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A REVIEW ON GREEN TREATMENTS FOR PSORIASIS

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ABSTRACT

Psoriasis is a chronic inflammatory skin condition that significantly affects a patient's quality of life. Both its prevalence and incidence are steadily rising. Only a portion of the disorder's complicated etiopathology is understood; however, there is a strong hereditary predisposition that links several environmental triggers, including an unbalanced diet and lifestyle. Psoriasis is a chronic autoimmune skin condition. The overgrowth of cells in psoriasis results in reddish lesions and silvery scales. Psoriasis is frequently accompanied by bleeding and itching. The chronic illness is more prevalent in adults and is so severe that it frequently requires lifetime care. Researchers worldwide are looking for new, safer, and more effective medications made from natural resources because the synthetic medications currently on the market for the treatment of psoriasis are linked to several negative side effects. There are a lot of medicinal plants in nature that are used to cure skin conditions. For skin conditions, almost all people consistently turn to medicinal herbs. Many medicinal plants can slow down the proliferation of skin cells and reduce inflammation. To raise awareness of the usefulness of certain medicinal plants in the treatment of psoriasis, this study will address their positive effects. The plants selected for these uses have important therapeutic properties; several of them are recognised to be anti-psoriatic and contain active phytochemical elements

Keywords: Psoriasis, anti-psoriatic, herbals, medicines.

I. INTRODUCTION

The Greek word "psora," which means "itch," is the source of the disease's name. An immune system that is overactive and resistant is the cause of psoriasis, a chronic skin disorder. The World Health Organization states that the average age of onset is between 15 and 35 years old. Patients may be more likely to get scalp psoriasis if it runs in the family. Psoriasis has an eccentric course of manifestations, various outer triggers and huge comorbidities, including joint inflammation, cardiovascular ailments, metabolic disorder, incendiary illness and wretchedness. Based on current studies, clinical predominance of psoriasis in grown-ups shifts from 0.44% to 2.8%, with a much lower rate in kids[1]. Approximately 75% of patients suffer from mild-to-moderate psoriasis, and the disease activity associated with psoriasis typically occurs in the epidermis. Around 2.3% individuals worldwide have the immune system sickness known as psoriasis. This condition makes the body produce too many skin cells. Cells develop on the skin, framing flaky red or shiny white patches and wounds. Psoriasis can occur anywhere on the body, including the chest, arms, legs, trunk, and nails. About a portion of individuals with psoriasis and

around 80 percent of individuals with psoriatic joint pain, a related joint condition, exhibit nail changes. In uncommon cases, the nails are the main part of the body that gives indications of psoriasis. Normally, individuals with psoriasis have the rash on different parts of their bodies. Other inflammatory conditions, such as Crohn's disease or inflammatory bowel disease, and human immunodeficiency virus (HIV) infection, can coexist with psoriasis[2,3].

II. DIAGNOSIS

Clinical signs and symptoms are the main basis for psoriasis diagnosis. The most common and persistent type of psoriasis, chronic plaque psoriasis, affects 80–90% of people with the condition and is characterised by recurring flare-ups interspersed with periods of remission. Plaque psoriasis typically manifests as erythematous, symmetrical, well-defined plaques with silvery scales covering them. Anywhere on the human body, plaques can form. Active lesions may be unpleasant, itchy, and red. Traumatized skin that was once normal might develop new lesions. It may appear as an isomorphic response as well. The disease is categorized as mild if the patient can obtain a satisfactory degree of symptomatic control with topical therapy and regular skin care practices, moderate if the disease is severe and the patient experiences physical pain on the face, hands, feet, or genitalia, and severe if the disease cannot be or would not be expected to be controlled by topical therapy and that causes the patient to deteriorate significantly[4,5].

III. EPIDEMIOLOGY

While psoriasis can occur at any age, 75% of cases of chronic plaque psoriasis start before the age of 46, with an average onset age of 33. Psoriasis seems to start in women a little earlier than in men. Research indicates that approximately one-third of psoriasis patients may experience spontaneous healing[6].

IV. SYMPTOMS

The most frequently reported symptoms connected to psoriasis are scaling (92%), itching (72%), redness (69%), fatigue (27%), swelling (23%), burning (20%), and bleeding (20%) in individuals[7].

V. PATHOPHYSIOLOGY

Once thought to be an epidermal keratinocyte problem, psoriasis is now recognized as an immunological or immune-mediated condition[6]. The condition is characterized by several interconnected cellular alterations in the skin, including vascular hyperplasia, epidermal keratinocyte hyperplasia, and T lymphocyte, neutrophil, and other leucocyte infiltration in the afflicted skin or body area[8].

