and life as well as less side effects.

Plant-based therapeutic preparations are cyclically returning to complement dermatologic therapy. They serve as therapeutic alternatives, safer choices, or in some cases, as the only effective treatment. Folk medicine tradition provides different indicators for use than the medical disease model. It is anticipated by this article that researchers, cosmetician, academician, pharmacists, industrialists and

dermatologists will utilize more precisely these herbs in topical dermato-cosmetic formulation so that consumers can get maximum benefits of natural substances.

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