

Phytotherapy in pediatric dermatology

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ABSTRACT

Skin has protective, defensive, thermoregulatory, and aesthetic roles to play. Various local and systemic diseases can affect it in all age groups. There is significant morbidity associated that usually also has an impact on the quality of life of the patient. In children, infective and allergic skin conditions predominate. Though western medicine can control and cure these skin ailments, they have the high potential to result in side-effects.

The treatment of skin diseases at the primary level includes herbal therapy. Plants and their parts and extracts have been used traditionally to heal diseases of the body, including that of the skin. Phytotherapy has advantages in the form of easy accessibility, easy availability, inexpensiveness and affordability, effectiveness, non-invasive nature, immuno-modulatory, antioxidant, anti-inflammatory, microbial properties, and safety. The current review is an attempt to summarize on the various plants that are useful in the management of various skin conditions in children.

Keywords

Skin diseases; plants; phytotherapy; herbal medicine; plant extracts

INTRODUCTION

Skin is the largest external organ of the human body, serving as a protective barrier for the internal body organs and tissues¹. Consequently, it is subjected to a lot of external insults. Additionally, systemic and organ-specific diseases can affect it². Being visible to the world, it has a lot of aesthetic value tied with it. The appearance and proper functioning of this integumentary system are vital².

Skin disorders are a problem in humans of all age groups. They are among the common reasons for seeking specialized medical consultations. Although mortality due to skin conditions is low, these disorders cause significant morbidity, impacting the quality of life of affected individuals mainly due to aesthetic concerns and discomfort². Conventional mainstream treatments are not always effective or safe for managing all skin conditions in every patient. Therefore, alternative remedies are often employed to provide relief.

First-aid and primary-level care for skin lesions often involve herbal remedies derived from plant parts and their extracts. This approach is particularly prevalent in developing and underdeveloped countries, where standard medical care is out of reach for the poor people in remote villages⁴. Due to their safer nature, these treatments are commonly used in infants and toddlers with immature body systems. Ethnopharmacology has emerged as a scientific discipline dedicated to studying and utilizing natural products, such as plants and fungi, to alleviate human sufferings. However, this field- especially concerning pediatric applications- remains understudied and underexploited⁵. This review highlights various plants that can be effectively employed in managing pediatric skin conditions.

Conventional treatment vs herbal medicine

Conventional treatment is the first-line therapy adopted by the majority of people worldwide. However, this therapy has its limitations. It is not effective for all diseases and may not benefit all affected individuals. Moreover, it can cause a lot

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of adverse effects, ranging from mild to life-threatening. In rare cases, it may even result in death [6, Table 1].

Table 1: Advantages of herbal medicine

Parameters	Herbal medicine	Western medicine
Efficacy rates	Good to fair. Effective in some skin conditions recalcitrant to allopathic medicine	Good
Safety	Safety high. Deaths rare	Low to moderate. Deaths can occur
Availability	Easy	Easy
Cost	Cheap	Expensive
Cultural acceptance	High	Moderate
Invasive	No	Yes
Administration	Easy	Easy. Some drugs need help of medical personnel to administer
Other health benefits	Yes	Probably yes
Special importance	In chronic ailments	For acute cases as well as chronic ailments

In view of the above, a significant number of people resort to herbal medicine to address various physical ailments. When used appropriately, herbal medicine has been found effective in treating certain disorders that are recalcitrant to conventional treatments. While plants may not cure every individual affected by a particular disease, their efficacy rate is generally favorable. The consumption or application of herbal products is also relatively safe, with adverse effects being minimal or nonexistent. Any side effects that do occur tend to be mild and easily manageable. Herbal therapy rarely causes death in the treated person⁷.

The other advantages of using plants and their parts to treat various diseases are their easy availability and accessibility. They are also inexpensive, and one can either cultivate these plants or obtain them from nature, where they are abundant [Table 1].

Phytotherapy has wide applications in the treatment of skin disorders. It can relieve the symptoms of itching and irritation and safely cure the condition. Additionally, this therapy can help in boosting other bodily systems, including the immune system. It also improves digestion and helps prevent allergies and asthma. Phytotherapy is believed to have a positive impact on an individual's overall health [7, Table 1].

Patients and parents of pediatric patients often prefer plant-based therapies for themselves or their children. They welcome these alternatives because many have tried conventional treatments, developed aversions to them, and are seeking safer, more effective options. Herbal medicine fits well into this role. Additionally, many people fear surgery or invasive procedures and therefore turn to plant-based therapies, which are non-invasive and easy to administer [7, Table 1].

