

Ayurvedic Opportunities for Restoration of Skin Health

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Abstract: In Ayurveda, there is description of a number of herbs having properties of promoting and maintaining the skin health. There are numerous forms of skin diseases affecting all ages of life through number of ways. Skin is affected by its own disease and sometimes even by the diseases of other organs of the body, including cancer, herpes, liver disorder, parasitic diseases, etc. In normal course, the skin diseases range from dermatosis, eczema, scabies, leucoderma, itching, boils to eruptions. Ayurveda is manifested with a record of plants which show positive effects in treating the skin related problems. In the present review, it has been attempted to briefly discuss the botanical aspects of these plants and describe their method of application as depicted in Ayurveda in the treatment of various skin diseases. Scientific evidences have been included in case of some of the important plants. The major chemical components of these plants have also been discussed.

Keywords: Skin diseases, medicinal plants, Ayurvedic recommendations, chemical constituents, scientific validation.

1. Introduction

Looking beautiful is human desire since the inception of the humankind. Healthy, thus attractive, skin plays an important role in having the charming personality. It is essential to have proper nutrition to maintain healthy skin. By generating a number of herbal drug and cosmetic preparations, the traditional systems have stood the test of time through centuries. Besides health care, the beautification

of body is very well supported by herbal treatments from remote past. Keeping the body and skin hydrated, is important factor for skin health. With the advancement of age, the skin reduces its natural glow. However, attempts have been made to rejuvenate the skin to keep it attractive [1]. Simply pure water keeps the skin healthy as it aids in proper digestion, sustains cell health, aids in elimination of toxins and waste and regulates body functions [2]. However, the disease free skin can stay healthy, vital and attractive, if all of the body's functions are working properly. Skin is the largest organ of the body and protects all internal organs from various diseases and offenses [3]. During this process, many times the skin itself gets infected or damaged leading to the generation of various diseases. Besides health care, beautification of the body is done by herbal cosmetics and colors. Some of the plants have earlier been reviewed for their uses in skin related diseases but the selected plants were not necessarily Ayurveda based [4]. In Ayurveda, there are records of plants recommended for the skin rehabilitation. In continuation of our interest on the studies of Indian medicinal plants [5-9] and reviewing of their Ayurvedic uses in various diseases [10-12], we now intend to compile the botany, chemistry, Ayurvedic uses and the scientific support of various traditional plants useful in the restoration of skin health.

2. Skin Structure and Function

The skin is constituted by specialized cells and can be divided into three distinct layers, the epidermis, dermis and hypodermis. The thickness of the skin varies from one external body organ to the other. The thinnest is on the eyelids while thickest on the sole and palm. The epidermis is the outermost layer followed by dermis and hypodermis. The hypodermis or the subcutaneous connective tissue contains the blood vessels and nerves and is also responsible for the regulation of temperature of body. The epidermis is the most active tissues in terms of regeneration. However, it experiences a decrease with time, leading to the appearance of ageing signs, such as wrinkles and dullness. A recent investigation has established that a peptide has shown potential capacity to improve the epidermal regeneration by a reprogramming effect of epidermal cells through the modulation of epigenetic mechanisms. When this method was applied on the skin of volunteers, it helped accelerate the renewal time and improved their skin appearance [13].

The skin plays very important role to the body through a number of functions. The most important of them are (i) protection of the human body from microorganisms, UV radiation and physical injuries (ii) temperature regulation through sweat glands and blood flow (iii) sensation for touch, temperature and pain (iv) immunity by interaction of skin with body's immune system (v) help in movement and growth of the body (vi) excretion of urea, water, ammonia and uric acid (vii) synthesis of vitamin D from sunlight [14,15].

3. Common Skin Diseases

Since skin is the outermost and largest organ of the body, it has to face with many adverse external and internal impacts leading to certain disorders. The emergent skin health conditions are faced with chemical or heat burn injuries. Most of the hospitals are equipped with the emergency treatments to save the life but skin tissue damage and scars left behind, are normally irreversible. One of the recent and successful alternatives is, preparing to graft out the skin. The health experts reveal that the skin can be safely stored for five years under special medical techniques, once the skin is removed from a dead body. The skin surgeons are now capable to graft out sheets of skin from a cadaver. Thus the donation of skin shall go a long way in treating serious cases of patients with burn injuries. Since the demand is more and supply is very less, the people should be encouraged for more such donations [16]. On the other hand, many treatable skin disorders are caused by allergy, infections, related to the pigmentation and diseases of even the other body organs, etc. [17-19]. Examples of some of them are given as below.

3.1. Dermatitis

It is the inflammation in the skin leading to red and itchy patches with some acute attacks causing crusty scales or blisters oozing fluid. It leads to a dry, reddish, itchy skin indicative of some kind of dermatitis [20]. Skin dermatitis can be of several types:

3.1.1. Contact dermatitis

A red rash that is limited to the area of skin exposed to an irritant is probably contact dermatitis. It typically causes the skin to develop a pink or red rash, which normally itches. Contact dermatitis may be irritant or allergic of common chemical irritants including detergents, soaps, nail polish remover, anti-perspirants, formaldehyde and some synthetic fibres. Certain plants also cause irritation in some people. Rubber gloves, nickel or cobalt in jewellery, cosmetics, perfumes, hair dyes and skin-care products may also cause contact allergic dermatitis [21].

3.1.2. Atopic dermatitis or eczema

Often itchiness results simply from dry skin, however, extreme, persistent itchiness may signal atopic dermatitis (atopic eczema). Under this condition, the skin faces itch, scale, swell and sometimes blister. This type of eczema is often associated with allergies, asthma, stress which usually runs in families [22].

3.1.3. Nummular dermatitis

Circular patches of red, itchy, moist, scaly or encrusted skin suggest nummular dermatitis, common in older people who have dry skin or live in dry environments. Nummular dermatitis is most

commonly seen on the legs, hands, arms, and torso consisting of distinctive coin-shaped red plaques. Having very hot showers, living in a dry environment, normally cause this condition [23].

3.1.4. Stasis dermatitis

Scaling and ulcerated skin appearing on the lower legs and around the ankles, are indicative of stasis dermatitis. Stasis dermatitis is caused by poor blood circulation and can happen in people with congestive heart failure, varicose veins, etc. Veins in the lower legs fail to return blood efficiently, causing pooling of blood and fluid build-up and oedema leading to irritation, especially round the ankles [24].

3.1.5. Seborrhoeic dermatitis

Also called as cradle cap in infants, it generates greasy, yellowish scales on the scalp and eyebrows, behind the ears, and around the nose. It may also affect the face or genitals, under the breasts, etc. This condition may be related to maternal hormonal changes affecting the sebaceous glands and may be aggravated by stress [25].

3.2. Rashes

An abnormal change in skin colour or texture is known as a rash. Some skin rashes may be caused by viruses, such as measles, chicken pox, shingles, etc. Rashes are often followed by skin irritation, which can have many reasons, including allergic reaction or sting from a plant. Some rashes, such as psoriasis, are caused by chronic or lifelong conditions. Eczema is another example of rashes [26].

3.3. Chronic Skin Problems

There are more than a dozen chronic skin problems. Of them most common is eczema. It is a family of skin conditions, atopic dermatitis being the most common. It can happen at any age, even in infancy often affecting the face, hands, knees, or feet. Psoriasis is another difficult disease with varied symptoms. Plaque psoriasis, the most common type, causes thick red plaques covered with silvery scales. The most common areas affected are the scalp, elbows, knees, and lower back extending up to the nails and body folds. Although psoriasis can occur in members of the same family, it is not contagious and cannot be passed from person to person. Scleroderma is an autoimmune disorder where the skin gradually tightens, thickens or hardens and loses its ability to stretch [27,28].

3.4. Bacterial Infections

The bacterial infections are of many types. Some of them may bring fever, others don't. Cellulitis, impetigo, MRSA (methicillin-resistant staphylococcus aureus), staph infection, leg ulcer are commonly

occurring. Leprosy is an infectious nerve and skin disease affecting many parts of world, including India [29,30].

3.5. Viral Infections

Shingles, warts and *Molluscum contagiosum* are the most common viral skin infections. Shingles and chicken pox are caused by varicella-zoster virus. Both of them are marked by an outbreak of rash or blisters on the skin. Shingles or herpes zoster appears when the dormant chickenpox virus, *Varicella zoster*, is reactivated in the nerve tissues. Early signs of shingles include tingling and localized pain mostly accompanied with blistering rash having itching, burning or deep pain. After a person has had chickenpox, the virus lies dormant in the nerves. In some people, it gets reactivated at some point in their lives, resulting in an outbreak of herpes zoster. Herpes zoster is more common in people older than age 50 with a depressed immune system. The virus usually results in a painful rash or small blisters on a strip of skin anywhere on the body. In some cases, even after the rash is gone, a complication called post herpetic neuralgia (PHN) may appear with the pain continuing for a prolonged period of time. The children, most at risk for herpes zoster, are those whose mothers had chickenpox very late during pregnancy or who themselves had chickenpox during the first year of life [31].

3.6. Fungal Infections

Ringworm, athlete's foot, jock itch and yeast infections are examples of fungal infections. Candidiasis is a systemic version of yeast infection, commonly known as thrush. *Pityriasis versicolor* or *Tinea versicolor*, is also a fungal infection of the skin. A fungal nail infection occurs when a fungus attacks a fingernail, a toenail, or the nail bed [32].

3.7. Pigmentation Related Problems

Birthmarks are well known as coloured marks on the skin. Some birthmarks may require treatment to avoid them becoming permanent. Some of the birthmarks may be treated for cosmetic reasons while others can cause medical problems around the eyes, mouth or nose. *Acanthosis nigricans* causes dark, thickened patches on the skin in areas of neck, armpits, groins and under the breasts. It is frequently found in diabetic patients. Hyperpigmentation is excessive pigmentation or colouring of the skin, while hypopigmentation is a short condition in pigmentation. Hyperpigmentation is caused by an increase in melanin, the substance in the body that is responsible for skin colour. Vitiligo is a long-term skin condition that causes white patches and develops as a result of the lack of melanin. Hypopigmentation is the result of a reduction in melanin production. Vitiligo can affect any part of the body but it is usually seen on areas exposed to the sun, such as the face, neck and hands. Vitiligo is caused by the destruction of pigment-forming cells known as melanocytes, exact cause of which is not

very clear. One possible explanation might be that the body's immune system destroys the cells, as in other autoimmune conditions [33,34].

3.8. Skin Lumps and Bumps

Besides diseases, the cysts, hives, moles, etc. can pop up on the skin from time to time [35,36]. Most of them are harmless, however if they change and look like skin cancer, it needs urgent attention of a skin specialist, just to be safe. Some of them, as example, are given as follows.

3.8.1. Keloids

A keloid is a bump of scar tissue growing past a wound's bounds. It may keep growing weeks after your skin heals, commonly in dark skin. Keloids can form anywhere, but often they're on earlobes, shoulders, the upper back, chest or cheeks. They're not harmful, normally [37,38].

3.8.2. Skin tags

Skin tags are little growths of skin with a bulge at the end and usually form in places where the skin rubs together, like neck, armpits or groin. Normally, it needs not to worry but if they're painful, bleeding or irritated, a doctor may be consulted [39].

3.8.3. Skin cysts

The small, flesh-colored sacs under the skin are filled with keratin, a soft, cheese-like protein forming slow-growing bumps when a hair follicle or oil gland is blocked or damaged. Most skin cysts are benign (not cancer) and won't need treatment unless they hurt, leak, or bother [40].

3.8.4. Warts

Warts can pop up on the hands, face, feet, limbs, and near nails. They are caused by the human papillomavirus (HPV), but different strains affect only certain body parts. It can be passed on others or a new area of skin by touch. Warts may go away on their own, however the treatment stops them from spreading [41,42].

3.8.5. Folliculitis

In this skin condition, bacteria infect the hair follicles, mostly on the neck, thighs, armpits or buttocks. It causes small, red bumps or white-headed pimples, blisters, crusty sores and itchy or tender skin. It can be treated by bathing with antibacterial soap [43].

