

THERAPEUTIC IMPACT ON LEUCODERMA – A REVIEW**Chandrasekar R^{1*} Sivagami B¹ Kumanan R²**

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ABSTRACT

Leucoderma is an autoimmune disorder, about 1-2% of the world population is affected by Leucoderma. Leucoderma is only a substitute name for vitiligo. Leucoderma, a Latin word, is caused by the destruction of melanocytes; the cells which are responsible for producing the white skin color. Vitiligo is an example of hypo pigmentation caused by loss of pigments due to absence of melanocytes. Leucoderma is a chronic disorder it can be controlled but cannot be cured. Even extensive treatments are available for Leucoderma, they do not work for a majority of people. This paper gives an overview of the natural herbal treatments available for Leucoderma. In this paper, the modern medical understanding and treatment of Leucoderma will be discussed. Indian Ayurvedic medicine provides a description of Leucoderma with recommendations

for treatment. The present review includes the study of Leucoderma, its different types and treatments available.

KEYWORDS: Leucoderma, Melanocytes, Hypopigmentation, Vitiligo and Treatment.

1. INTRODUCTION

Leucoderma is a skin disorder that affects nearly 1.5% to 2% of the world population. All of us are born with Melanocyte, there are two types of cells present in the epidermis the Melanocytes and the keratinocytes, the enzyme melanosome synthesize melanin from the

amino acid tyrosine. The Melanocytes manufacture the pigment melanin in the skin, which is stored in the keratinocytes, they are the storage cells present in the skin. There are about 1000 to 2000 melanocytes present per square mm of the skin. Melanocytes comprise about 5% to 10% of the cells present in the basal layer of the epidermis. People with Leucoderma develop antibodies that directly destroy melanocytes.

Leucoderma is a distressing skin condition marked by loss of melanocytes. The cells responsible for producing melanin pigment in skin layers results in irregular white patches. Leucoderma usually starts with a small white spot and later develops into patches. Due to increase in loss of melanin pigments the patches are pale in the beginning but as time passes they become darker. Hyper pigmentation is darkening of an area of skin caused by overproduction of pigment or melanin, the function of melanocytes is to protect the skin against sunlight. Melanocytes produce melanin to protect the skin from UV rays. The amount of melanin produced in the body depends upon genetics and exposure to sunlight.

Leucoderma can occur at any age, in both sexes and on any part of the body. It is, however, more common in women than men. Since it affects the old aged people 40 to 50 but the middle aged young below 30 try to hide their faces because it affects the area of the face first, and then spreads to the rest of the body parts. But it does not affect the whole body, there is no itching, burning sensation like other skin disorders. The disorder is said to affect all races and genders equally ^[1] the most commonly affected areas of the body are the hands and faces, and hyper-pigmented areas of the body ^[2] like hands, neck, back and wrist. The exact cause for destruction of melanocytes which results in Leucoderma is unknown.

There are different types of melanin

Eumelanin is found in the hair and skin. It is particularly abundant among black people and provides black and brown pigment to the skin, hair and eyes. It is present only in small amounts.

Pheomelanin is also found in the hair and skin. This type of melanin provides red colors and is the main pigment found among red-haired people.

Neuromelanin is a form of melanin found in the brain and loss of this melanin may lead to several neurological disorders.^[3]

As for a possible hereditary link, approximately 30% of patients have a family history of vitiligo. Several studies suggest that, melanocytes are destroyed in those people whose body accumulates many toxic radicals. This abnormal accumulation of radicals results in destruction of melanocytes. Many physicians believe that Leucoderma may be caused by nutritional deficiencies caused by an intake of diet comprising of denatured foods which are low in nutrients. Researchers also suggest other factors like, sunburn, injury to skin, physical illness and mental distress are possible causes of Leucoderma.

There are many theories as what may be responsible for causing Leucoderma. Physicians have suggested that Leucoderma may be caused due to an auto-immunological, neurological or auto-cytotoxic origin.^[4] The disorder is not infectious, and does not cause any pathological harm to the body. However, the skin becomes aesthetically disfigured, often causing psychological and emotional stress.

Different types of vitiligo

Focal vitiligo: In focal vitiligo few patches appear on the body.

Segmental Vitiligo: a segment of skin is affected by white patches, segmental vitiligo affects one side of the body.

Generalized Vitiligo: Here the patches appear on both sides of the body, most common areas affected could be the eyes, lips, chest, nipples, abdomen, elbows, wrist, fingers, genitals, legs, knees and foot.

Acro Facial Vitiligo: Here patches develop on lips, fingers and feet including the toes and the chances of curing this with medicine is very poor.^[3]

Different treatments available for Leucoderma

Protection of the skin from depigmentation and repigmentation therapies. Due to the absence of melanocytes in depigmented skin, the body is unable to provide adequate UV light from the harmful rays of the sun; to minimize exposure to UV light, some protective measures are encouraged, such as the application of Sunscreen lotion, the sun protection factor (SPF) of sunscreens should be no less than SPF 30, or the use of protective clothing to cover the patches.^[2] In addition, many cosmetic products are also available in the market to protect the skin from Leucoderma.

The second approach to the management of leucoderma focuses on repigmentation therapies.

The treatments are of three types

The topical application of corticosteroids (PUVA) psoralen photo chemotherapy and Surgical therapies.