A study carried out in Maputaland, South Africa, revealed that most people preferred herbal medicine due to its efficacy, low cost, easy availability, safety, and cultural significance. Many respondents believed that certain conditions, such as acne, warts, and shingles, lack effective treatments in Western medicine. Traditional medicine demonstrated a higher cure rate for acne and warts, utilizing plants such as *Clerodendrum inerme* (*Volkameria inermis*, glory bower), *Dichrostachys cinerea* (*Fabaceae* family; sicklebush, bell mimosa, Kalahari Christmas tree, or Chinese lantern tree), *Solanum incanum* (thorn apple, bitter apple, or bitter tomato), and *Strychnos spinosa* (natal orange). Nearly 33% of those surveyed used a combination of herbal and Western medicine to treat skin problems. In this study, only 11% of participants did not use any herbal therapies, with the most common reasons quoted being religious beliefs and taste preferences. The general opinion was that traditional medicine is effective for chronic conditions, while Western medicine is better suited to managing acute conditions⁸.

MEDICINAL PLANTS FOR SKIN CONDITIONS

A variety of plants have traditionally been used to treat skin symptoms and diseases. Emphasis is placed on locally available plants, which vary from region to region.

Tsioutsou EE *et al* studied medicinal plants that people use in the South Balkan and East Mediterranean regions to relieve dermatological symptoms. The most common plant families employed were *Asteraceae* (11.7%),

Lamiaceae (7.4%), Rosaceae (6.7%), Plantaginaceae (5.4%), Malvaceae (3.8%), Urticaceae (3.3%), Hypericaceae (3.1%), Moraceae (2.5%), Fabaceae (2.3%), Boraginaceae (2.3%), Juglandaceae (2.3%), Pinaceae (2.2%), Euphorbiaceae (2.2%), Apiaceae (1.9%), Solanaceae (1.8%), Adoxaceae (1.8%), Anacardiaceae (1.6%), Papaveraceae (1.6%), and Polygonaceae (1.6%) [9].

Plantago major L. (broadleaf plantain) was most commonly used in 3.0% of skin cases. This was followed by *Juglans regia* L. (English walnut) in 2.3%, *Urtica dioica* L. (common nettle) (2.2%), *Hypericum perforatum* L. (perforate St. John's wort) (1.7%), *Plantago lanceolata* L. (ribwort plantain) (1.7%), *Ficus carica* L. (fig) (1.6%), *Allium cepa* L. (onion) (1.3%), *Rosa canina* L. (dog rose) (1.3%), *Malva neglecta* Wallr. (Dwarf mallow) (1.3%), *Malva sylvestris* L. (cheeses) (1.3%), *Sambucus ebulus* L. (danewort, dane weed, danesblood, European dwarf elder, dwarf elder, walewort, dwarf elderberry, elderwort or blood hilder) (1.0%), *Laurus nobilis* L. (bay laurel) (1.0%), and *Juniperus oxycedrus* L. (cade juniper, prickly juniper, cade, sharp cedar) (0.9%). Whereas, *Olea europaea* L. (olive tree), *Sambucus nigra* L. (elder plant, European elderberry), *Allium sativum* L. (garlic), *Vitis vinifera* L. (common grape vine), and *Achillea millefolium* L. (yarrow) were used in 0.8% of the cases each. *Matricaria chamomilla* L. (German chamomile) and *Rubus sanctus* Schreb. (Holy bramble) found use in 0.7% of these skin conditions⁹.

A South African study found that the most commonly used botanical families for treating skin conditions were Fabaceae, followed by Astraea, Solanaceae, and Anacardiaceae⁸. The researchers also identified nine plant species that appeared to be newly documented globally as dermatological remedies. These species included *Acacia burkei* (Egyptian thorn), *Brachylaena discolor* (coast silver oak), *Ozoroa engleri* (drooping resin tree), *Parinari capensis* (sand apple), *Portulacaria afra* (dwarf jade, elephant bush, porkbush, or purslane tree), *Sida pseudocordifolia* (flannel weed), *Solanum rigescens* (Wilde lemoentjie), *Strychnos madagascariensis* (black monkey orange), and *Drimys delagoensis* (from Delagoa or southern Mozambique)⁸.

In South Asia, several plant families are traditionally used to alleviate skin diseases. These include Fabaceae, Solanaceae, Moraceae, Verbenaceae/Lamiaceae, Amaranthaceae, Liliaceae, Papaveraceae, Meliaceae,