Genetic basis

Keratinocytes are not destroyed by self-reactive T cells but are stimulated to proliferate in psoriasis[6]. It may be caused by a hereditary tendency that causes patients' keratinocytes to be very sensitive to various stimulations. Different variations may bring about a lower limit of inflammatory cells for actuation or a prolonged condition of activation. PSORS-1 is the major susceptibility gene for psoriasis vulgaris, suggested by genome-wise linkage scans. The primary genetic determinant of psoriasis is a region on chromosome 6p2 of the major histocompatibility complex. Up to 50% of the hereditary predisposition to the disease is caused by this gene, even if the exact gene has not yet been found[5]. Human leucocyte antigen (HLA)-Cw*0602 is one of the most strong susceptibility factors for psoriasis; further psoriasis loci are found on chromosomes 1q21, 3q21, 4q, 7p, 8, 11, 16q, 17q, and 20p [9].

Cellular basis

The Keratinocytes multiply, which means that the process of changing into squamous corneocytes occurs after granular keratinocytes are not fully

developed on the skin of people with psoriasis[8]. The characteristic scale and flakes of psoriasis lesions are caused by the formation of a poorly adhering stratum corneum. In the dermis and epidermis, certain dendritic cells (DC) are activated at the onset of psoriasis[10]. These cells generate the messenger molecules IL-23 and TNF-α, which encourage the growth of specific T cell subtypes (Th1, Th17). After that, these T cells release mediators that aid in the vascular and epidermal alterations associated with psoriasis. An essential role is played by Intracellular signal transduction pathways in reinforcing the inflammatory immune reaction[9].

VI. TYPES OF PSORIASIS

Psoriasis Vulgaris

Psoriasis vulgaris is present with scaly, erythematous plaques on the limb's extensor surfaces and trunk. About 90% of psoriasis cases are the chronic plaque type of psoriasis[10]. The most prevalent kind of psoriasis is psoriasis vulgaris. It is portrayed with a silver or white textured layer and thick red patches of skin[11].The chronic inflammatory skin condition known as psoriasis vulgaris has an increasing prevalence and incidence. Epidemiological research indicates that its impact is growing at a rate of 1.5–4% depending on ethnicity and climate, with important local variations[12]. In addition to having a symmetrical distribution, lesions are commonly found on the knees, scalp, elbows, and sacral region[13].

Inverse Psoriasis

Inverse psoriasis affects the axillary, intergluteal, inframammary, and vaginal folds of the skin. Mildly erosive erythematous plaques and patches that affect intertriginous tissues are the clinical hallmark of flexural psoriasis, another name for inverse psoriasis[10]. Bright red, symmetrical, infiltrative, fissured plaques with definite contours are the lesions' outward manifestation. Sharply contoured, fissured plaques are indicative of this type of psoriasis. Obesity increases its prevalence, and seborrheic lesions are more likely to form[14].

Guttate Psoriasis

Among other forms of psoriasis, *Guttate psoriasis* is known to have a better prognosis, exhibiting quicker involution and longer remission[15]. Typically, lesions appear on the face, scalp, proximal portion of the extremities, and trunk. Usually, they regress in three to four months. Young adults and kids are commonly affected by this form of psoriasis. *Guttate psoriasis* causes lesions that start as tiny drops[14].

Pustular psoriasis

Palmoplantar pustular psoriasis is a localized form of pustular psoriasis that typically affects both the soles of the feet and the palms of the hands. It presents as painful, pus-filled blisters and is often symmetrical in distribution. While the soles may be more frequently or severely involved, the palms are also commonly affectedThere are two types of pustular psoriasis: localized and widespread. Acute and quickly progressing, pustular psoriasis is typified by subcorneal pustules and diffuse redness[10]. Individuals with a family history of palmoplantar pustulosis and women are more likely to have this chronic, recurrent form of the condition. High temperatures, humidity, tonsillitis, and smoking can all trigger the illness. Pustules unite to form tiny, fluid-filled, polycyclic, purulent vesicles[14].

Psoriatic Arthritis

Psoriatic arthritis affects 20% of people with psoriasis[16]. Approximately one-third of psoriasis patients also have psoriatic arthritis. In addition to developing on the skin, lesions may also affect the nails. *Psoriatic arthritis* patients may experience axial symptoms, which include back pain and stiffness that gets better with movement, in as many as 50% of cases. *Psoriatic arthritis* is one type of arthritis that

can cause pain in many different joints and typically involves the wrist (19%), hip (19%), ankle (19%), finger (26%), and knee (41%). *Psoriatic arthritis* can affect six clinical domains, such as dactylitis, enthesitis, peripheral arthritis, psoriatic nail disease, psoriasis, and axial disease[17].