3.8.6. Cherry hemangioma

These tiny, bright red spots or bumps on the skin are usually harmless. In most cases, there is no need of treatment for cherry hemangioma unless they are irritated or bleeding [44].

3.8.7. Moles

Almost all of us have moles as flat or slightly raised round brown or black spots. They have been recognized as one of the face detectors for identification purposes. Most of the time, we do not need to worry about them but if they change in size, shape or color, it deserves attention of a doctor [45,46].

3.8.8. Seborrheic keratosis

These thick, rough bumps found anywhere on the skin can look waxy or scaly, like they are pasted on. They may have a warty surface, but are not contagious, some itch but most are painless and do not need treatment [47].

4. Disadvantages of Treatment by Synthetic Drugs

Oral medications for skin diseases are common prescription by allopathic practitioners. But in many cases, when they are not sure of exact diagnoses of skin ailments, triple combination creams are prescribed by doctors or bought over the counter as a shot-gun therapy. They are based on the hope that at least one of the ingredients will work. But sometimes the rash rebounds, resulting in the infections requiring longer treatment time and higher doses to recover. In fact, the real culprit is the indiscriminate use of potent steroid containing creams (steroid along with antibiotic and antifungal) available over the counter without prescriptions. There are about several hundred brands of topical steroids available in the market. It is observed that due to the widespread use of these cocktail-type creams, simple skin conditions are becoming almost non-treatable. They are now half a billion dollar business and are used either alone or in combinations. There is also an increase in the side effects caused by steroidal creams. About 66% of steroid creams are sold without proper prescriptions. However, currently the derma market is growing fast, touching a business of Rs 6,000 crore [48-50]. On the other hand the medicinal plants are well proven for reducing the side effects of even western medicine. For instance, if glycyrrhizic acid, a compound from licorice, is concomitantly used with streptomycin, it can reduce or even eliminate the nerve damage of our brain induced by streptomycin without affecting the potency of streptomycin [51].

5. Ayurvedic Skin Type and Treatments

For Ayurvedic treatment, it is also important to understand the type of skin of the patient. Like other body and mind type diseases, skin disease treatments by Ayurveda also depend upon *Vata*, *Pitta*

and *Kapha* properties of an individual. (i) *Vata* type of skin is generally thin, delicate, dry and cool to touch. It easily gets dehydrated and is vulnerable to weather changes. To keep *Vata* in balance, it is advised to use essential oils to nurture the skin and protect from dryness. (ii) The skin of *Pitta* type people have soft, fair, sensitive, warm with medium thickness. This type of skin is susceptible to eruptions, acne, sun spot and rashes and needs cooling, extra nurturing and protection from strong sun. (iii) The *Kapha* skin is soft, oily, thick, cool and more tolerant to sun. The aging is slower in this type of skin and is more resistant to wrinkles. In this type, the skin is dull complexioned, oily having black heads and pimples and is more resistant and needs normal cleaning and scrubbing [52]. Based on this principle, a large number of plants have been recommended for the treatment of skin related disorders. Most commonly used among them are listed hereunder and their method of uses have been described in Table 1.

Table 1: List of commonly recommended Ayurvedic plants in skin restoration

S. No.	Botanical name	Family	Hindi name	English name	Major chemical constituents	Ayurvedic recommendations
1.	<i>Acacia nilotica</i>	Mimosaceae	Babool, Baboor	Acacia tree, Babool	Tannins, saponins, flavonoids	Flowers are grinded in vinegar and applied to cure eczema.
2.	<i>Aconitum heterophyllum</i>	Renunculaceae	Atis	Indian atis	Aconitine, mesaconitine	Indian atis powder along with "chiretta" extract is given to cure boils and acne.
3.	<i>Adhatoda zeylanica</i>	Acanthaceae	Adusa, Adusi, Safed vasa, Vakas, Visotta	Malabar nut	Vasicine, vasicinone	Its leaves and turmeric are grinded in cow urine. It cures itching swelling and eczema.
4.	<i>Alangium salvifolium</i>	Alangiaceae	Ankol, Dhera	Tlebid Alu Retis	Alangine, ankorine, alangamide	Its root bark, jayaphal, javitri and cloves are powdered and given for dermatosis.
5.	<i>Albizia lebbek</i>	Mimosaceae	Siris, Siras	Siris tree	Budmunchia mine alkaloids, saponins	(i) Paste of its flowers is applied to cure boils, acne and swellings. (ii) The lotion form of the bark cures skin wound and itching. (iii) Its leaves and black pepper are grinded and given to cure dermatosis.
6.	<i>Allium cepa</i>	Liliaceae	Pyaz, Kanda	Onion	Dialkenyl sulfides	(i) Paste of its seeds is beneficial in leucoderma. (ii) It is grinded in vinegar and applied to cure eczema.

7.	<i>Aloe vera</i>	Liliaceae	Ghee kunwar, Ghritkumari	Indian aloe	Emodin, aloemodin	(iii) To cure boils, pimples, acne and goiter, it is boiled in ghee and tied. (i) Its pulp, saltpeter and turmeric powder are bound on the abscess to cure it by burst. (ii) To benefit from cyst in the breast, its roots powder and turmeric powder are warmed and bound 3 times a day.
8.	<i>Amomum subulatum</i>	Zingiberaceae	Badi Elaichi	Large cardamom	1,8-Cineole, alpha-pinene	To heal burns and wounds, its fruits' powder is taken in combination with several other materials to form a paste and applied.
9.	<i>Apium graveolens</i>	Apiaceae	Ajmod	Celery seeds	Limonene, selinine	Celery seeds powder is taken with jaggery 3 times for seven days to cure dermatosis.
10.	<i>Argemone mexicana</i>	Papaveraceae	Satyanashi, Bhabhbhanda	Prickly poppy, Mexican poppy	Sanguinarine, reticuline	(i) To cure dermatosis and bleeding diathesis, its oil is applied and the juice from leaves in milk is taken. (ii) Its milk treats ulcer and itching. (iii) The yellow milk or whole plant juice is applied to cure boils, acne, itching, eczema and irritation.
11.	<i>Azadirachta indica</i>	Meliaceae	Neem	Margosa tree	Azadirone, nimbin	(i) To cure itching, boils and dandruff, head is washed with its decoction and its oil is applied. (ii) Eczema can be cured by the bandage dipped in its leaves juice. (iii) The preparations from its leaves, flowers and fruits are recommended for leucoderma.
12.	<i>Brassica juncea</i>	Brassicaceae	Rae	Indian mustard	beta-Sitosterol, Linoleic acid	The paste of mustard powder in "ghee" is applied to cure scars, scabies, eczema, etc.
13.	<i>Buchanania latifolia</i>	Anacardiaceae	Chironji	Calampang nut tree	Cardanol, cardol	(i) In combination with other materials, the paste is cooked in oil and filtered. It is applied to cure abscess. (ii) Its kernel is pasted in rose water and borax is added and applied for itching.
14.	<i>Butea monosperma</i>	Fabaceae	Dhak, Tesu	Jungle flame	Butrin, butein, butin	(i) When its seeds' oil is injected in the affected area, it cures dermatosis. (ii) When seeds powder in lemon juice is applied, it cures eczema and itching.
15.		Caesalpinaceae	Kat karanj	Fever nut		

16.	<i>Caesalpinia bonduc</i> <i>Calotropis procera</i>	Asclepiadaceae	Madar, Aak, Akwan	Swallow wort, Madar	Hematoxylol, stereochenol A Ursane triterpenoids	(i) Its leaves are grinded with neem and khair (<i>Acacia chundra</i>) leaves and applied, bathed and drunk for dermatosis. (ii) Its seeds are mixed with turmeric, black myrobalan (<i>Terminalia chebula</i>) and mustard seeds to cure dermatosis. (iii) Its oil is useful in skin problems when mixed with rock salt and “ <i>jasta bhasma</i> ” or lemon juice or leadwort powder. (i) Its milk with honey is applied to cure eczema and with coconut oil relieves from scabies. Its root powder in curd is also helpful in eczema. (ii) Its milk is mixed with mustard oil, turmeric powder, realgar (arsenic sulfide) and boiled in water to cure skin disorders. Its milk, bawchi seeds and realgar paste is applied for treating leucoderma. (iii) Preparations of its leaves and several other ingredients are useful in eczema, itching, etc. (iv) Its leaves are burnt in mustard oil and realgar is added and used for skin rejuvenation. The leaves extract and several other items are cooked in ghee to cure eczema and other problems.
17.	<i>Cassia fistula</i>	Caesalpinaceae	Amaltas, Dhanbaheda	Purging cassia	Leucopelargonidin, Leucoanthocyanidin	(i) Leaves and roots are useful in dermatosis. (ii) Roots and aerial parts are boiled in milk and applied to cure skin diseases, including eczema, itching.
18.	<i>Cassia occidentalis</i>	Caesalpinaceae	Kasaundi	Negro coffee	Flavonoid glycosides	(i) Its seeds in buttermilk and with vinegar are used for eczema. (ii) Its seeds and radish seeds are grinded with sulfur to form a paste and applied for leucoderma.
19.	<i>Cassia tora</i>	Caesalpinaceae	Panvad, Chakravada	Foetid carria, Ringworm plant	Cassidine, toralactone	(i) To cure eczema, whole plant in curd, leaves in jaggery and “khatai”, seeds with sulfur in milk and oil or in cow urine are independently prepared and applied. (ii) Seeds are grinded in milk and mixed with castor oil. It cures dermatosis.
20.		Celastraceae		Staff tree		

21.	<i>Celastrus paniculatus</i>	Lauraceae	Malkangani, Jyotishmati	Cinnamon	Celapanigin, cellapanin, fatty acids	It heals the wound faster. Its oil is useful in skin disorders. A paste of its seed powder in cow urine is useful in “pama” (scab).
22.	<i>Cinnamomum zeylanicum</i>	Rutaceae	Dalchini	Lemon	Cinnamaldehyde, cinnamates	A paste of cinnamon and honey are applied to get relief from itching, eczema and boils.
23.	<i>Citrus aurantifolia</i>	Iridaceae	Neembu, Kagaji nimbu	Saffron	Bergamottin, bergapten	Half of lime is rubbed on the itching, sensation and eczema affected area of skin for relief.
24.	<i>Crocus sativus</i>	Zingiberaceae	Keshar	Turmeric	Safranal, crocin, picrocrocin	The paste of leaves of kesar is applied over wound for healing.
25.	<i>Curcuma longa</i>	Poaceae	Haldi	Conch grass, Doob grass	α -Atlantone, β -turmerone, zingiberene	(i) Turmeric powder is mixed with cow urine or butter and applied for itching, eczema, boils. (ii) Turmeric powder and green leaves are mixed with butter for glowing of the skin and curing scabies. “Doob” grass and turmeric powder are grinded and applied for scabies, eczema and urticaria.
26.	<i>Cynodon dactylon</i>	Fabaceae	Doob, Doorba	Sissoo, Rosewood	Flavonoids, β -sitosterol	As stated above, it is useful with turmeric powder. A medicated oil made from its juice cures eczema, itching and wounds.
27.	<i>Dalbergia sissoo</i>	Apiaceae	Sheesham, Sheesho	Carrot	Tectorigenin, dalbergin derivatives	Leaves’ oil and decoction are useful in dermatological disorders.
28.	<i>Daucus carota</i>	Asteraceae	Gajar	Trailing eclipa	Lutein, zeaxanthin, α -pinene	Carrot is boiled in water and its paste is applied to treat the wound, burn and abscess. The fresh juice of carrot in turmeric is applied on the face to cure acne.
29.	<i>Eclipta alba</i>	Euphorbiaceae	Bhangra, Bhangraiya	Indian gooseberry	Widelolactone and glycoside	Its leaves along with “jawasa”, “chiretta” and “sharpunkha” after grinding in water and filtered, is given in honey to cure itching.
30.	<i>Emblica officinalis</i>	Euphorbiaceae	Amla, Anwala	Milk hedge	Gallic and ellagic acid derivatives	Its fruit with margosa leaves are given to cure serious forms of dermatosis.
	<i>Euphorbia thymifolia</i>		Doodhi		Luteolin, apigenin	The fresh or dried plant is powdered and cow’s butter is added to form a paste then applied for treating the itching.