Aristolochiaceae, Caesalpiniaceae, Caricaceae, Apiaceae, Apocynaceae, Cyperaceae, Marsileaceae, and Euphorbiaceae. Commonly used plants, listed alphabetically, are *Abrus precatorius* (rosary pea), *Achyranthes aspera* (prickly chaff, chaff, devil's horsewhip), *Aloe barbadensis* miller (Aloe vera), *Argemone mexicana* (Mexican prickly poppy), *Aristolochia indica* (Indian birthwort), *Azadirachta indica* (Neem tree), *Carica papaya* (papaya), *Cassia fistula* (golden shower tree, purging cassia, or pudding-pipe tree), *Catheranthus roseus* (Madagascar periwinkle, bright eyes, Cape periwinkle, graveyard plant, old maid, pink periwinkle, or rose periwinkle), *Centella asiatica* (Asiatic pennywort), *Clerodendrum viscosum/infortunatum* (hill glory bower), *Clitoria ternatea* (bluebell vine, Asian pigeonwings, blue pea, butterfly pea, cordofan pea, or Darwin pea), *Cyperus rotundus* (nut grass), *Dalbergia sissoo* (North Indian rosewood or sheesham), *Ficus benghalensis* (banyan tree), *ficus religiosa* (pipal, Bodhi, or pimple tree), *Marsilea quadrifolia* (four-leaf clover or European watercress), *Ricinus communis* (castor bean or castor oil plant), *Solanum nigrum* (black nightshade, European black nightshade, or blackberry nightshade), *Solanum surattense/Solanum virginianum* (Surattense nightshade, yellow-fruit nightshade, or Thai green eggplant), *Tectona grandis* (teak), and *Tephrosia purpurea* (wild indigo)¹⁰.

A Polish study identified the following plants as being popularly employed in the treatment of inflammatory skin conditions: *Matricariae flos/Chamomillae anthodium* [matricaria flower from *Matricaria recutita* L. (German chamomile)], *Calendulae flos* [calendula flower from *Calendula officinalis* L. (marigold)], *Hamamelidis cortex* [hamamelis bark of *Hamamelis virginiana* L. (witch hazel)], *Hamamelidis folium* (hamamelis leaf), *folium et cortex aut ramunculus destillatum hamamelis* water (hamamelidid distillate or aqua), *Aloe vera folium recens* (fresh leaves of *Aloe barbadensis* miller), *Althaeae radix* (marshmallow root), *Avenae fructus* (oat fruit), *Avenae stramentum* (oat straw), *Echinaceae purpureae herba recens* (purple coneflower fresh herb), *Symphyti radix* (comfrey root), *Millefolii herba* (yarrow plant), *Plantaginis lanceolatae folium/herba* (ribwort plantain leaf/herb), *Salviae folium* (sage leaf), *Hyperici herba* (St. John's wort), *Oenotherae oleum* (evening primrose oil), *Quercus cortex* (oak bark), *Juglandis folium* (walnut leaf), *Lini semen* (linseed), and *Trigonellae foenugraeci semen* (fenugreek seeds)¹¹.

However, none of the plants mentioned above are suitable for use in children. Some are contraindicated, while others carry a red box warning due to insufficient safety data in pediatric populations. The European Medicines Agency has approved only 157 herbal products for pediatric use, of which 30 are recommended for pediatric skin diseases. Nevertheless, none of these products have adequate data to fully support their efficacy and safety. Despite this, they may be used cautiously because, in clinical practice, they have been found effective with no reported adverse events in children. These plant products include: *Agrimoniae herba* from *A. eupatoria* (common agrimony, church steeples or sticklewort), *Arctii radix* or *Bardanae radix* from *Arctium lappa*, and *Arctium tomentosum*, *Arnicae flos* (arnica flower from *Arnica Montana* L.), *Avenae fructus* (oat fruit or common oat from *Avena Sativa* L.), *Calendulae flos* (calendula flower from *C. officinalis* L.), *Echinaceae purpureae herba* or *Echinaceae purpureae* (eastern purple cone flower, purple coneflower, *Echinacea* or hedgehog coneflower from *Echinaceae purpureae* L. Moench (flowering aerial parts are used), *Echinaceae purpureae radix* (roots of *Echinaceae purpureae* L. Moench), *Equiseti herba* (horsetail herb from *Equisetum arvense* L.), *Hamamelidis cortex* (*Hamamelis* bark from *Hamamelis virginiana* L.), *Hamamelidis folium* (*Hamamelis* leaf from *Hamamelis virginiana* L.), *Hamamelidis folium et cortex aut ramunculus destillatum* (*Hamamelis* distillate from *Hamamelis Virginiana* L.), *Hyperici herba* from *Hypericum perforatum*, *Juglandis folium* from *Juglans regia* L., *Matricariae flos*, *Matricariae aetheroleum* (*matricaria* oil which is essential oil from the flower heads of *Matricaria recutita* L.), *Melaleuca alternifoliae aetheroleum* (tea tree oil, an essential oil obtained from the leaves and terminal branches of *Melaleuca alternifolia* (Maiden and Betche) Cheel, *M. linariifolia* Smith, *M. dissitiflora* F. Mueller, and other species of *Melaleuca*, *Menthae piperitae aetheroleum* (peppermint oil, an essential oil from the fresh aerial parts of the flowering plant called *Mentha x piperita* L.), *Millefolii flos* (yarrow flower from *Achillea millefolium* L.), *Millefolii herba* (yarrow plant or *Achillea millefolium* L.), *Myrrha* (*Myrrh*, African *Myrrha*, common *myrrh*, or Somali *myrrh* or *Commiphora myrrha*), *Oenotherae oleum* (evening primrose oil from *Oenothera biennis* L.), *Oenothera lamarckiana* L., *Origanum dictamnii herba* (*dittany* of Crete herb, Cretan