Of these treatments PUVA is considered the most effective. However side effects are more, can be severe and the treatments are time-consuming,^[4] and complete repigmentation only occurs in 15-20% of the cases.^[5] Interestingly, psoralens from *psoralea corylifolia* used with photochemotherapy are obtained from the Ayurvedic treatment.^[5]

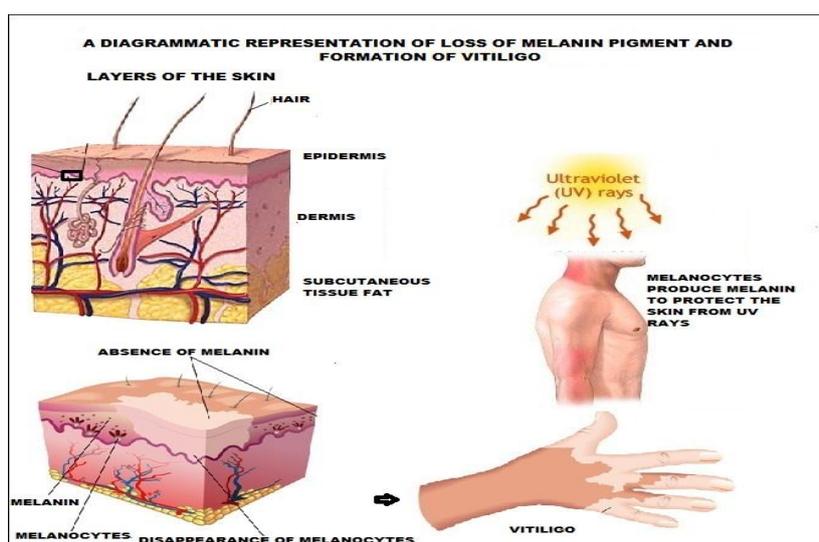


Fig 1. Showing a Diagrammatic Representation of Loss of Melanin Pigment which leads to formation of Vitiligo.

Table 1 The plants used are enlisted by their botanical names, families, local name and parts used.

S. No	Plant Name	Family Name	Local Name	Plant Part Used
1	<i>Abelmoschus moschatus</i> Medik	Malvaceae	Vettrilaikkasturi Kattukasturi	Seeds
2	<i>Abrus precatorius</i> L.	Fabaceae	Kuntumani	seeds
3	<i>Acacia catechu</i> Willd	Mimosaceae	Karunkali	Bark
4	<i>Acacia leucophloea</i> (Roxb.) Willd	Mimosaceae	Rattaiccarayamaram	Bark
5	<i>Acacia nilotica</i> (Lam)	Mimosaceae	Karuvelam	Bark
6	<i>Albizia lebbek</i> (L.) Benth.	Mimosaceae	Vakai	Barks
7	<i>Allium cepa</i> L.	Liliaceae	Venkayam	Bulbs
8	<i>Allium sativum</i> L.	Liliaceae	Vellaipuntu	Bulbs
9	<i>Aristolochia indica</i> L.	Aristolochiaceae	Karutakkoti	Roots
10	<i>Azadirachta indica</i> A. Juss	Meliaceae	Veppu	leaves
11	<i>Baliospermum montanum</i> Willd	Euphorbiaceae	Nakatanti	Roots

12	<i>Caesalpinia bonduc</i> L.	Caesalpiniaceae	Kaliccikkai	Seeds
13	<i>Careya arborea</i> Roxb	Barringtoniaceae	Kumbi	Bark
14	<i>Carthamus tinctorius</i> L.	Asteraceae	Kusumbs	Leaves
15	<i>Cassia senna</i> L.	Caesalpiniaceae	Nilavirai	Leaves
16	<i>Cedrus deodara</i> (Roxb.)	Pinaceae	Terataram	Heartwood
17	<i>Celastrus paniculatus</i> Willd	Celastraceae	Valuluvai	Seeds
18	<i>Citrullus colocynthis</i> (L)	Cucurbitaceae	Paitummathi	Fruits
19	<i>Clerodendrum serratum</i> (L)	Verbenaceae	Sirutekku	Roots
20	<i>Clitoria ternatea</i> L.	Fabaceae	Kannikkoti	Roots
21	<i>Commiphora mukul</i>	Burseraceae	Gukkulu	Gum
22	<i>Ficus hispida</i> Linn	Moraceae	Peyatti	Fruits
23	<i>Gentian kuroo</i> Royle	Gentianaceae	Kampantirai	Rhizomes
24	<i>Lawsonia inermis</i> L	Lythraceae	Marutani	Leaves
25	<i>Melia azadarach</i> L	Meliaceae	Malaivempu	Roots
26	<i>Merremia emarginata</i> Burm. F	Convulvulaceae	Perattaikkirai	Whole plant
27	<i>Mimosa pudica</i> L	Mimosaceae	Total curunki	Roots
28	<i>Murraya koenigii</i> (L.) Spreng	Rutaceae	Kariveppilai	Roots, barks and leaves
29	<i>Mussaenda frondosa</i> Linn	Rubiaceae	Vellai ilai	Whole plant
30	<i>Nelumbo nucifera</i> Gaertn.	Nymphaeaceae	Tamarai	Roots
31	<i>Niligirianthus ciliatus</i> (Nees) Bremek	Acanthaceae	Kurunji	Leaves and bark
32	<i>Ocimum basilicum</i> L	Lamiaceae	Tirunitru	Whole plant
33	<i>Ocimum tenuiflorum</i> L	Lamiaceae	Tulaci	Whole plant
34	<i>Operculina turpethum</i> (L.)	Convulvulaceae	Kumbham	Roots
35	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Palaiyudaycci	Roots
36	<i>Ougeinia oojeinensis</i> (Roxb.)	Fabaceae	Narivengai	Bark
37	<i>Pandanus odoratissimus</i> L	Pandanaceae	Talai	Leaves
38	<i>Pergularia daemia</i> (Forssk.)	Asclepiadaceae	Velipparutti	Whole plant
39	<i>Picrorrhiza scrophulariiflora</i> Pennell	Scrophulariaceae	katugurohini	
40	<i>Plectranthus vettiveroides</i>	Lamiaceae	Vettiver	Whole plant
41	<i>Plumbago indica</i> L	Plumbaginaceae	Cenkotiveli	Roots
42	<i>Plumbago zeylanica</i> Linn	Plumbaginaceae		
43	<i>Psoralea corylifolia</i> Linn	Fabaceae	Karpokkarisi	Seeds
44	<i>Gymnema sylvestre</i> R. Br.	Asclepiadaceae	Sakkaraikolli	Whole plant
45	<i>Hemidesmus indicus</i> (L)	Asclepiadaceae	Nannari	Leaves
46	<i>Hydnocarpus laurifolia</i>	Flacourtiaceae	Maravattai	Seeds
47	<i>Ipomoea nil</i> (L.) Roth	Convulvulaceae	Kakkattan	Seeds
48	<i>Rubia cordifolia</i> L	Rubiaceae	Manjitti	Roots
49	<i>Semecarpus anacardium</i> Linn	Anacardiaceae	Senkottai	Fruits
50	<i>Sesamum indicum</i> L.f	Pedaliaceae	Eelluceti	Oil
51	<i>Tectonia grandis</i> L.f	Verbenaceae	Tekkumaram	Wood
52	<i>Terminalia bellirica</i> Roxb	Combretaceae	Tanni	Fruits
53	<i>Trichosanthes lobata</i> Roxb	Cucurbitaceae	Peepudal	Whole plant
54	<i>Veronica antheilmintica</i> Willd	Asteraceae	Kattu ccirakam	Fruits
55	<i>Vigna radiate</i> L R Wilczek	Fabaceae	Pasippayaru	Seeds
56	<i>Vitex trifolia</i> L. f.	Verbenaceae	Nirnocci	Leaves