31.	<i>Ficus benghalensis</i>	Moraceae	Bargad, Badha	Banyan tree	Bengalenosides, Leucopelargonidin glycosides	Its milk heals the unripe boils and helps in burst and healing when in advanced stage, also.
32.	<i>Ficus religiosa</i>	Moraceae	Peepal	Peepal tree, Sacred fig	Kaempferol, sterols	Soft leaves are eaten raw or extract is taken to treat the skin disorders. A paste of bark, lime and “ghee” is applied to cure eczema and itching.
33.	<i>Hydnocarpus pentandra</i>	Flacourtiaceae	Chaulmoogra	Hydnocarpus	Alkaloids, tannins, flavonoids	(i) A mixture of its oil in castor oil, sulfur, camphor and lemon juice is useful in eczema and itching. (ii) Its peel is grinded with castor seeds and mixed in castor oil. The paste is applied for scabies.
34.	<i>Jasminum grandiflorum</i>	Oleaceae	Chameli	Jasmine	Oleanolic acid, isoquercitrin, ursolic acid	(i) A paste of its new leaves, “kutaj”, white kaner’s roots, “karaj” fruits and “daruhaldi” bark is applied for dermatoses. (ii) Jasmine oil is very effective in curing wound, eczema, itching and burns.
35.	<i>Juglans regia</i>	Juglandaceae	Akhrot	Walnut	Fatty acids, linoleic acid	When the walnut seeds are chewed, before morning brush, and applied over the eczema, in few days it is cured.
36.	<i>Lawsonia inermis</i>	Lythraceae	Mehendi	Henna	α - and β -ionones, lawsone	(i) Its flowers and “katira” are soaked in water overnight and after adding sugar, the decoction is taken for few days to get relief from itching and burning sensation in head. (ii) The juice of its leaves and flowers are beneficial in dermatosis. The aqueous decoction of its leaves and bark are also useful in dermatosis.
37.	<i>Linum usitatissimum</i>	Linaceae	Alasi, Tees	Linseed, Flaxseed	Oleic acid and linoleic acid	(i) The roasted linseed and sesame is boiled in cow milk and the paste is applied. It is effective in burns and boils. (ii) To get relief from burns, the linseed oil and lime water is applied.
38.	<i>Mangifera indica</i>	Anacardiaceae	Aam	Mango	Mangiferin, isomangiferin	The unripe mango when processed with methylated spirit, is applied to treat the eczema and boils.
				Persian lilac		

39.	<i>Melia azadarach</i>	Meliaceae	Bakayan		Melianoninol, melianol	After soaking ripe yellow seeds in water overnight, it is powdered and taken orally to treat dermatosis.
40.	<i>Momordica charantia</i>	Cucurbitaceae	Karela	Bitter Gourd	momordicolide, momordicophenolide A	(i) Its whole plant, cinnamon, "peepar" and rice are mixed in wild almond oil, and applied to cure itching and other skin diseases. (ii) Applying its juice and paste of the roots on the head, cures boils.
41.	<i>Ocimum sanctum</i>	Lamiaceae	Tulasi	Holy basil	Rosmarinic acid, apigenin	(i) Its leaves' juice is useful in dermatosis. A paste of its leaves in lemon juice is used for eczema and dermatosis. (ii) A mixture of basil and ginger roots are given in honey to cure dermatosis.
42.	<i>Phyllanthus fraternus</i>	Euphorbiaceae	Bhui amla, Bhum aawali	--	Phyllanthin, hypophyllanthin	A paste of its grinded leaves and salt are applied for itching.
43.	<i>Plumbago zeylanica</i>	Plumbaginaceae	Chitrak cheeta	Leadwort	Plumbagin, isoshinanolone	The paste of its grinded bark in milk or water is applied to cure skin disorders including leucoderma.
44.	<i>Premna latifolia</i>	Verbenaceae	Arani, Ganiyar, Agethu	--	p-Methoxy cinnamic acid, linalool	A decoction of Arani leaves and myrobalan is given to cure dermatosis.
45.	<i>Prunus amygdalus</i>	Rosaceae	Badaam	Almond	Amandine, albumin, amygdaline	(i) Paste of its seeds is applied to treat wound and abscess. (ii) A paste of badam, mustard, vacha (<i>Acorus calamus</i>) and black salt is applied to treat freckles.
46.	<i>Psoralea corylifolia</i>	Fabaceae	Bakuchi, Bavachi	Psoralea seeds	Psoralen, angelicin	(i) Its seeds are extremely useful for leucoderma in several combination forms, e.g. (a) its seeds and As ₂ S ₃ are grinded in cow urine and the paste is applied to cure vitiligo, (b) similar benefits are achievable when the seeds are grinded with psoralea seeds in vinegar and applied, (c) The decoction of its seeds with gooseberry or "khair" is given to cure vitiligo, etc. (ii) Psoralea seeds are soaked in cow urine for several days, dried and grinded. It cures dermatosis when given before meals.
47.		Punicaceae		Pomegranate		The paste of its leaves is mixed in mustard oil and massaged to cure itching.

48.	<i>Punica granatum</i> <i>Rubia cordifolia</i>	Rubiaceae	Anaar Majith, Manjistha	Madder root	1-(2-Propenyl)-piperidine in leaves, anthocyanins in fruits Cordifoliol, cordifodiol	A paste of manjishtha powder in honey is useful in freckles. Its leaves and roots are grinded to form a paste and applied to treat the wound or abscess.
49.	<i>Santalum album</i>	Santalaceae	Chandan	Sandalwood	alpha- and beta-Santalols	(i) Sandal powder in “ <i>guduchi</i> ” (<i>Tinospora cordifolia</i>) decoction is useful in hives (“ <i>pitti</i> ”). (ii) Its paste in water is useful in itching.
50.	<i>Tamarindus indica</i>	Caesalpiniaceae	Imali	Tamarind	Fatty acid derivatives, pinitol	(i) Tamarind seed powder in lemon juice is applied to cure eczema. (ii) The poultice of its seeds and leaves when tied on boils, helps it burst and heal faster. (iii) Tamarind seeds kernel and psoralea seeds are grinded and the paste is applied to cure the white patches.
51.	<i>Tephrosia purpuria</i>	Fabaceae	Sarphonka	Purple tephrosia, wild indigo	Rutin, purpurin	Its oil is used to cure itching and leaves juice is given to treat dermatosis.
52.	<i>Terminalia arjuna</i>	Combretaceae	Arjuna	Arjuna	Arjunic acid, arjunolic acid	Its bark powder with water is given for dermatosis. A paste of its bark in water is applied over the affected skin.
53.	<i>Thevetia peruviana</i>	Apocynaceae	Kaner, Kanail	Oleander	Digitoxigenin , cannogenin	When the oil from root bark is applied, it cures eczema, itching and dermatosis. The paste of leaves, flowers and roots are useful in itching. A thick paste of ajowan cures eczema, boils and burn. Ajowan boiled water is used to rinse the affected skin part.
54.	<i>Trachyspermum ammi</i>	Apiaceae	Ajawayan	Ajowan	Thymol, p-cymene	The powder of ginger roots, “ <i>madar</i> ” leaves, Malabar nut leaves, “ <i>nishoth</i> ”, cardamom and “ <i>kundru</i> ” is prepared and mixed with ash of “ <i>palaash</i> ” to make a paste. It is applied to cure dermatosis.
55.	<i>Zingiber officinalis</i>	Zingiberaceae	Adi, Adarak	Ginger	Gingerols, shogaol	

6. Ayurvedic Plants Useful in Skin Diseases

In order to get rid of skin problems and get a natural glow especially on the face, the natural Ayurvedic creams are available in the Indian market. These creams are made from extracts of commonly recommended plant materials like, *Aloe vera*, wheat germ oil, jojoba oil, mulethi, manjishta, banana, etc. It is claimed that they nourish and rejuvenate the face skin [53]. But there are large number of plants described for overall skin restoration in Ayurvedic system of medicine. The important of them have been included for discussion hereunder. It needs to be mentioned that out of a list of about 450 Ayurvedic plants, 55 have been selected for this review. The selection is based on their popularity as one of the components of Ayurvedic prescriptions for common skin diseases. But the present list cannot be claimed for having included all the Ayurvedic plants used for the skin disorders. Therefore, the present list focuses on most of the Indian plants, which are used for the rejuvenation and cure of skin diseases and are currently prescribed in Ayurveda. The Ayurvedic plants, useful in the skin illnesses, have been included in Table 1. Since in Ayurvedic system of medicine, the prescription of a polyherbal formulation is quite popular, therefore some of the unlisted plants could also find place in treating the skin problems. However the present list cannot be claimed being the complete. It is apparently visible that a single plant is useful in more than one type of skin disorders (Table 2) because they are used in different application methods or combinations [54]. Due to the paucity of space, the picture of each plant has been referred to the easy online access, although including them in this review should have been attractive to the readers [55]. The names of the major isolated compounds of each plant have been included in Table 1 but they must not be misunderstood for the bioactive constituents for skin rejuvenation. The investigations pertaining to the structure activity relationship have rarely been attempted but it is definitely the need of hour for a detailed future research.

Table 2. Category of skin disorders and recommended plants

S. No.	Skin disorder	Name of plants in Hindi	Botanical name of the plants
1	Eczema	Babool, Baboor Adusa, Adusi, Safed vasa, Vakas, Visotta Pyaz, Kanda Satyanashi, Bhadbhanda Neem Rae Dhaak, Tesu Madaar, Aak, Akwan Amaltas, Dhanbaheda Kasaundi Panvad, Chakravada Dalchini Neembu, Kagaji nimbu	<i>Acacia nilotica</i> <i>Adhatoda zeylanica</i> <i>Allium cepa</i> <i>Argemone mexicana</i> <i>Azadirachta indica</i> <i>Brassica juncea</i> <i>Butea monosperma</i> <i>Calotropis procera</i> <i>Cassia fistula</i> <i>Cassia occidentalis</i> <i>Cassia tora</i> <i>Cinnamomum zeylanicum</i> <i>Citrus aurantifolia</i>

2.	Dermatosis	<p>Haldi Doob, Doorba Peepal Chaulmoogra Chameli Akhrot Aam Tulasi Imali Kaner, Kanail Ajawayan</p> <p>Ankol, Dhera Siris, Siras Ajmod Satyanashi, Bhadbhanda Dhaak Kat karanj Amaltas, Dhanbaheda Panvad, Chakravada Amala Chameli Mehendi Bakayan Tulasi Arani, Ganiyar, Agethu Bakuchi, Bavachi Sarphonka Arjuna Kaner, Kanail Adi, Adarak</p>	<p><i>Curcuma longa</i> <i>Cynodon dactylon</i> <i>Ficus religiosa</i> <i>Hydnocarpus pentandra</i> <i>Jasminum grandiflorum</i> <i>Juglans regia</i> <i>Mangifera indica</i> <i>Ocimum sanctum</i> <i>Tamarindus indica</i> <i>Thevetia peruviana</i> <i>Trachyspermum ammi</i></p> <p><i>Alangium salvifolium</i> <i>Albizzia lebbek</i> <i>Apium graveolens</i> <i>Argemone mexicana</i> <i>Butea monosperma</i> <i>Caesalpinia bonduc</i> <i>Cassia fistula</i> <i>Cassia tora</i> <i>Embllica officinalis</i> <i>Jasminum grndiflorum</i> <i>Lawsonia inermis</i> <i>Melia azadarach</i> <i>Ocimum sanctum</i> <i>Premna latifolia</i> <i>Psoralia corylifolia</i> <i>Tephrosia purpurea</i> <i>Terminalia arjuna</i> <i>Thevetia peruviana</i> <i>Zingiber officinalis</i></p>
3.	Itching	<p>Adusa, Adusi, Safed vasa, Vakas, Visotta Siris, Siras Satyanashi, Bhadbhanda Neem Rae Chironji Dhaak Madaar, Aak, Akwan Amaltaas, Dhanbaheda Malkangani, jyotishmati Dalchini Neembu, Kagaji nimbu Haldi Doob, Doorba Bhangra, Bhangraiya Doodhi Peepal Chaulmugra Chameli Mehendi Karela</p>	<p><i>Adhatoda zeylanica</i></p> <p><i>Albizzia lebbek</i> <i>Argemone mexicana</i> <i>Azadirachta indica</i> <i>Brassica juncia</i> <i>Buchanania cochinchinensis</i> <i>Butea monosperma</i> <i>Calotropis procera</i> <i>Cassia fistula</i> <i>Celastrus paniculatus</i> <i>Cinnamomum zeylanicum</i> <i>Citrus aurantifolia</i> <i>Curcuma longa</i> <i>Cynodon dactylon</i> <i>Eclipta alba</i> <i>Euphorbia thymifolia</i> <i>Ficus religiosa</i> <i>Hydnocarpus pentandra</i> <i>Jasminum grandiflorum</i> <i>Lawsonia inermis</i> <i>Momordica charantia</i></p>