dittany, or *hop majoram* from *Origanum dictamnus*), *Origanum majoranae herba* or *majoram* from *Origanum majorana* L., *Pistacia Lentiscus resin* (*mastix*) [resin from *Pistacia lentiscus* (*mastic tree*)], *Rosae flos* (rose flower from *Rosa centifolia* L.), *Salviae officinalis folium* (*sage leaf* from *Salviae Officinalis* L.), *Soiae Oleum raffinatum* (soybean oil from *Glycine max* L.), *Trigonellae foenugraeci semen* (seeds of *Trigonella foenum-graecum* L.), *Urticae herba* (*nettle herb* of *Urtica dioica* L. and *Urtica urens* L.), and *Violae herba cum flore* (*wild pansy* or flowers of *Viola tricolor* L.).

However, some researchers advise against using *Salviae folium*, *Hypericum perforatum*, *Quercus cortex*, and *Trigonellae foenugraeci semen* in children under 18 years of age. They also recommend avoiding the use of *Hamamelidis cortex* and *Echinaceae purpureae herba recens* in children under 12 years of age. They assert that flowers of *Calendula officinalis* L., *Hamamelidis folium* and *Hamamelidis distillate* should not be used in kids below 6 years ^{11,12}.

Plant parts in skin diseases

In traditional practice, healers use either whole plant extracts or extracts from specific plant parts to treat skin diseases. These parts may be the leaves, flowers, fruits, stems, bark, heartwood, roots, seed extract or oil, or latex or sap ^{10,11}. In the Mediterranean region, leaves were most commonly used as herbal remedies for skin diseases, accounting for 28% of usage. This was followed by aerial plant parts (13.1%), fruits in 11.6%, flowers/inflorescence in 10.0%, roots or rhizome or radix in 9.3%, whole plant or herb in 6.4%, seeds in 4.7%, stems in 3.7%, latex in 3.4%, bark in 3.2%, and resin in 1.9%. 4.5% of the surveyed population reported using bulbs and essential oils for treating skin lesions ⁹. The South African study found that people there also used bulbs, corms, and fruit saps in the management of skin disorders. Their survey results were somewhat similar to the Mediterranean findings, showing that leaves were the most commonly used plant parts (31%), followed by bark (28%), roots (13%), fruits (11%), and bulbs, stems, whole plants, twigs, and corms each at 3%, with rhizomes at 1% [8]. Poly-herbal formulations (combinations of plants) and the use of multiple parts of the same plant were also preferred ⁸. This approach imparts synergistic properties to the treatment products, including antibacterial, antifungal, antiviral, anti-inflammatory, antioxidant, analgesic, and astringent effects, among others.

Methods of administration

In the Mediterranean region, people primarily use plant parts as remedies in the form of decoctions or infusions, which are taken orally. In some cases, these are also applied externally. Other methods of using herbs include warm or cold poultice/plaster/cataplasm or compress or occlusive dressing or as an ointment. Some apply the plant parts crudely as macerations over lesions⁹. In South Africa, these plant parts are utilized as fresh or dried powders, applied directly or mixed with water, alcohol, or oil to form a paste. Some preparations are heated in water to produce a decoction, which is then applied topically or taken orally. Sap or latex is applied without mixing, and for acne, people also use normal or warm baths, rinses, washes, or steam treatments with herbal extracts. An uncommon method of administering herbal decoctions is as an enema, believed by users to eliminate the root cause of disease from within⁸. For topical treatment with *Aloe barbadensis* Miller, fresh gel is preferred because the active ingredients degrade through oxidation and enzymatic or microbial activity¹¹. Expressed juice (fresh or dried) from leaves or other plant parts is beneficial and provides relief in many skin diseases [11, Table 2].

Table 2: Modes of administration of herbal medicine

Route of Administration	Forms of medicine	Method of administration
Dermal	Macerated crude plant parts, plant parts juice, powder, paste, decoction, infusion, gel, ointment, raw sap, latex, resin, essential oils	Plaster, cataplasm, poultice, occlusive dressing, rubbing, spray, bath, washes/ rinses, steaming
Systemic-oral, per rectal, nasal, ophthalmic, aural, oropharyngeal	Tablet, capsule, powder, tea, extract, paste, decoction, infusion	Ingestion, enema, nasal drops, eye drops, ear drops, mouth rinses

Phytotherapy and skin conditions in children

All types of skin disorders have been addressed in herbal medicine treatments, although only a limited number of studies have demonstrated the efficacy and safety of a few plants for these conditions. According to a review by Serbian researchers, the most common skin-related indications for herbal applications were wounds (22.1%), hemorrhoids (14.7%), skin infections

and boils, and eczema (6.0%). People also used herbal therapies to stop skin bleeding or applied them to excrescences, areas affected by alopecia, or sites of dog bites⁹. In Africa, common complaints treated with herbal remedies include skin sores, ringworm infections, bacterial skin infections such as boils, skin burns, rashes, wounds, warts, shingles, acne, and scars⁸.