57	<i>Withania somnifera</i> (L)	Solanaceae	Amukkiar	Roots
58	<i>Zanthoxylum armatum</i> DC.	Rutaceae	Tumpunalu	Bark, fruits

The present work is collection of information regarding plants having potential in treatment of Leucoderma, used in the traditional Indian system of medicine. These are being used in the form of therapeutical and topical preparations.

Abelmoschus moschatus Medik. Is an aromatic and medicinal plant in the Malvaceae family, which is native to India. Seeds are effective aphrodisiac and antispasmodic, and used in tonics. They check vomiting and are useful in treating intestinal disorders, urinary discharge, nervous disorders, hysteria, skin diseases etc. The mucilaginous seeds are emollients and demulcents. Flower infusion is contraceptive. Different parts of the plant have uses in traditional and complementary medicine, not all of which have been scientifically proven. It is used externally to relieve spasms of the digestive tract, cramp, poor circulation and aching joints. It is also considered an insecticide and an aphrodisiac. In India, roots, leaves, and seeds of ambrette are considered valuable traditional medicines. The bitter, sweet, acid, aromatic seeds are used as atonic and are considered cooling, aphrodisiac, ophthalmic, cardiogenic, digestive, stomachic, constipating, carminative, pectoral, diuretic, stimulant, antispasmodic, deodorant, and effective against kapha and vata, intestinal complaints, stomatitis; and diseases of the heart. According to Unani system of medicine seeds allay thirst, cure stomatitis, dyspepsia, urinary discharge, gonorrhoea, leucoderma and itch. Roots and leaves are cures for gonorrhoea.^[6-11]

Abrus precatorius L. The plant is used in some traditional medicine to treat scratches and sores and wounds caused by dogs, cats and mice, and are also used with other ingredients to treat leucoderma. The juice of the fresh leaves is believed to be effective against leucoderma.^[12]

Acacia catechu Willd. Belonging to Family: Mimosaceae, is widely used in Ayurveda for many diseases and mainly for skin diseases. The heartwood of Khadira is used in melancholia, conjunctivitis, haemoptysis, catarrh, cough, pruritus, leprosy, leucoderma, skin diseases, helminthiasis, anorexia, diarrhea, dysentery, foul ulcers and wounds, haemoptysis, haematemesis, haemorrhages, fever, anaemia, diabetes and pharyngodynia.^[13, 14]

Acacia leucophloea The barks of plant are used in traditional medicine as an astringent, a bitter, a thermogenic, a styptic, a preventive of infections, an anthelmintic, a vulnerary, a

demulcent, an expectorant, an antipyretic, an antidote for snake bites. Freshly collected stem barks and in the treatment of bronchitis, dry cough, vomiting, of *Acacia leucophloea* were dried in shade and pulverized wounds, ulcers, diabetes, diarrhea, dysentery, internal and to a coarse powder and extracted with ethanol using the external hemorrhages, dental caries stomatitis, intermittent Soxhlet apparatus. The filtrate obtained was evaporated and used for fevers and skin diseases.^[15-19]

Acacia nilotica Lam Belonging to Family (Mimosaceae) stem bark is used as Anti bacterial, antioxidant, anti-mutagenic, cytotoxic bark is used as astringent, acrid cooling, styptic, emollient, anthelmintic, aphrodisiac, diuretic, expectorant, emetic, nutritive, in hemorrhage, wound ulcers, leprosy, leucoderma, small pox, skin diseases, biliousness, burning sensation, toothache, leucoderma, dysentery and seminal weakness. The trunk bark is used for cold, bronchitis, diarrhoea, dysentery, biliousness, bleeding piles and leucoderma.^[20-25]

Albizia lebbek Albizia species (Family - Mimosaceae) The bark is bitter, cooling, alexiteric, and anthelmintic, and cures diseases of blood, leucoderma, itching, skin disease, piles, excessive perspiration, inflammation, bronchitis, and toothache and strengthens the gums and teeth; it is used for leprosy, deafness, boils, scabies, syphilis, paralysis, and weakness. The seeds are aphrodisiac, astringent, and used as brain tonic as well as for treating gonorrhea, while the seed oil is applied topically to cure Leucoderma.^[26]