4.	Leucoderma	Bhui amala Anaar Chandan Kaner Pyaz, Kanda Neem Madaar, Aak, Akwan Kasaundi Amala Chitrak Bakuchi Imali	<i>Phyllanthus fraternus</i> <i>Punica granatum</i> <i>Santalum album</i> <i>Thevetia peruviana</i> <i>Allium cepa</i> <i>Azadirachta indica</i> <i>Calotropis procera</i> <i>Cassia occidentalis</i> <i>Emblica officinalis</i> <i>Plumbago zeylanica</i> <i>Psoralea corylifolia</i> <i>Tamarindus indica</i>
5.	Wound healing and swelling	Adusa, Adusi, Safed vasa, Vakas, Visotta Siris, Siras Ghritkumari Badi elaichi Satyanashi, Bhadbhanda Raeer Chironji Malkangani, Jyotishmati Keshar Doob, Doorba Gajar Chameli Alasi, Tees Badaam Manjistha Imali Ajawayan	<i>Adhatoda zeylanica</i> <i>Albizia lebbek</i> <i>Aloe vera</i> <i>Amomum subulatum</i> <i>Argemone mexicana</i> <i>Brassica juncea</i> <i>Buchanania cochinchinensis</i> <i>Celastrus paniculatus</i> <i>Crocus sativus</i> <i>Cynodon dactylon</i> <i>Daucus carota</i> <i>Jasminum grandiflorum</i> <i>Linium usitatissimum</i> <i>Prunus amygdalus</i> <i>Rubia cordifolia</i> <i>Tamarindus indica</i> <i>Trachyspermum ammi</i>
6.	Boils/ Acne/ Pimples	Atis Siris, Siras Pyaz, Kanda Satyanashi, Bhadbhanda Neem Dalchini Haldi Gajar Doodhi Bargad, Badha Alasi, Tees Aam Karela Ajawayan	<i>Aconitum heterophyllum</i> <i>Albizia lebbek</i> <i>Allium cepa</i> <i>Argemone mexicana</i> <i>Azadirachta indica</i> <i>Cinnamomum zeylanicum</i> <i>Curcuma longa</i> <i>Daucus carota</i> <i>Euphorbia thymifolia</i> <i>Ficus benghalensis</i> <i>Linium usitatissimum</i> <i>Mangifera indica</i> <i>Momordica charantia</i> <i>Trachyspermum ammi</i>
7.	Miscellaneous (Dandruff, Urticaria/ hives, Freckles, Cyst, Rejuvenation)	Ghritkumari Neem Kat karanj Madaar, Aak, Akwan Amaltaas, Dhanbaheda Malkangani, Jyotishmati	<i>Aloe vera</i> <i>Azadirachta indica</i> <i>Caesalpinia bonduc</i> <i>Calotropis procera</i> <i>Cassia fistula</i> <i>Celastrus paniculatus</i>

		Haldi Sheesham Peepal Karela Chitrak, Cheeta Badaam Manjistha Chandan	<i>Curcuma longa</i> <i>Dalbergia sissoo</i> <i>Ficus religiosa</i> <i>Momordica charantia</i> <i>Plumbago zeylanica</i> <i>Prunus amygdalus</i> <i>Rubia cordifolia</i> <i>Santalum album</i>
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6.1. *Acacia nilotica* (L.) Willd. ex Delile ssp. *indica* (Benth.) Brenan

It belongs to the Family Mimosaceae and is popularly known as “babool” in Hindi. It is an average sized tree of deserts. It is found as wild and cultivated throughout India. Its branches are full of thorns and leaves and are bipinnate, small with a group of up to 9. Flowers, yellow in colour, also grow in bunches. 3-6 Inch long pods have 8-12 seeds. In summer brownish gum oozes out from stems. The flowers are grinded in vinegar and applied to cure eczema. Its bark and gum are also useful in gynecological problems. Leaves are useful in diarrhea and dysentery [56,57]. A formulated ointment, containing 20% active antimicrobial honey having *A. nilotica* as one of the components, was found very effective, low-cost product for the treatment of wound infections [58]. The phytochemical analysis of the aqueous, ethyl acetate and n-butanol fractionated portions of the pod extracts of *A. nilotica* revealed the presence of tannins, saponins, flavonoids, carbohydrates whereas in the residue portion the carbohydrates and tannins were the only constituents [59].

6.2. *Aconitum heterophyllum* Wall. ex Royle

It belongs to the Family Renunculaceae and is found in the north western India up to the height of 15,000 feet with Hindi name as “atis”. It is 1-4 feet tall with a flat branch with leaves. The leaves are 2-4 inch long and round and the flowers are shiny greenish blue as hooded cap. The roots having medicinal importance, are the esculent tubers. Indian atis powder along with “chiretta” extract is given to cure boils and acne. It is also useful in bronchitis, fever and improving the immunity [56,57]. Its major constituents are aconitine, mesaconitine, hypaconitine, benzoylaconine, benzoylmesaconine, and benzoylhypaconine [60].

6.3. *Adhatoda zeylanica* Medik. Syn. *A. vasica* Nees., *Justicia adhatoda* L.

It belongs to the Family Acanthaceae and is known as “adusa, safed vasa, vakas, visotta” in Hindi. It is wildly found in planes up to the height of 4000 feet. Its stem is small and leaves are 3-8 inch long, curvy and pointed at the end. Flowers are white in color. Its leaves are grinded with turmeric and cow urine. This paste cures itching, swelling and eczema. It is also used in bronchial asthma, cough, piles, epilepsy

and fever [56,57,61]. It consists of pyroquinazoline alkaloids with vasicine and vasicinone as the major alkaloid. Flavonoids and sterols have also been reported [62,63].

6.4. *Alangium salvifolium* (L.f.) Wang

Belonging to the Family Alangiaceae, it is called in Hindi as “*ankol*” or “*dhera*”. It grows in dry land throughout India. It is a 10-20 feet tall tree with brown coloured bark. Its leaves are 3-5 inch long and are found in different shapes. The flowers are white to yellowish white in colour with nice fragrance. Fruits are round or oval in shape and the seeds are large and sticky. Its root bark, jayphal, javitri and cloves are powdered and given to the dermatosis patient. It is also useful in diarrhoea, dysentery, fever and as anti-poison in snake or insect bite [56,57]. The major constituents have been reported as alangine, ankorine, alangamide [64,65].

6.5. *Albizzia lebeck* (L.) Benth. Syn. *Acacia lebbek* (L.) Willd., *Mimosa lebeck* L.

A. lebeck belongs to the Family Mimosaceae and is a forest tree. In Hindi, it is called as “*siris*” or “*siras*” and is planted up to the height of 8000 feet throughout India. Its inner bark is red and leaves are winged. The flowers are yellowish white producing 4-12 inch long pod each having up to two dozen seeds. The paste of its flowers is applied to cure boils, acne and swellings. The lotion from of the bark cures skin wound and itching. Its leaves and black pepper are grinded and given to cure dermatosis. It is also useful in tooth problems, urinary troubles, piles and mental disorders [56,57]. From the seeds, saponins have been reported. A rare class of macrocyclic alkaloids, called budmunchiamines, has been reported from its seeds [66,67].

6.6. *Allium cepa* L. Syn. *A. angolense* Baker

The plant is a vegetable with Hindi name as “*pyaz*” or “*kanda*” belonging to the Family Liliaceae. It is 2-3 feet tall with long muscular, hollow and cylindrical leaves with edible bulb at the base. It is cultivated and used as vegetable throughout the world. It attains common prescription in Ayurvedic skin diseases treatment. The Paste of its seeds is beneficial in leucoderma. It is grinded in vinegar and applied to cure eczema. It is boiled in ghee and tied to cure boils, pimples, acne and goiter. It is also useful in eye problem, cough, cholera, sleeplessness and improves sexual vigor [56,57,61]. The results indicated that onion might be promising in treatment of fungal-associated diseases from important pathogenic genera like, *Candida*, *Malassezia* and the dermatophytes [4]. Warts also sometimes disappear if rubbed with cut onions. Roasted onions are applied as a poultice to boils, bruises, wounds to bring them to maturity by its heaty sensation [68]. The slicing, chopping or dicing the onion, ruptures the cells and releases alliin and alliinase thus allowing them to mingle and form a powerful new compound called

allicin, responsible for giving onion its pungent aroma which makes the eyes tear. Other compounds identified from onion are dialkyl sulfides [4,69].

6.7. *Aloe vera* (L.) Burm.f. Syn. *A. barbadensis* Mill.

It belongs to the Family Liliaceae and is popularly known as “*gheekunwar*” or “*ghritkumari*”. It is very popular house plant and grown on the border of fields. It is 1-2 feet high fleshy and green perennial plant. Its leaves are 1-2 feet long fleshy up to 4 inch broad. Red coloured flowers are arranged in a long inflorescence. Its fruits are oval in shape and with pointed edge. A yellowish liquid oozes out when the leaves are cut. It attains common prescription in Ayurvedic skin diseases treatment. Its pulp, saltpeter and turmeric powder are bound on the abscess to cure it by burst. To benefit from cyst in the breast, its roots powder along with the turmeric powder are warmed and bound 3 times a day. It is also useful in digestive and reproductive disorders [56,57,61]. Use of gel, in spontaneous atopic dermatitis, like skin lesions, revealed that the group receiving only *Aloe vera* in a dose of 0.8 mg/kg p.o. provided relief in atopic dermatitis due to the reduction of interleukin IL-5 and IL-10 levels [4]. Its major constituents have been reported as emodin, aloe-emodin, aloetic acid, anthranol, aloin A and B (barbaloin), isobarbaloin and ester of cinnamic acid [70].

6.8. *Amomum subulatum* Roxb.

Zingiberaceae is the Family of this spicy plant and is known as “*badi elaichi*” in Hindi. It is essential ingredient of Indian curry and is cultivated in eastern Himalayan part of India. It is 3-4 feet tall with 3-4 inch wide leaves. The yellowish white coloured flowers are in bunches of 2-3 inch long and dense. Green fruits have seeds with fragrant sweet kernel. Its fruits/ seeds powder is mixed with cow urine along with several ingredients and cooked for few days. This paste is applied in open sun to cure boils and wounds. It is also prescribed as appetizer and liver tonic [56,57]. It contains protocatechuic acid in its acetone and methanol extracts [71] whereas its essential oils’ major constituents are 1,8-cineole, alpha-pinene, beta-pinene and alpha-terpineol [72].

6.9. *Apium graveolens* L.