Most skin diseases involve an underlying component of inflammation. This inflammation can result from mechanical, chemical, biological, or immunological factors. Medications that reduce inflammation and restore the skin's moisture and lipid content are the most effective remedies¹¹. The various conditions and the specific botanicals useful in their treatment are outlined below in alphabetical order.

Acne

Azadirachta indica leaf extracts, *Cannabis sativus* (hemp) seed oil and leaf powder, *Echinacea augustifolia* (narrow-leaved purple coneflower), *Rosmarinus officinalis* (rosemary), and *Melaleuca alternifolia* (tea tree oil) have demonstrated good efficacy against these lesions^{12,13}. Additionally, *Clerodendrum inerme*, *Dichrostachys cinerea*, *Solanum incanum*, and *Strychnos spinosa* have also shown effectiveness⁸. A recent meta-analysis done showed that *Melaleuca alternifolia*, *Camellia sinensis* (green tea), lactobacilli-fermented *Chamaecyparis obtusa* (Hinoki cypress), *Berberis vulgaris* (common barberry), *Garcinia mangostana* (mangosteen), and *Aloe barbadensis* miller are used most to clear these lesions¹⁴. Furthermore, an ethanolic extract of corn silk (scientific name: *Stigma maydis*) was tested in vitro for its antibacterial activity against *P. acnes*, *S. epidermidis*, and *S. aureus*, bacteria commonly found in acne lesions. The study showed that the extract inhibited these acne-associated bacteria and may prove useful in acne clearance¹⁵.

Athlete's foot and fungal infections, such as ringworm infection

Melaleuca alternifoliae aetheroleum helps clear this infection¹². *Allium sativum* L. foot soak is also effective.

Atopic dermatitis

Normally, topical moisturizers, glucocorticosteroids, tacrolimus, pimecrolimus, calcineurin inhibitors are employed as therapy in atopic dermatitis. Also, UV light, anti-microbial therapy, oral anti-inflammatory medications and steroids, immunotherapy and lifestyle modifications are useful¹⁶. A multidisciplinary

approach that is customized for a patient helps rather than any standard treatment. Studies have favored herbal medicine with or without conventional therapy in management of these cases ¹⁶.

But no standard treatment helps and it has to be tailor-made and multimodal. For control of symptoms such as itching, studies have shown that plant therapy is better than oral anti-histamines ¹⁷. Plant therapy does lower IL-4, eosinophils, and CRP in blood. Serum IFN- γ rises whereas IL-2 remains unaffected. And serum IgE levels remain the same or get lower with herbal remedies. But overall, herbal medicine shows better efficacy and tolerability. Herbal remedies fare better than conventional medicine. When it is combined with conventional treatment, efficacy is better but side-effects are the same. Follow-up data shows a mixed outcome as regards recurrence rate in conventional vs. herbal therapy ¹³. Most commonly used plants are roots of *Glycyrrhizae uralensis* (Chinese liquorice) (70.91%), followed by *Atractylodis Rhizoma Alba* (dried roots of *Atractylodes chinensis*, *Atractylodes lancea* or *Atractylodes japonica koidz*) (67.27%), *Poria cocos* (Schw.) Wolf (Fu-ling or Hoelen) (58.18%), roots of *Angelica gigas Nakai* (Korean angelica or dangquai) (40.0%), *Dictamni Radicis* (dried root bark of *Dictamnus dasycarpus* Turcz or densefruit dittany) (40.0%), *Atractylodis Rhizoma* (Bai zhu) (34.55%), *Saposhnikoviae Radix* (root of *Saposhnikovia divaricate*) (34.55%), *Citri Unshius Pericarpium* (traditional Chinese medicine) (32.73%), and *Astragali Radix* (roots of *Astragalus propinquus*) (29.09%) ¹⁶. Oral *Oenotherae oleum*, topical *Matricaria chamomilla* L. flower extract or decoction or oil, *Althaeae radix*, *Avenae stramentum*, *Symphyti radix*, *Millefolii herba*, *Plantaginis lanceolatae folium/herba*, and *Juglandis folium* are also good ¹¹. The anti-fungal and bactericidal actions of *Matricaria chamomilla* L. oil and its alpha-bisabolol content can treat super-added infections in atopic lesions ¹¹.