Allium cepa a new therapeutic protocol including topical application of a formulation of honeybee, *Allium cepa* L. juice and *Avena sativa* L. stem decoction.^[27]

Allium sativum Garlic has a tremendous pharmacological effects due to its biological active constituent (Allicin and its derivatives) organosulfur compounds. Studies carried out on the chemical composition of the plant show that the most important constituents of this plant are organosulfur compounds such as allicin, diallyl disulphide, S-allylcysteine, and diallyl trisulfide which contribute a vital role in its nutraceutical applications. Garlic is one of the most important bulb vegetables, which is used as spice and flavoring agent for foods Garlic adds to taste of foods as well as it helps to make them digestible. Garlic contains different useful minerals, vitamins and many other substances used for health of human beings. It is rich in sugar, protein, fat, calcium, potassium, phosphorous, sulfur, iodine fiber and silicon in addition to vitamins. It possesses high nutritive value. Furthermore, garlic has pharmaceutical effects and used to cure a vast conditions including blood pressure and cholesterol, cancer,

hepatoprotective, antihelmentics, antiinflammatory, antioxidant, antifungal and wound healing, asthma, arthritis, sciatica, lumbago, backache, bronchitis, chronic fever, tuberculosis, rhinitis, malaria, obstinate skin disease including leprosy, leucoderma, discolouration of the skin and itches, indigestion, colic pain, enlargement of spleen, piles, fistula, fracture of bone, gout, urinary diseases, diabetes, kidney stone, anemia, jaundice, epilepsy, cataract and night blindness.^[28]

Aristolochia indica The root of the plant is used as a stimulant and tonic. It is also used in powder form along with honey as a relieve for leucoderma. The decoction of the root is beneficial for relieving impotency. Crushed root is advised for reducing itching. The juice of the leaves is used to relieve snake bites and coughs. The seeds are used for reducing inflammations and biliousness. The plant is used as an aphrodisiac, anthelmintic (eliminates parasitical worms) and appetizer. The roots of the plant are mixed with honey and are used to relieve leprosy in traditional medicine.^[29, 30]

Azadirachta indica The Neem tree (*Azadirachta indica*) has been known as the wonder tree for centuries in the Indian subcontinent. Azadirachtin and other active ingredients in the neem seed have insecticidal properties that are effective against a broad spectrum of insects, many mites and nematodes, and even snails and fungi, and do not seem to generate resistance in the pests they affect. Nowadays, neem and its extracts are used in numerous herbal and allopathic medicines. What's more, even neem contraceptives are available in the market these days. Neem extract which have Nimbinin, nimbandiol as active constituents, alcoholic extract of the leaves was found to possess a significant blood sugar lowering effect, which are very useful against diabetes. Neem is used in Dermatitis Eczema, Acne, Bacterial, Fungal infections and other skin disorders. It has demonstrated its effectiveness as a powerful antibiotic. Neem also has shown antiviral, anti-fungal and anti-bacterial properties. It helps support a strong immune system and is used in cases of inflammatory skin conditions. Traditionally Neem has been used for skin and blood purifying conditions. Neem not only helps in curing diseases, but it also provides us with the strength of fighting diseases by enhancing our immunity.^[31]

Baliospermum montanum (Willd.) Muell-Arg belonging to the family (Euphorbiaceae) The plant is documented to possess beneficial effects as digestive, anthelmintic, diuretic, diaphoretic, rubefacient, febrifuge and tonic. It believed to be useful in asthma, bronchitis, leprosy, jaundice, wounds, constipation, anemia, leucoderma and fever. A scrutiny of

literature revealed some notable pharmacological activities of the plant such as anticancer, antimicrobial, free radical scavenging, immunomodulatory, hepatoprotective, and anthelmintic.^[32]

Caesalpinia bonduc L. is a medicinal plant belonging to the family Caesalpiniaceae. The plant has been reported to possess anxiolytic, antinociceptive, antidiarrhoeal, antidiabetic, adaptogenic, anthelmintic, antiestrogenic, anti-inflammatory, antimalarial, antimicrobial, antifungal, antispasmodic, anti-oxidant, antiproliferative, antipsoriatic, antitumor, larvacidal, muscle contractile, hepatoprotective, anticonvulsant and antifilarial activities. Phytochemical analysis of *Caesalpinia bonduc* (L.) has revealed the presence of alkaloids, flavo-noids, glycosides, saponins, tannins and triterpenoids.^[33]

Careya arborea It is reported to be useful in tumours, cough, bronchitis, toothache, wounds, dyspepsia, colic, haemorrhoids, intestinal worms, dysentery, leucoderma, epilepsy, abscesses, ulcers and eruptive fever particularly smallpox and antipruritic.^[34]

Carthamus tinctorius Safflower is a plant known already in the ancient times, but nowadays rarely used in cosmetics. Safflower's oil is still used in Asiatic countries but a natural dye, carthamin, has been replaced by cheaper synthetic dyes. In recent years studies have been conducted confirming safflower properties used in traditional Chinese and Indian medicine. Those studies confirmed anti-radical efficiency of alcohol extract of safflower flowers. Also pain relief properties of oil applied locally, used for years in pharmacopuncture in Korea, were confirmed. Safflower extracts and oil are promising ingredients of skin whitening cosmetics due to the content of strong inhibitors of melanin synthesis.^[35]