It belongs to the Family Apiaceae and is popularly known as “*ajmod*” in Hindi. A seasonal herb, it grows in the north western Himalayas and in Punjab. It is 1-3 feet tall. The graded margin leaves and umbrella like flowers are present in bunches. The small seeds from flowers are called as celery seeds. Celery seeds powder is taken with jaggery 3 times for seven days to cure dermatosis [56,57]. It is also useful apasmolytic agent [73]. Its major constituents are limonene and selinine [74].

6.10. *Argemone mexicana* L.

Belonging to the Family Papaveraceae, it is called in Hindi as “*satyanashi*” or “*bhadbanda*”. It grows as weed throughout India and exudes yellow juice when any part is broken. It is 2-4 feet tall with short stem and long thorny leaves. The shiny yellow flowers yield square, thorny fruits having mustard like seeds. To cure dermatosis and bleeding diathesis, its oil is applied and the juice from leaves is taken in milk. Its milk treats ulcer and itching. The yellow milk or whole plant juice is applied to cure boils, acne, itching, eczema and irritation. It is also used for cough and urinary disorder [56,57]. Wound healing activity has been observed in the *in vivo* tests [74-76]. Its major constituents have been reported as sanguinarine, reticuline, hygenamine, argenaxine [76].

6.11. *Azadirachta indica* (L.) A. Juss. Syn. *Melia indica* (A. Juss.) Brantis

It belongs to the Family Meliaceae and is famous as “*neem*” tree. It is available throughout India as 25-30 feet tall evergreen tree. Its stem bark is rough and brown and leaves are shiny and curved dark green. The white and small flowers have typical smell. Small greenish yellow fruits have a single seed. It attains common prescription in Ayurvedic skin diseases treatment. To cure itching, boils and dandruff, head is washed with its decoction and its oil is applied. Eczema can be cured by the bandage dipped in its leaves juice. The preparations from its leaves, flowers and fruits are recommended for leucoderma. It is also used in eye disorder, headache, anaemia, piles, etc. In fact, it has power of curing most of the diseases, this is why it is said as “*sarva rog haro nimba*” meaning that it cures all the diseases [56,57,61]. It showed high antibacterial activity against *Staphylococcus aureus* with MIC and MBC values of 2.5 and 5mg/ml, respectively. It was also found to be effective against the fungus *Candida albicans*, with MIC value of 0.625 mg/ml and MBC values of 1.25 mg/ml [4,77]. Its major constituents have been isolated as azadirone, epoxyazadiradione, nimbin, gedunin, azadiradione, deacetylnimbin, and 17-hydroxyazadiradione[78,79],

6.12. *Brassica juncea* (L.) Czern. & Coss.

It is a major crop of India and belongs to the Family Brassicaceae. It is known as “*raee*” in Hindi and is cultivated throughout India for its oil in seeds. It is 2-3 feet tall annual plant like mustard. Up to a foot long leaves are supported by a long stalk. The stem may also have tiny leaves. The flowers are shiny yellow yielding a 1-2 inch long pod. The seeds are little smaller than mustard. The paste of “*raee*” powder in “*ghee*” is applied to cure scars, scabies, eczema, etc. It is also useful in ear discharge and ulcer as well as swelling [56,57]. The wound healing activity of different leaf extracts of *B. juncea* in excision wound model in albino rats was screened. Among them, the aqueous extracts showed 94.94% maximum percentage of healing compared to control [80]. Its major constituents are beta-sitosterol, linoleic acid, α -linolenic acid, trilinolenin, lutein and β -carotene [81].

6.13. *Buchanania cochinchinensis* (Lour.) M.R. Almedia Syn. *B. latifolia* Roxb., *B. lanzan* Spreng.

It belongs to the Family Anacardiaceae and is called in Hindi as “*chironji*”, a constituent of Indian spices. It is distributed up to the height of 1500 to 3000 feet as wild tree in western India and Uttarakhand. It is 40 to 50 feet high with round stem. The leaves are simple and strong 6-8 inch long and 2-4 inch wide. Its flowers are small greenish white in bunch. The seeds are black and round or oval shaped. It attains common prescription in Ayurvedic skin diseases treatment. In combination with other materials, the paste is cooked in oil and filtered. It is applied to cure abscess. Its kernel is pasted in rose water then borax is added and applied for itching. It is also useful in the joint and digestive problems [56,57,61]. It was found that its root extract showed significant inhibition against all tested pathogens (gram positive MIC 0.625 mg/mL and gram negative MIC 0.625–1.25 mg/mL) [82]. Its major constituents are myricetin-3'-rhamnoside-3-galactoside A, cardanol, cardol, anacardic acid and fatty acids [83].

6.14. *Butea monosperma* (Lam.) Taub.

Belonging to the Family Fabaceae, it is commonly known as “*dhaak*”, “*palaash*” or “*tesu*” in Hindi. It is available throughout India as wild perennial shrub or small tree with height from 5-20 feet. Its stem bark is thick and rough. The leaves are 4-8 inch long and three foliated. Its flowers are very dense and attractive with shiny orange and dark red in colour. When its seeds' oil is injected in the affected area, it cures dermatosis. Its seeds powder in lemon juice is applied to cure eczema and itching. It is also useful in urinary diseases and sexual issues [56,57]. The *in vitro* antimicrobial efficiency of seed oil of *B. monosperma* showed a significant bactericidal and fungicidal effect [84]. Its major constituents have been identified as butrin, butein, butin, α -amyrin, β - sitosterol, β -sitosterol- β -D-glucoside, etc. [85,86].

6.15. *Caesalpinia bonduc* (L.) Roxb. Syn. *C. bonducella* (L.) Fleming

Belonging to the Caesalpiniaceae Family, it is known as “*kat karanj*” in Hindi. Occurring throughout India in waste land, this prickled climber is located in deciduous forests, also. It attains common prescription in Ayurvedic skin diseases treatment. Its leaves are grinded with “*neem*” and “*khair*” (*Acacia chundra*) leaves and applied, bathed and drunk for dermatosis. Its seeds are mixed with turmeric, black myrobalan (*Terminalia chebula*) and mustard seeds to cure dermatosis. Its oil is useful in skin problems when mixed with “*jasta bhasma*” or lemon juice or leadwort powder and rock salt. It is also useful in cough, piles, fistula, wound and joints pain and brain disorders [56,57]. Its extracts have shown large number of activities including antimicrobial [86,87]. It contains flavonoids, terpenoids and phenolic derivatives, viz. bonducellin, caesalpinin [86-88].

6.16. *Calotropis procera* (Ait.) Dryand. Syn. *Asclepias procera* Ait.

It belongs to Asclepiadaceae Family and in Hindi, it is known as “*madaar*” or “*aak*”. It is found in dry, barren grounds as perennial shrub or small tree. Based on the color of the flowers (red, whitish yellow and silver), it is distinguishable for three plant types. On squeezing or breaking any part of it, sticky white resinous liquid oozes out. This milky liquid with honey is applied to cure eczema and with coconut oil relieves from scabies. Its root powder in curd is also helpful in eczema. Its milk is mixed with mustard oil, turmeric powder, realgar (arsenic sulfide) and boiled in water to cure skin disorders. The milk, “*bawchi*” seeds and realgar paste is applied for treating leucoderma. Preparations of its leaves and several other ingredients are useful in eczema, itching, etc. Its leaves, burnt in mustard oil and realgar, is added and used for skin rejuvenation and leaves extract and several other items are cooked in “*ghee*” to cure eczema and other problems. It is also described to be useful in many ailments, viz. breathing problem, testicles swelling, cholera, piles, brain diseases, abdominal pain and fever [56,57]. Antibacterial activity has been observed in its extract [89]. The presence of saponins, tannins, alkaloids, cardiac glycosides, flavonoids, steroids and triterpenoids has been reported [90].

6.17. *Cassia fistula* L.

It belongs to the Family Caesalpiniaceae, it is popularly known as “*amaltaas*” in Hindi. It occurs all over India. It is a medium size tree with dark brown reddish bark. Small leaves of 4-8 pairs are arranged on a 1 ft long stalk. The flowers are shiny yellow in colour and the pods are 1-2 feet in length containing many yellowish brown coloured seeds. It attains common prescription in Ayurvedic skin diseases treatment. Leaves and roots are useful in dermatosis. Roots and aerial parts are boiled in milk and applied to cure skin diseases, including eczema, itching. It is also prescribed as purgative and in cough related issues [56,57]. The therapeutic and esthetic potential of *C. fistula* pod’s extracts to prevent or delay human skin ageing, has been observed [91]. Its major constituents have been reported as leucopelargonidin, leucoanthocyanidin, flavonoids and catechins [92].

6.18. *Cassia occidentalis* (L.) Rose. Syn. *Senna occidentalis* (L.) Link

It is a bushy plant belonging to the Family Caesalpiniaceae and is called as “*kasaundi*” in Hindi. It grows wildly on free land during rainy season. The plant has multiple branches just above the roots with dense leaves. Flowers are yellow and impart pungent smell. Its seeds in buttermilk and with vinegar are used for eczema. Its seeds and radish seeds are grinded with sulfur to form a paste and applied for leucoderma. The plant is also useful in cough, bronchitis and brain related problems [56,57]. Its leaves stimulated the healing of wounds induced by the dermal venom of *Bothrops moojeni* in mice and can be considered an alternative product to treat wounds caused by the snakebite [93]. C-glycosidic flavonoids have been reported from this plant [94].

6.19. *Cassia tora* L. Syn. *Senna tora* (L.) Roxb.

It belongs to Caesalpiniaceae Family and is known as “*panwada*” or “*chakravada*” in Hindi. It grows in rainy season in waste lands. The tree is up to 5 feet tall. When the leaves are crushed, they emit typical odor. Flowers are small giving 6 inch long pods. It attains common prescription in Ayurvedic skin diseases treatment. The whole plant in curd, leaves in jaggery and “*khatai*”, seeds with sulfur in milk and oil or in cow urine are independently prepared and applied to cure eczema. Seeds are grinded in milk and mixed with castor oil to treat the dermatosis [56,57]. Leaves and seed extracts are useful for skin infection, ringworm, eruption [95]. The seeds also bring relief from migraine attack. Chrysophanol and derivatives, anthraquinones, toralactone and sterols are its major constituents [96].

6.20. *Celastrus paniculatus* Willd. Syn. *C. nutans* Roxb., *Catha paniculata* Scheidw.

The plant belongs to the Family Celastraceae. It is called as “*malkangani*” or “*jyotishmati*” in Hindi. It is found in the lower hills of Himalaya up to 4000 feet. It is about 10 meter long climber mostly over the trees. The leaves are 4 to 6 inch long while yellowish green colored flowers are found in bunches giving yellow colored fruits. It heals the wound faster. Its oil is useful in skin disorders. A paste of its seed powder in cow urine is useful in “*pama*” (scabies). It is also used in arthritis, reproductory and mental problems [56,57]. The ethanol extract of leaves with the concentration of 100µg/100µL and its isolated compound, celapanigin with the concentration of 50µg/100µL exhibited a significant zone of inhibition of *S. aureus* puss from human wound [97]. Its seed oil is constituted by celapanigin, cellapanin, fatty acids and triglycerides [98,99].

6.21. *Cinnamomum zeylanicum* Breyn. Syn. *C. verum* J. Presl.

It has been included in the Family Lauraceae and in Hindi it is called as “*dalchini*”. Its dried inner stem bark is a component of Indian curry and is cultivated in southern India and Sri Lanka. It is 20-25 feet tall evergreen tree with 4-7 inch long leathery leaves having bitter and pungent taste. Long flowers with pungent smell grow in bunches. The fruits are oval and dark purple in colour. A paste of cinnamon and honey are applied to get relief from itching, eczema and boils. It is also useful in stomach disorder and headache [56,57]. It has been reported that the cinnamon oil on different bacterial (*Pediococcus halophilus* and *Staphylococcus aureus*), fungal (*Aspergillus flavus*, *Mucor plumbeus*, *Penicillium roqueforti*, and *Eurotium sp.*), and yeast species (*Candida lipolytica*, *Pichia membranaefaciens*, *Debaryomyces hansenii*, and *Zygosaccharomyces rouxii*), showed that it is a natural antimicrobial agent [99]. Its chemical constituents have been reported as cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oil constituents [100].