Aloe barbadensis miller leaf gel (Family Xanthorrhoeaceae), *Avena sativa* (oats or shofan) (Family Poaceae) as colloidal oat extract or decoction, *Curcuma longa* (turmeric or kurkum) (Family Zingiberaceae) root powder or paste also can heal the atopic lesions ¹³. A study that used extracts of 10 different Chinese plants [*Ledebouriella seseloides* (Bang-poong in Korea, Fang-feng in China and Bo-fu in Japan), *Potentilla chinensis* (cinquefoils, five fingers, or silverweeds), *Clematis armandii* (evergreen

clematis), *Rehmannia glutinosa* (Chinese foxglove), *Paeonia lactiflora* (Chinese peony), *Lophatherum gracile* (bamboo leaf), *Dictamnus dasycarpus*, *Tribulus terrestris* (puncture wine), *Glycyrrhiza uralensis*, and *Schizonepeta tenuifolia* (Japanese catnip)] in 47 children with extensive but non-exudative atopic dermatitis showed that the erythema and damage scores were better at 4 and 8 weeks in treated group ^{7,18}. But another trial in 7-50 age group patients failed to show any efficacy of the above plant combination in recalcitrant atopic dermatitis ¹⁹. However, all blood tests were normal throughout both clinical trials ^{18,19}.

Basal cell carcinoma

Though rare in children, it can occur in those with genetic defects with intense UV exposure. *Curcuma longa*, *Ginkgo biloba* (maidenhair), *Camellia sinensis*, *Linum usitatissimum* (flaxseeds, rich in lignans, fiber, vitamins and omega-3-fa), *Astragalus propinquus* (Mongolian milkvetch) and other Chinese medicinal roots have some proven role in its management ¹³.

Boils, furuncles, and bacterial skin infections

Matricariae flos, *Melaleuca alternifoliae aetheroleum*, *Myrrha* ¹², *Althaeae radix*, and *Lini semen* ¹¹ can control these infections.

Bruises and sprains or local muscular pains

Arnicae flos, *Origan dictamni herba* (especially in bruises) provide relief ¹².

Dandruff

Juglandis folium [11], *Melaleuca alternifoliae aetheroleum*, *Aloe barbadensis miller*, *Salvia rosmarinus* (rosemary) oil and *Citrus limonum* (lime) oil are effective for it ²⁰.

Dry skin

Oenotherae oleum, *Soiae Oleum raffinatum* relieve the skin dryness and associated itching ¹².

Excessive sweating of hands and feet

Juglandis folium and *Salviae officinalis folium* can bring down excessive perspiration ¹².

Frostbites

Matricariae flos and *Aloe barbadensis miller* give relief in this condition ¹¹. *Ginkgo biloba* extract protected rats against injury due to frostbites ¹². Bromelain, a proteolytic enzyme from the juice and stem of *Ananas comosus* (Pineapple) can debride the frostbite-induced eschar ²².

Herpes simplex

Melissa officinalis (lemon balm) (mint family with a lemon aroma) is useful. The essential oil from its steam-distilled leaves is soothing and healing¹³. A 2021 review of human trials studying the antiviral properties of botanicals against herpes simplex showed that parts of several plants are useful in treatment. These include but are not limited to *Melaleuca alternifolia*, *Coix lacryma-Jobi* (coix seed or Job's tears), and *Rheum palmatum* (Chinese rhubarb)²³.

Hypopigmentation

Extracts of several different plants can affect melanogenesis. *Psoralea corylifolia* (Purple fleabane), *Nigella sativa* (black caraway, black cumin), *Piper nigrum* (Black pepper), *Withania somnifera* (winter cherry), *Cassia occidentalis* (septic weed or styptic weed), *Ficus carica* are some of those that can induce skin repigmentation²⁴.

Hyperpigmentation

Plants and their active ingredients that hold promise in clearing hyperpigmentation include *Azadirachta indica*, *Glycyrrhiza glabra* (liquorice or licorice), *Panax ginseng* (red ginseng, Asian ginseng, Japanese ginseng, or Korean ginseng), *Ginkgo biloba*, *Santalum album* (Indian sandalwood), *Magnolia officinalis* (Houpu magnolia), *Curcuma longa*, *Camellia sinensis*, *Carica papaya*, *Acacia catechu* (black cutch), quercetin, ellagic acid, and genistein^{25,26}.

Insect bites

Melaleuca alternifoliae aetheroleum¹², *Matricariae* flos¹¹ are effective on them. *Aloe barbadensis miller*, *Ocimum basilicum* (basil), and *Hamamelis* (witch hazel) can also reduce itching and inflammation post-bite. Mosquitoes are the most common insects that bite humans. Some people develop local hypersensitivity reactions. In order to prevent these bites, repellants are helpful. Trongtokit Y *et al* from Thailand found that undiluted *Syzygium aromaticum* (clove oil), *Cymbopogon nardus* (citronella), *Zanthoxylum limonella* (makaen), and *Pogostemon cablin* (patchouli) are the essential oils that are excellent repellants. *Syzygium aromaticum* provides 100% protection for 2 to 4 hours²⁷.

Leg ulcers

Though uncommon, it is seen in children. *Symphyti radix* is healing on them¹¹. A meta-analysis done in 2017 by Brazilian researchers showed that *Mimosa tenuiflora* (Jurema or black jurema) hydrogel is a promising botanical in the management of venous ulcers. They minimize bacterial growth, re-epithelize and markedly lessen the ulcer area²⁸.