VII. PLANT FOR TREATMENT OF PSORIASIS

The herbals are effectively accessible, simple for the purpose of treating skin conditions. Herbal medications have a significant impact on the treatment of inflammatory and skin conditions. As fish oil contains omega-3 fatty acids and vitamin E, treatments that use it as a supplement have better results[18].

1. Angelica sinensis

Angelica sinensis is a short-lived perennial and belongs to the Apiaceae family. It produces a basal cluster of huge, three-sectioned leaves that are carried on two to three-foot clasping leaf stalks. It is known as Dong Quay. The aqueous extract from the yellowish-brown root contains potent furocoumarin, i.e., psoralen. In the presence of UV-A, psoralens are potent photosensitizers. Exposure to UV-A reduces the rate of epidermal DNA synthesis by causing cross-linking of the epidermal DNA. Dong Quay is being consumed by patients as a self-administered psoralen-UVA (PUVA) therapy, followed by exposure to UV light therapy or natural daylight. Therefore, this accelerates the degeneration and disintegration of psoriatic cells, while normalizing basal cell proliferation[19,20].

2. Aloe vera

Aloe vera is a type of succulent plant belonging to the Aloe genus belonging to the Asphodelaceae family. The active ingredient's strong analgesic, anti-inflammatory, anti-pruritic, and wound-healing qualities support aloe vera's potential as a successful psoriasis treatment. Thick and meaty, the leaves range in color from green to grey-green, and some varieties have white dots on the top and bottom of the stem. It features tiny white teeth and a serrated leaf border[21]. The two primary active ingredients in aloe vera, acemannan and anthraquinone, have antibacterial properties against *Streptococcus* and *Staphylococcus* species. They may also provide evidence supporting their effectiveness as a treatment for psoriasis. In almost every patient, the aloe group showed noticeably higher rates of psoriatic plaque clearance. Psoriatic plaques can be effectively treated with a hydrophilic cream extract applied three times a day for four weeks without occlusion. Aloe vera also contains salicylic acid, a keratolytic substance that helps explain why it works so well for skin peeling[22].

3. Ammi majus

Ammi majus is often referred to as bishop's weed and belongs to the family Apiaceae. The xanthotoxin and bergapten are present in considerable concentrations in *Ammi majus* fruit. Skin diseases are still treated with their furanocoumarins, and also consist of psoralen derivatives, which are well known for their photosensitizing effects. Xanthotoxin with UV-A and UV-B radiation helps in the healing of plaque psoriasis ranging from moderate to severe, in patients. The ethanolic extract of *Ammi majus* coumarins is used for inflammatory activity[23]. As anti-psoriatic activity primarily relies on ultraviolet A (UV-A, 320–400 nm) photoactivation of furocoumarins when administered either in oral forms or locally. The primary mechanism underlying the activity is the photochemical connection with DNA strands that triggers skin cell death, which in turn causes DNA fragmentation. Consequently, the overexpression of proliferative and inflammatory proteins in psoriatic lesions is decreased[24].

4. Ammi visnaga

Ammi visnaga is a type of flowering plant that belongs to the family Apiaceae. Its common name is

khella. The 2,2-diphenyl-1-picrylhydrazyl (DPPH) technique was used to assess the butanolic extract of Ammi visnaga seeds' antioxidant capacity. *Ammi visnaga* also contained fixed oils and coumarins. The main coumarin is the Pyranocoumarin Visnadin[23]. Because of their antimicrobial activities, *Ammi visnaga* could be used for curing psoriasis, as there are structural similarities between khellin and psoralen. *Ammi visnaga* has photo-sensitizing ability, and also it was considered a photo-sensitizer in patients with psoriasis. The reason is that *Ammi visnaga* possesses phototherapeutic properties which are similar to those of the psoralens, however, with lesser phototoxic and DNA mutation effects[23].