6.22. *Citrus aurantifolia* (Christm.) Swingle Syn. *C. medica* L. var. *acida* Hook. f.

It is Rutaceae Family plant and is commonly known as “*neembu*” in Hindi. It is household fruit cultivated throughout the world. Even though it is sour, it suppresses “*pitta*”. The tree is small bushy, thorny with leaves smelling like lime. Its fruits are round, smooth, green but yellow when ripe. Half of lime is rubbed on the itching, sensation and eczema affected area of skin for relief. It is also useful in brain, eye and liver diseases and is a rich source of vitamin C [56,57]. The hydroalcoholic extract of its leaves exhibited antibacterial activity on *Klebsiella pneumonia*, *Pseudomonas spp.*, *Staphylococcus aureus* and antifungal activity on *Aspergillus niger*, *Aspergillus fumigates*, *Mucor spp.* [101]. Its major constituents have been identified as coumarin derivatives and essential oil [102].

6.23. *Crocus sativus* L. Syn. *C. officinalis* (L.) Honck.

It is placed in the Family Iridaceae and is popular as “*kesar*” or “*jafran*”. It is native of southern Europe but is cultivated in India in Kashmir. The stigma of the flower is used as powerful medicine. It is one foot high perennial plant and is supported by the underground tuber. Its leaves are thin long tube and appear as grass. Flowers are scented blue violet in colour and its stigma is used as “*kesar*”. The rectangular fruits yield round seeds. It attains common prescription in Ayurvedic skin diseases treatment. The paste of leaves of kesar is applied over wound for healing. The other uses of the plant are in headache, digestive and reproductive systems [56,57]. The chemopreventive effect of aqueous saffron on chemically induced skin carcinogenesis using a histopathological approach was observed for the inhibition of the formation and reduction in size of skin papillomas in animals. Saffron also inhibited DMBA-induced skin carcinoma in mice when treated early [4]. It has also shown many therapeutic properties [102]. Characteristic components of saffron are safranal (responsible for odor and aroma), crocin (responsible for the color) and picrocrocin (responsible for the bitter taste) besides numerous essential oil constituents [103]. Although pollen and anthers of saffron well deserve attention as dietary supplements, but their tendency to absorb toxic metals from the soil must be taken into due account [104].

6.24. *Curcuma longa* L.

Belonging to the Family Zingiberaceae, it is commonly used in Indian curry with popular name as “*haldi*”. It is commercially cultivated in eastern and southern part of India. The plant is 2-3 feet tall with spear shaped leaves like banana leaf. The flowers are yellow and long. The underground yellow stem, after boiling, is stored as commercial turmeric. It has great cosmetic and religious value in Indian society. Turmeric powder is mixed with cow urine or butter and applied for itching, eczema, boils. Turmeric powder and green leaves are mixed with butter for glowing of the skin and curing scabies. The “*doob*” grass and turmeric powder are grinded and applied for scabies, eczema and urticaria. It is also useful in viral infections, swelling and arthritis [56,57,105]. The male Swiss albino mice having induced

topical application of DMBA skin cancer, revealed a significant reduction in number of tumors per mouse in the group receiving 1% curcumin isolated from its rhizomes [4]. The main constituents of turmeric powder are bisdemethoxycurcumin, curcumin and demethoxycurcumin while the volatiles of crude essential oil from *Curcuma longa* rhizomes are: α -atlantone, β -turmerone and zingiberene [106].

6.25. *Cynodon dactylon* (L.) Pers. Syn. *Panicum dactylon* (L.) Lam.

It belongs to the Family Poaceae and is very common grass known as “dooba” or “doorba” in Hindi. It has thin and hard stem which keeps on spreading in clumps. The leaves are 1-4 inch long, flowers are greenish blue with seeds as tiny grains. It attains common prescription in Ayurvedic skin diseases management. A medicated oil made from its juice cures eczema, itching and wounds. It is also used for madness, epilepsy, nasal breeding, diarrhea and urinary problem [56,57]. The aqueous and alcoholic extracts of *C. dactylon* have a significant wound healing potential and supports its traditional claim to be used in burns and inflammation [107]. It is one of the plants useful for improving complexion through “*mukha lepa*” and for the common skin ailments. In summer season “dooba” is one of the components for face pack and is also used as complexion promoter [108]. Its chemical constituents range from triterpenoids, sterols, flavonoids to phenolics [109].

6.26. *Dalbergia sissoo* Roxb. ex DC.

It has been placed in the Family Fabaceae and this tree is famous as “sheesham” in Hindi. It is cultivated all over India and is popular for its wood which is used in buildings and furniture. It is about a hundred feet tall tree with alternately arranged 1-2 inch long leaves. The flowers are yellowish white. It has long flat pods with 2-4 seeds. Leaves’ oil and decoction are useful in dermatological disorders. Its leaves are also useful in gynecological, urinary and brain disorders [56,57]. Sissoo oil is used in itching, skin irritation and scabies. [110,111]. Its major identified compounds are tectorigenin derivatives, dalbergin derivatives, inositol, etc. [110,111].

6.27. *Daucus carota* L. Subsp. *sativus* (Hoffm.) Arcang.

It belongs to the Family Apiaceae and is known as “gajar” in Hindi. This plant is a very common vegetable crop worldwide. It is up to 4 feet tall annual plant growing straight with branching. The root is 2-12 inch long in several colors. It is useful for eye sight, in heart, mental diseases and menstrual cycle. Carrot is boiled in water and its paste is applied to treat the wound, burn and abscess. The fresh juice of carrot in turmeric is applied on the face to cure acne [56,57,61]. The chemopreventive effects of oil of *D. carota* umbels on DMBA-induced skin cancer in mice for 20 weeks, showed significant reduction in tumor incidence following administration via intraperitoneal (0.3 ml of 2% oil) and topical

(0.2 ml of 5, 50 and 100% oil) [4]. Its major constituents are lutein, zeaxanthin in extract and α -pinene, sabinene are found in the essential oil [112,113].

6.28. *Eclipta alba* (L.) Hassk. Syn. *E. prostrata* L., *Acmella lanceolata* Link ex Spring.

It is common weed of the Family Asteraceae with name in Hindi as “*bhangaraiya*” or “*bhangra*”. It is small annual straight plant with profuse branching. The branches are covered with hairs and generate roots at the nodes. White flowers bear fruits which yield long short seeds. Its leaves along with “*jawasa*”, “*chiretta*” and “*sharpunkha*” after grinding in water, filtered and given in honey to cure itching. It is also recommended for hair and eye disorder, digestive trouble, brain disorders and piles [56,57,61]. Petroleum ether and ethanolic extracts have been used in oleaginous cream to be applied topically [114]. Its major constituents are alkaloids, terpenoids, flavonoids, phenolics and steroids [114,115].

6.29. *Emblica officinalis* Gaertn.

This is a very common tree known as “*Aamala*” belonging to the Family Euphorbiaceae. It is present in plains as well as in lower hills up to the height of 4500 feet. This tree is 20-25 feet tall with dark brown thin bark. The leaves are small and dense while flowers are long, in bunches and yellowish in colour. Yellowish fruits are of about 1 inch diameter and pulpy with six segmented seeds. It attains common prescription in Ayurvedic skin diseases treatment. Its fruit with margosa leaves are given to cure serious forms of dermatosis. Its seeds in honey and sugar are given to the patients of leucoderma. It is also useful in digestive and reproductive systems [56,57]. *P. emblica* showed a significant reduction in tumor incidence, tumor yield, tumor burden and cumulative number of papillomas. These findings were indicative of its chemo-preventive potential against skin carcinogenesis. The effectiveness of the standardized antioxidant fraction of fruits as a skin lightener and also as an antioxidant has been proven. Its bark and milky juice from leaves are useful in wound healing [116]. The major constituents reported from it, are gallic and ellagic acid derivatives and some flavonoids [116].

6.30. *Euphorbia thymifolia* L. Syn. *Chamaesyce thymifolia* (L.) Millsp.

Placed in the Family Euphorbiaceae, it is commonly called as “*doodhi*” in Hindi. The **one** foot tall plant spreads over the ground with proliferative branching. The leaves are very small and greenish pink small flowers appear in bunches. The hairy fruits and rectangular seeds are also very small. The fresh or dried plant is powdered and cow’s butter is added to form a paste, then applied for treating the itching. A paste of its leaves is useful in wound healing. Its milk is useful for acne and boils on the face. It is also useful in improving the sexual potency [56,57]. The comparative test against dermatological pathogens of its extracts was done exhibiting significant zone of inhibition [117]. Its major constituents

have been reported as luteolin, apigenin, quercetin, kaempferol, ethyl galloyl acid, p-coumaric acid, protocatechuic acid, gallic acid and caffeic acid [118].

6.31. *Ficus benghalensis* L. Syn. *F. banyana* Oken

It is a huge tree belonging to the Family Moraceae. It is commonly called as “*bargad*” in Hindi. Its branches are widely spread and mostly generate aerial roots towards ground and the tree lives for a century. Huge stem is whitish brown in color and the leaves are thick, 4-6 inch wide. Flowers are small and fruits are round. Its bark powder is used externally to cure scabies [4]. Its latex is applied externally on chronic infected wounds to alleviate pain and promote the healing. It is also useful in hair and tooth problems, piles, diarrhea, memory improvement and urinary troubles [56,57]. A paste of tender leaf buds is applied on the skin to improve the complexion [119]. Its milk heals the unripe boils and helps in burst and healing when in advanced stage. Its major constituents have been reported as flavonoids, terpenoids, coumarins, etc. [120].

6.32. *Ficus religiosa* L. Syn. *F. caudata* Stokes, *F. peepul* Griff.

It is also a big tree belonging to Moraceae Family. It is holy tree of Hindus and is commonly called as “*peepal*” in Hindi. It is a tree with very long life with dusty white bark of the stem. The leaves are smooth, clumpy and seeds are small and round. Soft leaves are eaten raw or extract is taken to treat the skin disorders. A paste of bark, lime and “*ghee*” is applied to cure eczema and itching. It is also used in nasal bleeding, sexual vitality, asthma, constipation, mental problems, etc. [56,57]. Its leaves smeared with ghee can be bandaged on the boil. The pus, if any, will burst and if it is in preliminary stage, the growth will subside [121]. Its chemical constituents belong to flavonoids, terpenoids, sterols [121,122].

6.33. *Hydnocarpus pentandra* (Buch.- Ham.) Oken

It belongs to the Family Flacourtiaceae and is locally called as “*chaulmoogra*”. It is found in the mountains of Western Ghats, southern Konkans and Travancore. It is more than 50 feet tall tree with 10 inch long and 1-4 inch wide soft leaves and pointed tips. The flowers are white and grow in bunches. The male and female flowers grow on separate tree. The apple shaped fruits are in 2-4 inch diameter with almond like brown seeds. It is very important plant for skin diseases and is commonly prescribed for various skin ailments. A mixture of its oil in castor oil, sulfur, camphor and lemon juice is useful in eczema and itching. Its peel is grinded with castor seeds and mixed in castor oil. The paste is applied for scabies [56,57]. The antifungal activity of methanolic extracts of different parts of the plant (leaf, flower, bark and root) was evaluated using agar disc diffusion method. Significant antifungal activity was shown having MIC 512µg/ml [123]. Its major constituents have been isolated as alkaloids, tannins, flavonoids, etc. [124].

6.34. *Jasminum grandiflorum* L.

It belongs to the Family Oleaceae and is called as “*chameli*” in Hindi. It is grown all over India as house or garden plant for its flowers for decoration. The fragrance of its flowers is pleasant and lifts the mood. It is a creeper with striped branches. Several leaves grow on a twig with white flowers. It attains common prescription in Ayurvedic skin diseases treatment. A paste of its new leaves, “*kutaj*”, “white *kaner*” roots, fruits of “*karaj*” and bark of “*daruhaldi*” is applied for dermatoses. Jasmine oil is very effective in curing wound, eczema, itching and burns. It is also useful for reproductive diseases [56,57]. Its leaves and flowers are useful in wound, corn, leprosy and skin diseases [125]. Its major constituents are oleanolic acid, isoquercitrin, ursolic acid from leaves and linalool, geranyl acetate, α -terpineol, geraniol, benzyl alcohol, methyl benzoate, benzyl acetate from flowers and oil [126].