Melasma

It can be due to environmental, genetic and hormonal reasons. *Aloe barbadensis miller* lightens the lesion¹³. Silymarin from *Silybum marianum* (milk thistle plant), extracts from *Orchidaceae* (orchid plant), *Vitis vinifera* (grape seed) extract, *Camellia sinensis* extract, *Morus alba* (mulberry) extract have skin lightening and antioxidant actions²⁹.

Mild skin inflammation due to any cause

Agrimoniae herba, *Juglandis folium*, *Origani dictamnii* herba, *Rosae flos*, *Salviae officinalis* folium¹², *Aloe barbadensis miller* folium recens, *Avenae stramentum*, *Millefolii herba*, *Plantaginis lanceolatae* folium/herba, *Juglandis folium*¹¹ can effectively and safely lessen the skin inflammation.

Minor wounds

Agrimoniae herba, *Avenae fructus*, *Equiseti herba*, *Hyperici herba*, *Juglandis folium*, *Matricariae flos*, *Melaleuca alternifoliae* aetheroleum, *Millefolii flos*, *Millefolii herba*, *Myrrha* have a role in faster wound healing^{11,12}.

Nappy rash or diaper dermatitis

*Matricariae flos*¹¹, *Aloe barbadensis miller*, and *Olea europaea* have been found to be curative on these lesions³⁰. These botanicals soothe the skin and act as a barrier to protect it against various organisms. Other plants that are beneficial include *Lawsonia inermis* (henna), citrus fruits, and apple cider vinegar or such extracts from *Malus domestica* (apples). Viscous substance (honey) made by honey bees (*Apis mellifera*), *Cera alba* (beeswax), and *Olea europaea* L. (olive) oil in combination applied topically also offers relief³¹.

Poor wound healing

Pistacia Lentiscus, resin (mastix)¹², *Matricariae flos*, *Plantaginis lanceolatae* folium/herba¹¹ can hasten proper wound healing.

Pruritus

Menthae piperitae aetheroleum (in children above 4 years of age) has anti-itching properties¹². *Vilosa Odorata* leaf essential oil (Violet oil) massage and *Syzygium aromaticum* oil can also bring about symptomatic improvement in these patients with chronic itching^{32,33}. An earlier study revealed that an ethanol extract made from the petals of *Impatiens balsamina* L. (balsam or touch-me-not) led to inhibition of the scratching behavior in mice³⁴. *Panax ginseng* also lessens scratching in animal studies³⁵.

Psoriasis

There is strong evidence that favors the use of *Mahonia aquifolium* (Oregon grape) in psoriasis, as per National Center for Complementary and Integrative Health or NCCIH. Studies have also shown that *Indigo naturalis* (Huang dai or qing dai) alone or in combination with *Mahonia aquifolium* are also excellent. *Aloe barbadensis miller* is another gel that can be applied topically on these lesions for relief. A 2023 meta-analysis revealed that randomized controlled trials (RCT) studies of plants for psoriasis are limited. Nonetheless, the study stated that medicinal plants are highly effective in curing these lesions. Different studies with *Curcuma longa*, *Abies alba* (European silver fir), and *Gynura pseudochina* (*Sambung Nyawa* Batik) did reveal subjective betterment in the patients, though clinical assessment showed no statistically significant difference before and after treatment with these agents. Studies with *Gracilaria* algae and *Paeonia officinalis* (common garden peony) showed statistically significant outcomes with treatment³⁶.

Scars or cicatrization

A 2018 study did show that a cosmetic combination of *Carthamus tinctorius* (safflower), *Olea europaea* L. and other plant oils are effective in management of non-keeloid scars³⁷. *Allium cepa* extract gel, however, is not superior to other topical applications and it can induce side-effects causing therapy abandonment³⁸. Honey and bioactive plant products such as quercetin, resveratrol, and epigallocatechin also have the potential to prevent and treat scars³⁹.

Seborrheic dermatitis

Arctii radix, *Urticae herba*, *Violae herba cum flore*¹², *Matricariae flos*, and *Avenae stramentum*¹¹ are useful

in providing relief for this condition and also are beneficial in cradle cap management.

Shingles

A number of plant extracts have been shown to be efficacious in treatment of herpes zoster pain and post-herpetic neuralgia. The noteworthy ones include the herb *Gentiana scabra* (Japanese Gentian tree)⁴⁰, *Mentha piperita* L. oil⁴¹, *Geranium* (Crane's-bill) oil⁴², and phenolic extracts of leaves of *Sapium sebiferum* (L.) Roxb.⁴³. A group of Cuban researchers also treated 12 patients of post-herpetic neuralgia with oral tablets of an aqueous extract of *Mangifera indica* (common Mango tree)⁴⁴.

Skin inflammation around the anal and genital region

Matricariae flos and *Matricariae aetheroleum* are beneficial for it. These plant parts are gentle at the lesion site.