Cassia senna is a small, perennial, branched under-shrub. Basically, the senna leaves that are used for medication are dried leaflets belonging to species of *Cassia*. For ages, senna has been used as a potent cathartic or purgative. Several scientists and researchers are of the view that the senna possesses this property owing to the apparent presence of elements and compounds such as dianthrone glycosides, main sennosides A and B along with minor quantities of sennosides C and D and other intimately associated amalgams. Besides being a laxative, senna is used as a febrifuge, in splenic enlargements, anaemia, typhoid, cholera, biliousness, jaundice, gout, rheumatism, tumours, foul breath and bronchitis, and probably in leprosy. It is employed in the treatment of amoebic dysentery as an anthelmintic and as a mild liver stimulant. Leaves are astringent, bitter, sweet, acrid, thermogenic, cathartic,

depurative, liver tonic, anthelmintic, cholagogue, expectorant, ferbifuge. Usefull in constipation, abdominal disordes, leprosy, skin disorders, leucoderma, splenomegaly, hepatomegaly, dyspepsia, cough, and bronchitis.^[36]

Cedrus deodara. All parts are bitter, hot, slightly pungent, oleaginous, useful in inflammations, dyspepsia, insomnia, cough, fever, urinary discharges, ozoena, bronchitis, itching, elephantiasis, tuberculous glands, leucoderma, ophthalmia, plies, disorders of the mind, diseases of the skin and of the blood.^[37-41]

Celastrus paniculatus Willd. (CP) belongs to family Celastraceae is a large, woody, climbing shrub. Ayurveda, the ancient Indian traditional system of medicine has used this plant seed for prevention and treatment of various diseases. The bark is abortifacient, depurative and a brain tonic. The leaves are emmenagogue and the leaf sap is a good antidote for opium poisoning. The seeds are acrid, bitter, thermogenic, emollient, stimulant, intellect promoting, digestive, laxative, emetic, expectorant, appetizer, aphrodisiac, cardiotoxic, anti-inflammatory, diuretic, emmenagogue, diaphoretic, febrifuge and tonic, abdominal disorders, leprosy, pruritus, skin diseases, paralysis, cephalalgia, arthralgia, asthma, leucoderma, cardiac debility, inflammation, nephropathy, amenorrhoea, dysmenorrhoea. The seed oil is bitter, thermogenic and intellect promoting and is useful in abdominal disorders, beri-beri and sores.^[42-44]

Citrullus colocynthis Family: Cucurbitaceae. This is perennial herbs usually trailing. Commonly *Citrullus colocynthis* known as -Indravaruni (Sanskrit), Chitrapala or Bitter apple. Medicinally root, bark and leaves are used. *Citrullus colocynthis* shows mild stomachic, bitter tonic, diuretic and antilithic property. As per Ayurveda and Siddha system of medicine it is Tikta-rasam, ushna-veeryam and katu vipakam and used as purgative, diuretic, lagu, kapharam and abortifacient. Fruit is bitter, pungent and used as purgative, anthelmintic, antipyretic, carminative, cures tumors, leucoderma, ulcers, asthma, etc. Root is useful in jaundice, ascites, urinary disease, rheumatism.^[45]

Clerodendrum serratum The parts used are the root and leaf. Its roots are bitter, acrid, thermogenic, anti-inflammatory, digestive, carminative, stomachic, anthelmintic, depurative, expectorant, sudorific, antispasmodic, stimulant and febrifuge and are useful in inflammations, dyspepsia, anorexia, colic, flatulence, helminthiasis, cough, asthma, bronchitis, hiccough, tumors, tubercular glands, dropsy, consumption, chronic inflammation

of the nose, skin diseases, leucoderma, leprosy and fever. Leaves are useful as an external application for cephalalgia, and ophthalmia. The root increases appetite, lessens expectoration. Seeds bruised and boiled in buttermilk are used as aperient and in dropsy^[46]

Clitoria ternatea is cultivated through-out India but is naturalized in the more tropical regions. The juice of flowers is reported to be used in insect bites and skin diseases. The roots are useful in asthma, burning sensation, ascites, inflammation, leucoderma, leprosy, hemi-crania, amentia, pulmonary tuberculosis, ophthalmology and reported as bitter, refrigerant, ophthalmic, laxative, diuretic, cathartic, aphrodisiac, tonic. Consequently they are used in the treatment of a number of ailments including body-aches, infections, urinogenital disorders and as antihelmintic and anti-dote to animal stings. Seeds are cathartic and useful in visceralgia. They are considered safe for colic, dropsy and enlargement of abdominal viscera. The root, stem and flower are recommended for the treatment of snakebite and scorpion sting in India.^[47-51]

Commiphora mukul Guggal (Burseraceae) is distributed in tropical and sub-tropical regions. It is small shrub with sessile leaves. Three sterols gugglusterols I, II and III, two sterones and two dieterpines are found. Gum and bark is useful to treat obesity, arthritis, indolent and ulcers. Guggul is used in various ways to cure different ailments like gonorrhoea, pyorrhoea, ulcers, piles, asthma, cough, hernia and leucoderma.^[52]

Ficus hispida (FH) Linn. Is a moderate sized tree found throughout the year and is grown wild or cultivated for its edible fruits and folklore value. Traditionally, different parts of the plant have been used in the treatment of ulcers, psoriasis, anemia, piles jaundice, vitiligo, hemorrhage, diabetes, convulsion, hepatitis, dysentery, biliousness, and as lactagogue and purgative. FH contains wide varieties of bioactives from different phytochemical groups like alkaloids, carbohydrates, proteins and amino acids, sterols, phenols, flavonoids, gums and mucilage, glycosides, saponins, and terpenes. Various scientific works have been published to establish the scientific basis of traditional medicinal values attributed to FH. Furthermore, newer pharmacological activities like antineoplastic, cardioprotective, neuroprotective and anti-inflammatory effects were also reported recently.^[53]