6.35. *Juglans regia* L.

Belonging to Juglandaceae Family, it is common nut fruit with the name as “*akharot*” in Hindi. They are up to 200 feet high tree available, especially, in Kashmir. Its stem bark is of dust color with lateral fissures. The dense leaves are 3-8 inch long and 2-4 inch wide. The greenish flowers are rectangular yielding round fruits with edible kernel. When the walnut seeds are chewed, before morning brush, and applied over the eczema, in few days it is cured. It is also useful in urinary disease, brain disorder and inflammation [56,57]. The leaves of this plant are used topically to treat scalp itching, dandruff, sunburn, superficial burns as well as an adjunctive emollient in skin disorders. The leaves extract is useful in acne [126]. The fruit is a good source of unsaturated fatty acids, useful in cholesterol lowering. The major constituent of the fatty oil is linoleic acid [127]. From the extract, juglone, juglanin, ellagic acid, have been reported [126].

6.36. *Lawsonia inermis* L. Syn. *L. alba* Lam., *L. speciosa* L.

It belongs to the Family Lithraceae and is called in Hindi as “*mehendi*”. Its leaves are used as coloring agent. It is a large shrub or small tree with a half an inch long leaves. Flowers are fragrant white and fruits are round yielding small slipper seeds. It is also used as dermatoses, cosmetics and hair coloring. Its flowers and “*katira*” are soaked in water overnight and after adding sugar, the decoction is taken for few days to get relief from itching and burning sensation in head. The juice of its leaves and flowers are beneficial in dermatosis. The aqueous decoction of its leaves and bark are also useful in dermatosis. [56,57]. With the use of henna anti-inflammatory, antipyretic and analgesic effects were noticed [4]. It showed activity against the fungus *Candida albicans*, with MIC value 0.625 mg/ml and MBC values of 1.25 mg/ml [76]. When animals were treated with its leaf extract, it showed 71% reduction in the wound area as compared to the control with 58% only [128]. Its major constituents are quinones, phenolics, alkaloids, terpenoids and fatty acids [129]. Other components were naphthoquinone

derivatives, luteolin, apigenin, and their glycosides, esculetin, fraxetin, scopoletin, beta-sitosterol in leaves, ionones in essential oil [128,130].

6.37. *Linum usitatissimum* L.

It belongs to the Family Linaceae and is called as “*alasi*” or “*tees*” in Hindi. It is the cultivated crop of “*rabi*” season in plains and can be found up to the height of 6000 feet in western Himalayas. It is 2-4 feet tall annual plant with spear shaped small leaves having pointed tips. The flowers are bright blue in colour and the fruits are round nipple shaped having shining flat dark brown seeds. It attains common prescription in Ayurvedic skin diseases treatment. The roasted linseed and sesame is boiled in cow milk and the paste is applied. It is effective in burns and boils. To get relief from burns, the linseed oil and lime water is applied. It is also useful for asthma and urinary problems [56,57]. Flaxseed oil treated rats showed significant reduction of inflammatory cells in the period of re-epithelization. It significantly accelerated wound healing process [131]. Major unsaturated fatty acids from its seeds are linolenic acid, oleic acid and linoleic acid [132].

6.38. *Mangifera indica* L.

It is a plant of Anacardiaceae Family and most popular for its delicious fruits called as “*aam*”. It is native of India and eastern islands. It is also found in the lower hills of Himalaya from Bhutan to Kumaon. The tree is 30 to 120 feet high with leaves 4-12 inch long and 1-3 inch wide having pointed tips. The flowers are in bunch of greenish yellow inflorescence. The fruits are of various shape, size and colour. The fruits have seeds inside a kernel. The unripe mango when processed with methylated spirit, is applied to treat the eczema and boils. It is also used in diarrhea and urinary problems [56,57]. The gum is used in dressings for cracked feet and for scabies. Latex is applied to cure ulcers [4]. Its major constituents have been identified as mangiferin, a xanthone glycoside major bio-active constituent, isomangiferin, tannins & gallic acid derivatives [133].

6.39. *Melia azedarach* L.

It belongs to the Family Meliaceae and is popular with the name of “*bakayan*” in Hindi. It is found in India in plains and in the Himalayan regions up to the height of 3000 feet. The stem of the tree is of 6- 8 feet in diameter. The grayish brown bark is half an inch thick. 3-6 Leaves are found in groups and furcated on a 10-20 inch long twig. They are half to 3 inch long and wider than “*neem*” leaves. The bluish coloured flowers are found in bunches and the fruits are round and yellow when ripe. The seeds have a hole. It attains common prescription in Ayurvedic skin diseases treatment. After soaking ripe yellow seeds in water overnight, it is powdered and taken orally to treat dermatosis. It is also recommended for piles and reproductive issues [56,57]. Its flowers showed potent antibacterial activity

against the skin infected with *Staphylococcus aureus* showing healing activity comparable with neomycin [134]. Melianonin, melianol, melianone, meliandiol, vanillin, vanillic acid were isolated from the fruits of *M. azedarach* [135].

6.40. *Momordica charantia* L.

Belonging to the Family Cucurbitaceae, it is popular vegetable crop of India, called as “*karela*”. It is cultivated throughout India. It has soft and hairy stem with broad sectioned leaves. The flowers bloom yellow and shiny. The fruits are 1-5 inch long, broad in the middle but pointed towards both the ends giving black seeds when ripe. Its whole plant in the wild almond oil, cinnamon, “*peepar*” (pepper) and rice are mixed and applied to cure itching and other skin diseases. Applying its juice and paste of the roots on the head, cures boils. It is also prescribed for diabetes, arthritis [56,57,61]. In a comparison of the anticarcinogenic efficacy of its peel, pulp, seed and whole fruit extract (100 µl/animal/day), after topical treatment during the peri-initiation and during the tumor promotion stage, revealed the modulation of the (i) tumor burden (tumors/mouse) to 3.06, 3.61, 3.17 and 3.11; (ii) cumulative number of papillomas to 49, 65, 54 and 53; and (iii) percent incidence of mice bearing papillomas to 84, 100, 94 and 94, respectively [4]. Its major constituents have been identified as momordicolide, momordicophenolide A, dihydrophaseic acid, 3-O-beta-D-glucopyranoside, blumenol [136].

6.41. *Ocimum sanctum* L.

Placed in the Family Lamiaceae, it is a holy plant of India with popular name as “*tulasi*”. The fragrant and attractive herb is found in most of the house gardens. It has hard stem with small leaves. The flowers are arranged in a spike and produce small seeds. Its leaves’ juice is useful in dermatosis. A paste of its leaves in lemon juice is used for eczema and dermatosis. Other uses of this plant are in fever, cold, cough, headache [56,57,61]. A mixture of basil and ginger roots are given in honey to cure dermatosis. *O. sanctum* fixed oil showed good antibacterial activity against *Staphylococcus aureus*, *Bacillus pumilus* and *Pseudomonas aeruginosa*, with *S. aureus* being the most sensitive among them. The antibacterial along with anti-inflammatory and analgesic activities of the oil, could make it useful in inflammatory disorder resulting from staphylococcal infection [137]. Its major constituents are rosmarinic acid, apigenin, cirsimaritin, isothymusin, isothymonin, orientin, vicenin from leaves and stem extracts and the volatile oil from leaves containing eugenol, carvacrol, linalool, caryophyllene [138].

6.42. *Phyllanthus fraternus* Webster

P. fraternus belongs to the Family Euphorbiaceae and it is known in the form of several varieties, viz., *P. debilis*, *P. maderaspatensis*, *P. rotundifolius*, *P. niruri* and *P. amarus*. In Hindi it is called as “*bhui amala*”. It has soft, straight, reddish stem with feather like branching. The leaves are half an inch

long, dense, oblong. Single flowers grow on the branches at the junction of the leaves. Fruits are round. A paste of its grinded leaves and salt are applied for itching. It is popularly recommended for liver disorders [56,57]. The fruits are used in the treatment of ulcers, wounds, sores, scabies, ringworm and other skin problems [139]. The major constituents isolated from this plant are lignans like, phyllanthin, hypophyllanthin, etc. [140].

6.43. *Plumbago zeylanica* L.

It is placed in the Family Plumbaginaceae and is popularly known as “*chitrak*” in Hindi and is found all over India. It is 3-6 feet tall, dense perennial and evergreen plant with short hollow stem and long branches. The leaves are 3 inch long and 1 inch wide with pointed tips. Its flowers are 4-12 inch long, white and are seen in bunches. Fruits are long, flat containing a blackish red seed. The paste of its grinded bark in milk or water is applied to cure skin disorders including leucoderma. It is also prescribed for osteo-arthritis, hysteria and fever [56,57,61]. Aqueous extract of its leaves exhibited antibacterial and antifungal activity on *E. coli*. [141]. Its major constituents have been studied as plumbagin, isoshinanolone, plumbagic acid, beta-sitosterol, 4-hydroxybenzaldehyde, trans-cinnamic acid, vanillic acid [142].

6.44. *Premna latifolia* Roxb.

Belonging to the Family Verbenaceae, it is called as “*arani*” in Hindi. It is 25-30 feet tall tree, commonly found in the Gangetic plains of north India extending up to the height of 5000 feet in Himalayas. Its bark is brown and the leaves are 2-6 inch long with taper at both the ends. The leaves after crushing, release off smelling compounds. The flowers are white with 2-5 inch in diameter, hairy with multiple buds. The fruits are greenish white and flat and turn purple black when ripe. A decoction of Arani leaves and myrobalan is given to cure dermatosis. It is also prescribed in abdominal pain and swellings [56,57,61]. A 69.15% of wound closure was observed on 10th day post wounding of the rats treated with 200 mg/kg of extract. The results also indicated significant antibacterial activity of 50% aqueous methanolic extract [143]. Its major compounds have been reported as p-methoxy cinnamic acid, linalool, linoleic acid, β -sitosterol, luteolin, iridoid glycoside, premnine, etc. [144].

6.45. *Prunus amygdalus* Batsch Syn. *P. dulcis* (Mill.) D.A. Webb, *A. communis* L.

It is placed in the Family Rosaceae and is famous with the name of “*badaam*” in Hindi. In India it is commercially cultivated in Kashmir and the higher altitude of Punjab. It is a tree of 8 meter height with brown violet stem bark. Its leaves are long and pointed at both the ends. It has white or reddish white flowers yielding ripe fruits having hard cover. The flat seeds are covered with a dark brown layer. The paste of its seeds is applied to treat wound and abscess. A paste of badam, mustard, vacha (*Acorus*

calamus) and black salt is applied to treat freckles. It is also useful in head and reproductive problems [56,57]. The use of shell extract of almond as an antimycotic drug may reduce the risk of common environmental microbial infections particularly ring worm or tinea infections [145]. Being a rich source of vitamin E and antioxidants, almonds can provide numerous benefits for the skin [146]. The active constituents of almonds are globulins such as amandine, albumin, amygdaline, flavonoids and amino acids [147].

6.46. *Psoralea corylifolia* L.