Skin irritation around nostrils

*Origani majorana herba*¹² can treat these lesions effectively and is well-tolerated.

UV Sunburns

Avenae fructus, *Hyperici herba*, *Matricariae flos*, *Althaeae radix*, *Symphyti radix*, *Juglandis folium* are soothing on these lesions. *Matricaria chamomilla* L. plant parts and their extracts can provide relief and this would be comparable or better than the action of hydrocortisone cream^{11,12}.

Vitiligo

Ginkgo biloba (oral 1 to 3 times for 3 months) is efficacious. Khellin is a naturally occurring furanochrome from the plant *Amni visnaga* (toothpick weed). It can lead to hepatic dysfunction and allergies. Hence, its analogues were synthesized for safety and better efficacy. When used with UVA phototherapy (2.5 hours later), it stimulates melanogenesis. This medicine can be administered orally or applied topically 2 or 3 times in a week. Besides this, polyphenols from *Camellia sinensis* polyphenols are useful. The plant parts have high content of EGCG (epigallocatechin-3-gallate) which is an anti-oxidant, anti-inflammatory, and immunomodulatory. It can be given orally or applied locally over the area. Capsaicin from the *Capsicum* genus of plants (chili peppers) also benefits¹³.

Warts

Clerodendrum inerme, *Dichrostachys cinerea*, *Solanum incanum* and *Strychnos spinosa* are effective in management of this chronic skin condition⁸.

Kloter E et al did a meta-analysis of all the studies on the role of plant products in pediatric skin conditions. The main skin conditions the researchers studied were diaper dermatitis, atopic dermatitis, and skin wounds. They found that, unlike expectations, there was no demonstrated positive effect of *Matricaria chamomilla* L. or *Aloe barbadensis miller* on skin disorders. But for atopic dermatitis, oral *Oenotherae oleum* was effective. Whereas for wounds, *Symphyti radix* was more beneficial⁴⁵.

Safety of herbs

Overall, herbal extracts are considered safe. Some minor side effects do occur in some people but these disappear on cessation of the herbal remedy. However, major adverse events are rare. Contact dermatitis has been reported in rare instances with use of *Matricaria chamomilla* L. flower extracts, *Aloe barbadensis miller*, *Avenae fructus* extract, and *Millefolii herba*¹¹.

Ginkgo biloba can induce bleeding and should be used with caution in those with bleeding tendencies or on blood-thinning medications. Some plant parts can lead to hepatic dysfunction. These plants include *Azadirachta indica*, *Lantana camara* Linn (camara or chumbinho), and *Symphyti radix*. *Symphyti radix* has pyrrolizidine alkaloid that is hepatotoxic, carcinogenic, and mutagenic. Hence, the amount of extract applied daily, whether in a crude or standardized form, should not have more than 10 to 100 micrograms of pyrrolizidine in it. And one should limit its use to less than 4 to 6 weeks for the same reason¹¹.

Patients of epilepsy or schizophrenia and those on eliptogenic drugs should avoid use of *Oenotherae oleum*. One should use it only under medical supervision¹¹.

Duration of treatment

Though people using botanicals report fewer and milder side effects compared to western medicine users, it is advised that treatment with the former should not exceed more than a certain period. Use over an extended period without medical supervision is not advisable.

Echinaceae purpureae herba recens use should be limited in children greater than 12 years to less than 8 weeks¹¹. And *Symphyti radix* extracts should have a treatment period of no more than 4 to 6 weeks.

CONCLUSION

Herbal medicine has been studied in dermal conditions of children but the trials are limited in number. However, there is scope for the use of plants to treat certain chronic and refractory ailments of the skin in children. The most common skin conditions where botanicals can step in include atopic dermatitis, psoriasis and pigmentation problems of the skin. These herbal remedies are overall safe but one should be aware of contact dermatitis with some of them. These herbal remedies can be used under medical supervision but more prolonged and extensive studies should be conducted before it goes for widespread prescriptions in these skin conditions.

Key points

1. Skin diseases affect people of all age groups. There is significant morbidity with a deeper impact on the quality of life of the sufferer.
2. Western medicine offers cures and control of these skin ailments but suffers from adverse events including death in some cases.
3. The immune system of children is immature and safety is a major concern in them.
4. Plants and their extracts are relatively safer than western drugs but equally effective in controlling skin ailments and their associated symptoms.
5. Plants also have a positive effect on the immune system and digestive system of the patient.
6. Studies on the use of plants in children are limited. But field use of plants in the management of pediatric skin disorders has been shown to be beneficial and safe.
7. There is a great scope of phytotherapy in the field of pediatric dermatology.
8. Ethnopharmacology has a supplementary role in the treatment of skin diseases in children and extensive and long-term studies would help us to use it in our day-to-day clinical practice for children.

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Ethical clearance

Ethical issues are not present in this study because it involves no experimental study on humans or animals.

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