Gentiana kurroo Royle belongs to the family Gentianaceae and is a critically endangered (CR) medicinal plant species, endemic to the northwestern Himalayas. The drug (rootstock) of this plant is administered in fevers and urinary complaints, also used as a bitter tonic, antiperiodic, expectorant, antibilious, astringent, stomachic, antihelmintic, blood purifier,

and carminative. The methanolic root extract of this plant contains tannins, alkaloids, saponins, cardiac glycosides, terpenes, flavonoids, phenolics, and carbohydrates. The root extract of this plant has been found to have an analgesic activity. The ethanolic extract of the flower tops of this plant contains alkaloids, flavonoids, glycosides, free phenols, and sterols/terpenes and thus has been found to show an anti-inflammatory activity.^[54-56]

Lawsonia inermis The leaves are frequently used as a herbal remedy for an array of human disorders including wounds, ulcers, strangery, cough, bronchitis, lumbago, hemi crania, leucoderma, scabies, boil, hepatopathy, spleenopathy, ophthalmic conditions, falling of hairs and jaundice.^[57]

Melia azedarach L. (Meliaceae), commonly known as Persian lilac or chinaberry, has long been recognized in Iran as a medicinal plant with a variety of medicinal effects and mentioned in ancient medical literatures as “*Azad derakht*”. Persian lilac is widely distributed in northern forests of Iran and has been also found to possess outstanding antifeedant, anti-insect and cytotoxic activities. Most of the former studies reported limonoids as responsible compounds for mentioned activities of *M. azedarach*, leaves and fruits are used in the treatment of leprosy and vitiligo.^[58-61]

Merremia emarginata (Burm. F.) which belongs to Convolvulaceae family is a procumbent herb spreading up to 1 m and has yellow coloured flowers. *M. emarginata* has been mentioned to be therapeutically used as deobstruent, diuretic, cough, headache, neuralgia and rheumatism. Methanol extract of this plant has been reported for antioxidant and antiobesity activities. The plant is also traditionally used to treat diabetes in Srilanka and India.^[62, 63]

Mimosa pudica Mimosa belongs to the taxonomic group Magnoliopsida and family Mimosaceae. In Latin it is called as *Mimosa pudica* Linn. Ayurveda has declared that its root is bitter, acrid, cooling, vulnerary, alexipharmic. It is used in the treatment of leprosy, dysentery, vaginal and uterine complaints, and inflammations, burning sensation, asthma, leucoderma, fatigue and blood diseases. Decoction of root is used as gargle to reduce toothache. It is very useful in diarrhea, amoebic dysentery, bleeding piles and urinary infections. This review gives a brief compilation of its phytochemical and pharmacological activities. The *Mimosa pudica*, invites attention of the researchers worldwide for its pharmacological activities such as anti diabetic, antitoxin, antihepatotoxin, antioxidant and wound healing activities. It is reported to contain alkaloid, glycoside, flavonoid and tannis. It

is used in suppresses kapha and pitta heals wounds, coagulates blood and sexual weakness. All parts of the tree are considered to possess medicinal properties and used in the treatment of biliousness, leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, fatigue, asthma, leucoderma, blood diseases.^[64, 65]

Murraya koenigii green leaves are eaten raw for cure of dysentery, diarrhoea and for checking vomiting. Leaves and roots are also used traditionally as bitter, anthelmintic, analgesic, curing piles, inflammation, itching and are useful in leucoderma and blood disorders.^[66, 67]

Mussaenda frondosa Linn(Rubiaceae) commonly called as Nagavalli reported to possess number of medicinal properties Traditionally leaves are used in the treatment of jaundice, asthma, hyperacidity, fever, ulcers, leprosy, diuretic, wound, astringent, expectorant, anti-inflammatory, cardiogenic, cough bronchitis, swells, antimicrobial etc.^[68-71]

Nelumbo nucifera, now placed in the mono-generic family Nymphaeaceae, has numerous common names (e.g. Indian lotus, Chinese water lily and sacred lotus) and synonyms (Nelumbium nelumbo, N. speciosa, N. speciosum and Nymphaea nelumbo). All parts of N. nucifera have many medicinal uses. The leaf, rhizome, seed and flower are traditionally used for the treatment of pharyngopathy, pectoralgia, spermatorrhoea, leucoderma, smallpox, dysentery, cough, haematemesis, epistaxis, haemoptysis, haematuria, metrorrhagia, hyperlipidaemia, fever, cholera, hepatopathy and hyperdipsia. In Ayurveda this plant is also used as a diuretic and anthelmintic and in the treatment of strangury, vomiting, leprosy, skin diseases and nervous exhaustion. In popular medicine it is used in the treatment of tissue inflammation, cancer, skin diseases, leprosy and as a poison antidote.^[72-76]

Niligiranthus ciliatus of Acanthaceae family is a highly potential medicinal plant in ayurveda. The roots are useful in the treatment of rheumatism, lumbago, sciatica, limping, chest congestion, strangury, fever, leucoderma, skin diseases, inflammation, and general debility. Its stem is widely used for whooping cough, bronchitis, dropsy, leprosy, and pruritus.^[77, 78]

Ocimum basilicum, sweet basil is used in Yemeni traditional medicine to treat various ailments: abdominal cramps, gastroenteritis, dysentery, and diarrhea. In northern Oman and Saudi Arabia, juice of leaves or crushed leaves is used in the treatment of wounds, acne, and vitiligo.^[79, 80]

Ocimum tenuiflorum is the most sacred herb in India and it is otherwise called as Krishna tulsi. *O. tenuiflorum* belongs to Lamiaceae family, which possesses various healing medicinal properties for human life. Traditionally the various parts like leaves, flowers and stems are being used in the treatment of various disorders such as skin diseases, cold, cough, fever, vomiting, swelling etc.^[81, 82]