Belonging to the Family Fabaceae, it is called as “*bakuchi*” in Hindi. It is 1-4 feet tall plant growing throughout India during rainy season. Having knots, the branches are hard with 2-3 inch long round leaves. The flowers are bluish in colour and are arranged in bunch of 10-30 flowers. The long round and oily pods are small and black. The seeds are also black and have a fragrance. It is very important plant for skin diseases and is commonly prescribed for various skin ailments. Its seeds are extremely useful for leucoderma in several combination forms, e.g. seeds and As_2S_3 are grinded in cow urine and the paste is applied to cure vitiligo. Similar benefit is achievable when the seeds are grinded with psoralea seeds in vinegar and applied. The decoction of its seeds with gooseberry or “*khair*” is given to cure vitiligo, etc. Psoralea seeds are soaked in cow urine for several days, dried and grinded. It cures dermatosis when given before meals. It promotes pigmentation and is recommended in leprosy and leucoderma, itching red papules, itching eruptions, extensive eczema with thickened dermis, ringworm, rough and discolored dermatosis, dermatosis with fissures and scabies. It is also useful in tooth and bronchial infections [56,57,61]. In a clinical study, it has been found that 14% were cured and another 19% regained pigmentation on at least two-thirds of the affected skin [148]. The essential oil contains limonene, α -elemene, γ -elemene, β -caryophyllene oxide while the other active components have been identified as psoralen, angelicin, bakuchiol, etc. [148].

6.47. *Punica granatum* L. Syn. *P. nana* L., *P. spinosa* Lam.

It refers to the Family Punicaceae and is known as “*anaar*” in Hindi. It is very popular fruit for its nutritional value. It is grown all over India and is widely found in western Himalayas up to Afghanistan. It is 10-15 feet tall with dark brown colored bark. The leaves are 2-3 inch long and flowers are yellow orange or blood red in color. The fruits are round with shiny skin having multiple sections inside. The seed coat is white, pink or red in color. Its described uses are in ear, nose and throat, skin and digestive problems, ulcer and wound. The paste of its leaves is mixed in mustard oil and massaged to cure itching [56,57]. It is also recommended in brain disorders. Besides many positive *in vitro*, animal and clinical trials for many disease conditions, ultraviolet radiation-induced skin damage has also been treated [149]. Its fruit bark has shown strong antimicrobial activity, as well. Its major chemical

constituents are anthocyanins, triterpenoids, flavonoids in fruits and some alkaloids in other parts [149-151].

6.48. *Rubia cordifolia* L. Syn. *R. Manjistha* Roxb., *Gallium cordifolium* (L.) Kuntze

It belongs to the Family Rubiaceae and is known as “*manjishtha*” in Hindi. It is available in the hilly regions of India up to the height of 8000 feet. It is highly branched climber with long stem. The branches are strong, rectangular and thorny. Its leaves are 2-4 inch long and an inch broad and thorny. Its flowers are yellowish white and greenish red with an aroma. It bears small size round and bright fruits with 2 seeds. It attains common prescription in Ayurvedic skin diseases treatment. A paste of manjishtha powder in honey is useful in freckles. Its leaves and roots are grinded to form a paste and applied to treat the wound or abscess. It is also useful in respiratory, reproductive and mental disorders [56,57]. It promotes contraction and epithelization of excision wound and the ethanolic extract of roots was found to be effective in the functional recovery and healing of wounds and also lead to histo-pathological alterations [152,153]. Its major constituents have been identified as anthraquinones, for example, cordifoliol and cordifodiol [152,153].

6.49. *Santalum album* L.

It is placed in the Family Santalaceae and is popular with the name of “*chandan*” in Hindi. It is popular tree of south India having calming aroma in its timber. It is available up to the height of 4000 feet. The tree is 20-30 ft high with evergreen branches. Its bark is reddish grey or brownish black with fragrant heartwood inside. The leaves are 2-3 inch long and up to an inch wide and pointed at the end. The flowers are brown violet with an inch diameter. The seeds are hard and round. The timber matures for its aroma after 40 years. It is very important plant for skin diseases and is commonly prescribed for various skin ailments. Sandal powder in “*guduchi*” (*Tinospora cordifolia*) decoction is useful in hives (“*pitti*”). Its paste in water is useful in itching. It is also useful in digestive, excretory and reproductive system in addition to the calming aroma [56,57]. Sandalwood oil and α -santalol showed anticancer effects in chemically-induced skin carcinogenesis in CD-1 and SENCAR mice. It also showed ultraviolet-B-induced skin carcinogenesis in SKH-1 mice and in vitro models of melanoma, non-melanoma. When applied on skin, it protects from wounds, sores, boils, pimples etc. from infections. Sandalwood oil has been tested for *in vitro* antiviral activity against *Herpes simplex* viruses-1 & 2 [154,155]. Its volatile oil contains about 70% alpha- and beta-santalols with variety of minor components including sesquiterpene hydrocarbons [154].

6.50. *Tamarindus indica* L.

This plant has been placed in the Family Caesalpiniaceae and is known as “*imali*” in Hindi. It is a common plant of India and is cultivated even on roadsides. It is a large evergreen tree up to 70 feet tall with 6.5 feet diameter. The bark is rough, fissured, grayish brown in colour. Leaves are arranged in 10-18 pairs of opposite leaflets which are 1 inch long and 0.25 inch wide. Flowers are pale yellow or pinkish and the fruit is a pod with brittle shell. The seeds are embedded in a sticky edible pulp and are 0.5 inch long with hard, shiny and smooth testa. Tamarind seed powder in lemon juice is applied to cure eczema. The poultice of its seeds and leaves when tied on boils, helps burst and dry faster. Tamarind seeds’ kernel and psoralea seeds are grinded and the paste is applied to cure the white patches. It is further useful as antidiarrhoeal [56,57]. Its extracts have shown potent antimicrobial and wound healing properties [156,157]. Its major constituents are fatty acid derivatives, pinitol, proanthocyanidins, etc. [158].

6.51. *Tephrosia purpuria* (L.) Pers.

Belonging to the Family Fabaceae, it is called as “*sarponkha*”. It is found throughout India and in Himalayas up to the height of 6000 feet. The plant is straight and 1-3 feet tall. The stem is slippery and hairy with 1 inch long and ½ inch wide leaves. The flowers are reddish purple coloured arranged on a flower stalk, producing 1-2 inch long pod. The seeds are kidney shaped and yellowish in colour. Its oil is used to cure itching and leaves juice is given to treat dermatosis. It is also useful in hepatic disorder [56,57]. The ethanolic extract of plant possesses the wound healing properties through an increase in the presence of fibroblasts and collagen fibers and the promotion of angiogenesis in wounded area [159]. It is marketed for skin diseases like *Acne vulgaris*, skin rashes and blemishes, boils, etc. [160]. Its major constituents have been reported as rutin, purpurin, purpurenone, purpuritenin and quercetin [159].

6.52. *Terminalia arjuna* (Roxb.) Wight & Arn.

It is placed in the Family Combretaceae and is popularly known as “*arjuna*” in Hindi. It is common throughout India especially on the river side in the sub Himalayan tracts and Eastern India. It has massive trunk of 10-20 feet diameter with white bark outside and red inside. Its leaves are 3-6 inch long and 1-2 inch wide. Light green flowers are available in clusters. The oval shaped fruits are 1-2 inch long but without seeds. When the oil from root bark is applied, it cures eczema, itching and dermatosis. The paste of leaves, flowers and roots are useful in itching. It is popularly useful in cardiac problems and in urinary disorders [56,57]. Estimation of granulation tissue obtained from excision wounds revealed an increase in the hexosamine content in the hydro-alcoholic extract of bark when compared with the control [161]. Its major constituents are tannins, triterpenoids, arjunic acid, arjunolic acid, arjungenin, arjunglycosides [162].

6.53. *Thevetia peruviana* (Pers.) Schum.

It belongs to the Family Apocyanaceae and is popularly known as “kaner” in Hindi. It is grown throughout India. It is 10-12 feet tall bush with a small stem and multiple branches. The 6-9 inch long and 1 inch wide leaves appear as green smooth and shiny. It flowers throughout the year with yellow colour which bears seeds. All parts of this plant are poisonous however its bark powder with water is given for dermatosis. A paste of its bark in water is applied over the affected skin. It is also prescribed for headache, sexual vigour and as wormicide [56,57]. Its seed oil was used to make a herbal lotion for skin care which inhibited *S. aureus* and *E. coli* in a concentration dependent manner [163]. Its major components have been identified as digitoxigenin, cannogenin, thevetiogenin, uzarigenin and their glycosides [164].

6.54. *Trachyspermum ammi* (L.) Sprague

It is placed in the Family Apiaceae with common name as “ajawayan” in Hindi. The herb is 1-3 feet tall, branched and oily. The stem has linear markings and the leaves are 0.5 to 1 inch long with linear stripes. The white coloured flowers grow in an umbrella like bunch. The fruits are small, hairy, dark brown in colour having 2 seeds. A thick paste of ajowan cures eczema, urticaria, boils and burn. Ajowan boiled water is used to rinse the affected skin part. It is also recommended for cough [56,57]. Ajowan leaves can be crushed and used for skin infections [165]. It is an important medicinal plant for digestive system and pain reliever. The major constituents of its essential oil are thymol, p-cymene, γ -terpinene and α -terpinene [165].

6.55. *Zingiber officinalis* Rosc.

It belongs to the Family Zingiberaceae and is known as “adarak” in Hindi. It is cultivated all over India for its rhizomes used as spices. The leaves are of the shape of bamboo leaves and are above the ground on shoots. They are 6-14 inch long and an inch wide. The flowers are pale yellow in colour with a purplish lip. The powder of ginger roots, “madaar” leaves, Malabar nut leaves, “nishoth”, cardamom and “kundru” is prepared and mixed with ash of “palaash” to make a paste. It is applied to cure dermatosis. It is also useful in cold and digestive problems [56,57,61,166]. Skin anticarcinogenic and wound healing effects have been observed from its phytochemicals [167]. Its major components are gingerols, shogaol, and paradols [168].

7. Toxicological Studies

The research on toxicity of herbal medicines happens to be a crucial task as their use for primary healthcare is common among the majority of the world population. The main problems involve changes in botanical misidentification or mislabeling of plant materials, contamination of herbs with

microorganisms, fungal toxins, pesticides and heavy metals. Another reason of herbal poisoning could be because of the deviations from traditional preparation and following the modern unprofessional processing [169-172]. There is an urgent need for improved standards of toxicological assessments, quality control and postmarket surveillance for all herbal therapies and practices. It is quite possible that the causative constituents for toxicity, if noticed, are removed so that the protective effects are enhanced by chemical manipulations [173].

It is important to note that the prescription drugs may carry greater risks of adverse reactions than Ayurvedic preparations. There are several examples of recalled allopathic drugs from the US market due to the failed dissolution specifications like, the recently launched zenatane (isotretinoin) capsules used for the treatment of severe acne [174]. A U.S. study reported that 25% of patients admitted to hospitals are prescribed at least one inappropriate allopathic medication and up to 20% of all patient deaths may be attributed to potentially preventable adverse drug reactions [175].

While dermatology's most studied adverse reaction is contact dermatitis but little is reported on reactions from herbals and the essential oils used in aromatherapy, for example. However, to be sure, the standard double-blind clinical trials are recommended to determine the safety and efficacy of each plant for general medical use. Besides possible toxic effects of its own, the herbal medicines may interact with synthetic drugs taken simultaneously causing toxicity to the patient and may have contamination leading to safety concerns [54]. The Ayurvedic physicians in India have been prescribing the plant based drugs for centuries and most of the drugs have not shown any adverse effect on the patients of skin related diseases [176].

8. Conclusion

The world has been looking for healthy and good looking skin since the inception of the humankind. Right from the olden days the humankind has been in regular touch with skin restoring properties of traditional medicines, including Ayurveda, for a friendly and reliable cure with no or minimal side effects. The present review deals with the medicinal plants of Ayurvedic system of medicine which are very well accounted for treating most of the skin related disorders. Although the emergency cures are available with allopathy and surgery but the common treatable skin disorders viz., allergy, infections, problems related to the pigmentation, etc. can be handled by Ayurvedic herbal treatments. From present review, it could be concluded that the Ayurvedic system of herbal medicine is well proven for skin healing properties with strong back up from a number of potentially active medicinal plants. However, there is certainly reasonable future scope of scientific substantiation in terms of the active components and their mechanism of action (structure activity relationship studies) of these precious Ayurvedic plants recommended in skin related disorders.

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