Operculina turpethum The paste of root powder of *Operculina turpethum* is used topically to treat vitiligo and other skin disorders, alopecia, cervical lymphadenitis, hemorrhoids, fistulas, ulcers, and chancres.^[83]

Oroxylum indicum Roots are sweet, astringent, bitter, acrid, refrigerant, anti-inflammatory, anodyne, aphrodisiac, expectorant, appetizer, carminative, digestive, anthelmintic, constipating, diaphoretic, diuretic, antiarthritic, antidiabetic and febrifuges. Tonic is useful in dropsy, cough, sprains neuralgia, hiccough, asthma, bronchitis, anorexia, dyspepsia, flatulence, colic, diarrhea, dysentery, strangury, gout, vomiting, leucoderma, wounds, rheumatoid arthritis and fever. Root bark is used in stomatitis, nasopharyngeal cancer and tuberculosis.^[84-86]

Ougeinia oojeinensis Bark indicates its use in leprosy, leucoderma, gonorrhoea, and diabetes.^[87]

Pandanus odoratissimus The leaves are said to be valuable in leprosy, small pox, syphilis, scabies, heat of body, pain, leucoderma, diseases of heart and the brain, and as an aphrodisiac, tonic.^[88-91]

Pergularia daemia The plant is pungent, cooling; anthelmintic, laxative, antipyretic; cures biliousness, "kapha", asthma, "tridosha" ulcers, useful in eye troubles, urinary discharges, leucoderma, strangury, uterine complaints, inflammations; facilitates parturition.^[92]

Picrorrhiza scrophulariiflora The major uses of the plant are due to its hepatoprotective, anticholestatic, antioxidant, and immunomodulatory activity. Other reported activities in the plant are against leucoderma, anti-inflammatory, jaundice, fever and urinary diseases^[93-97]

Plectranthus vettiveroide The roots are used in various formulations in Ayurveda and Siddha. The roots and root oil are traditionally used in anti-cachetic, fever, burning of liver, swelling of hands and feet, head-ache, dysentery and eye pain. The roots are also used for the

treatment of burning eyes, diarrhoea, intrinsic haemorrhage, strangury, hyperdipsia, leprosy, leucoderma ulcer, vomiting, skin diseases, giddiness and quenching thirst. It is also used to promote hair growth.^[98-100]

Plumbago indica The genus *Plumbago* includes 3 species, namely *Plumbago indica*. L, *Plumbago rosea*. L, *Plumbagocapensis*. L, and *Plumbago zeylanica* .L, which are distributed in several parts of India 5 root increases digestive power, promotes appetite and has long been marked as a powerful antiseptic. A liniment made from bruised root mixed with a few amount of bland oil is used in treating rheumatism, paralysis, leucoderma, enlarged glands and buboes and scorpion-sting.^[101,102]

Plumbago zeylanica L. Is a multipurpose medicinal herb of family Plumbaginaceae. A native of South Asia. It has been used as a remedy for skin diseases viz., Leprosy, Scabies, ringworm. Powdered bark, root are used as a conventional method to treat gonorrhoea, syphilis, tuberculosis, rheumatic pain swelling and wounds treatment systems in Ethiopia. In India *Plumbago zeylanica* L. commends an important place among medicinal herb, since ancient times in Ayurvedic and Unani systems for its different activities such as in curing laryngitis is ringworm infection, vitiligo and other skin diseases. *Plumbago zeylanica* L. has been categorized as an appetizer anti-saturative, anti-anorexic, anti-haemorrhoidal and pain – reliever *Plumbago zeylanica* L. root powder to treat leucoderma or vitiligo skin disease.^[103-106]

Psoralea corylifolia The drug appears to have a purely local action with a specific effect on the arterioles of the subcapillary plexuses, which are dilated so that the plasma is increased in this area. The skin becomes red and the melanoblasts (pigment-forming cells) are stimulated. In leukoderma, melanoblasts do not function properly and their stimulation by the drug leads them to form and exudate pigments, which gradually diffuse into the white leukodermic patches. Also, the phytochemically induced covalent binding of the drug to pyrimidine bases is responsible for its therapeutic effect. The photoconjunction involves thymine dimer adducts on the opposite strands of DNA. Psoralen has been found to intercalate into DNA, where they form mono- and di-adducts in the presence of long wavelength UV light and thus are used for the treatment of hypo-pigmented lesions of the skin, such as leukoderma.^[107,108]

Gymnema sylvestre The plant also exhibits medicinal importance in the treatment of jaundice, constipation, cardiopathy, asthma, bronchitis, amenorrhoea, conjunctivitis, renal and vesical calculi, dyspepsia, leucoderma, and Parkinsonism. Reports in the ancient literature suggested

that the plant has multiple medicinal applications, namely, antihelminthic, antipyretic, astringent, an alexipharmic, anodyne, cardiogenic, digestive, diuretic, cough dyspepsia, hemorrhoids, hepatosplenomegaly, laxative, stimulant, stomachic, uterine tonic, intermittent fever, jaundice, and leucoderma.^[109]

Hemidesmus indicus According to Unani system of medicine, roots and stems of *H. indicus* act as laxative, diaphoretic, diuretic and are useful in treatment of syphilis and leucoderma. The roots are used by the tribal India to cure gonorrhoea, leucoderma, bleeding piles, jaundice and dysentery.^[110]

Hydnocarpus laurifolia It is one of the important plants known as Tuvarakain Sanskrit, is useful in the treatment of intestinal worms, helminthiasis, infected wounds, skin diseases, fever, piles, and wounds with inflammation.^[111]

Traditionally the seeds and oil are acrid, astringent, bitter, emollient, vermifuge, anodyne, purgative, emetic, carminative, stomachic, haematinic and tonic. They are useful in leprosy, skin diseases, pruritis, leucoderma, dermatitis, bronchopathy, eczema, sprains, bruises, chronic ulcers, dyspepsia, colic, flatulence, diabetes, wounds, ulcers and scald-head.^[112]

Ipomoea nil These species are used in different parts of the world for the treatment of several diseases, such as, diabetes, hypertension, dysentery, constipation, fatigue, arthritis, rheumatism, hydrocephaly, meningitis, kidney ailments and inflammations. Some of these species showed antimicrobial, analgesic, spasmolytic, spasmogenic, hypoglycemic, hypotensive, anticoagulant, anti-inflammatory, psychotomimetic and anticancer activities. Alkaloids, phenolics compounds and glycolipids are the most common biologically active constituents from these plant extracts.^[113]

Rubia cordifolia It is a popular remedy for the relief of heat and itching in eczema, psoriasis, herpes, scabies and also reported successful in treatment of vitiligo when given with honey.^[114]

Semecarpus anacardium (SA) Linn. (Family Anacardiaceae), commonly called as Sanjivani or Bhallatak, is well-known for its anti-arthritis properties in Ayurveda, the ancient system of Indian medicine. Traditionally, the fruits of this plant are used as carminative, tonic, aphrodisiac, antihelminthic and in the treatment of asthma, leucoderma and nervous debilities.^[115,116]

Sesamum indicum Sesame oil has been found to inhibit the growth of malignant melanoma in vitro and the proliferation of human colon cancer cells. In the tissues beneath the skin, this oil neutralizes oxygen radicals. It penetrates into the skin quickly and enters the blood stream through the capillaries.^[117-118]

Tectonia grandis According to Ayurveda, the wood of *T. grandis* is acrid, cooling, laxative, sedative to gravid uterus and is useful in the treatment of piles, leukoderma and dysentery. Roots are useful in anuria and retention of urine. The flowers are acrid, bitter, dry and cure bronchitis, biliousness, urinary discharges, etc. According to Unani system of medicine, its oil is useful in scabies, whereas the wood is best used for headache, biliousness, burning sensation and pain and liver-related troubles. It allays thirst, and acts as an anthelmintic, expectorant and anti-inflammatory agent. The bark is astringent, acrid, cooling, constipating, anthelmintic and depurative. It is useful in bronchitis, hyperacidity, vitiated conditions of pitta; dysentery, verminosis, burning sensation, diabetes, leprosy and skin diseases.^[119-121]

Terminalia bellirica is a large deciduous tree. It belongs to Combretaceae family and available in forests of India, Burma, and Ceylon except in the dry and arid region of Sind and Rajaputana. The bark has medicinal value in anemia and leucoderma.^[122]

Trichosanthes lobata *Trichosanthes* species of the *Cucurbitaceae* family, fruits of this species are good potential sources of various phenolic compounds and antioxidants with anticancer, antiproliferative, cardioprotective and antioxidant properties. Biological components in species are valued as a stimulant for its medical properties like Anti-inflammatory, Antidiabetic, Antiulcer and Cardioprotective activities.^[123]

Veronica anthelmintica According to Ayurveda, seeds are hot, acrid, astringent, anthelmintic; cure ulcers, vata and kapha; use in skin disease, leucoderma and fever. According to Unani system of medicine, the seeds are anthelmintic, purgative; used for asthma, kidney troubles, hiccough, inflammatory swellings, to remove blood from the liver, sores and itching of the eyes. The seeds are anthelmintic, stomachic, tonic, diuretic and antiperiodic. The powdered seeds are applied externally in paralysis of the legs at Mundas of Chota Nagpur. The juice of the leaf is given to cure phlegmatic discharges from the nostrils. In Ceylon, the plant is used for fever convulsions.^[124]

Vigna radiate Further Mudgahas been used as a reference to describe the shapes of lesions of certain skin disease.^[125]

Vitex trifolia Linn. Belonging to the family of Verbenaceae is commonly known as chaste tree (English), Nirnochi (Tamil) and jalanirgundi (Sanskrit). It is distributed throughout India in tropical and subtropical regions. Leaves are commonly used as poultice for rheumatic pains, inflammations, sprains, fever, anthelmintic, improve memory, favour the growth of hair, good for the eyes, leucoderma, bad taste in mouth and bronchitis.^[126]

Root of *Withania somnifera* used for the treatment of asthma, bronchitis, edema, leucoderma, anorexia, consumption, asthenia, anemia, exhaustion, aging, insomnia, ADD/ADHD, neurasthenia, infertility, impotence, repeated miscarriage, paralysis, memory loss, multiple sclerosis, immune- dysfunction, carcinoma, rheumatism, arthritis, lumbago.^[127-130]

Zanthoxylum armatum Asthma, Bronchitis, Cholera, Fever, Fibrosis's, Indigestion, Rheumatism, Skin diseases, Toothache, Varicose veins. Prickly Ash is used in many chronic problems such a rheumatism and skin diseases; chilblains, cramp in the leg, varicose veins and varicose ulcers. A paste of the leaves is applied externally to treat Leucoderma.^[131, 132]

CONCLUSION

Skin diseases are the major problem in the modern world, but one third of all traditional medicines are used for the treatment of skin diseases, compared to modern drugs. Skin diseases are classified into acute and chronic conditions, chronic skin diseases can be managed using drugs but they typically aren't curable. Since the synthetic drugs used for the treatment of skin disease are associated with severe side effects. The researchers around the world are concentrating on new, effective, and safer drugs from natural resources. Since exclusive treatments are available for Leucoderma, they do not work for a majority of people. Leucoderma is a chronic disorder that cannot be cured but can be controlled. The active constituents of traditional herbal medicine must be discovered and synthesized into new medicines. The valuable traditional knowledge of herbal medicine requires more scientific research for the discovery of new drugs and compounds.

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