5. Annona squamosa

The tiny, well-branched shrub *Annona squamosa* is a member of the Annonaceae family and produces edible fruits known as sweetsops or sugar apples. The most prevalent diterpenoid alkaloid in the root is atisine, which is also composed of the flavonoid quercetin-3-O-glucoside, oxophoebine, reticuline, isocorydine, and methylcorydaldine. Ethanolic extracts decrease psoriasis at the molecular level via controlling nuclear factor-kB signaling biomarkers. Ten distinct genes were subjected to semi-quantitative RT-PCR (Reverse Transcription Polymerase Chain Reaction) and gene assay of the nuclear factor-kB signalling network in HaCaT (Cultured Human Keratinocyte) cells. Unripe fruits and seed oil are made into a paste and applied to the skin. They were used for their anti-psoriatic effect[19,25].

6. Alpinia galanga

Alpinia galanga is known as Thai ginger. Thai ginger belongs to the ginger family Zingiberaceae. With its long leaves, it reaches a height of roughly five feet. The rhizomes range in length from 3.5 to 7.5 cm and are rarely thicker than 2 cm. The rhizome contains the flavonol galangin. *Alpinia galanga* is also known for its anti-psoriatic effect. The function of the molecules in the crude ethanolic extracts suppresses psoriasis by regulating the nuclear factor-κB signalling biomarkers. Reverse transcription polymerase chain reaction, or semi-quantitative RT-PCR and gene assays, are used in 10 distinct genes of the nuclear factor-kB signalling network in HaCaT (Cultured Human Keratinocyte) cells[19,26].

7.Azadirachta indica

Azadirachta indica is commonly referred to as neem. It is a member of the Meliaceae family, which is found in Bangladesh, Nepal, India, and Pakistan. *Azadirachta indica* is a rich source of antioxidants. Azadirachtin, nimbolinin, nimbin, nimbidin, nimbidol, salannin, and quercetin are among its active ingredients. The primary components of neem seeds, gedunin and azadirachtin, have the ability to scavenge free radicals since they are abundant in antioxidants.

Reactive oxygen species or free radicals are among the primary causes of a number of illnesses. Neem contains powerful antioxidant compounds such as nimbin, azadirachtin, and quercetin that help neutralize free radicals. By scavenging these harmful molecules, neem can reduce oxidative stress and potentially prevent or slow the progression of certain illnesses

Before attacking biological cell targets, antioxidants deactivate or stabilize free radicals. Neem is crucial for the activation of antioxidant enzymes, which help treat problems caused by free radicals or reactive oxygen species. Additionally, *Azadirachta indica* leaf aqueous extract has anti-inflammatory properties by regulating pro-inflammatory enzyme activities, such as those of the cyclooxygenase (COX) and lipoxygenase (LOX) enzymes[27,28].

8. Cannabis sativa

Commonly, it is named Charas, Ganja, belonging to the Family Cannabinaceae. *Cannabis sativa* leaf powder is applied as a treatment to cuts or sores and

consists of chemical constituents such as tetrahydrocannabinol. It is utilized externally to treat itchy skin conditions. Numerous skin conditions, including dermatitis, varicose eczema, psoriasis, and acne rosacea, can be treated with *Cannabis sativa* seed oil. Cannabis sativa seed oil is used to strengthen and make the skin more resistant to diseases. The afflicted areas are rubbed with crushed leaves to reduce irritation.

Phyto cannabinoids are medications that show promise in the treatment of psoriasis because they both reduce the inflammatory component linked to the condition and prevent keratinocyte proliferation. By inhibiting inflammatory cytokines and angiogenic growth factors and reestablishing the balance of Th1 (T helper type 1) and Th2 (T helper type 2), topical administration of cannabidiol and cannabigerol exhibits dose-dependent efficacy in the treatment of psoriasis. Tetrahydrocannabinol and cannabidiol, two phytocannabinoids, have been shown to help psoriasis by converting the pro-inflammatory Th1 profile to an anti-inflammatory Th2 type expression and by having anti-proliferative effects on keratinocytes[29].

9. Capsicum annum

Commonly known as Cayenne pepper. It belongs to the Solanaceae family. Berries, which can be red, green, or yellow when ripe, are the fruit. The primary component of the herb is capsaicin. It reduces psoriasis-related discomfort and itching. Hydroalcoholic paste is applied externally to treat psoriasis plaque. Capsaicin is the chief component of *Capsicum annum*. Psoriasis's pathophysiology points to a neurogenic inflammatory etiology mediated by substance-P, an undecapeptide released by inflammatory cells like dendritic cells, lymphocytes, and macrophages as well as nerves. Substance-P sustains angiogenesis, vasodilatation, and keratinocyte hyperproliferation via activating inflammatory cells. Slow-conducting, unmyelinated type C neurons' vanilloid receptor is bound by this substance, which eventually causes its depletion. Capsaicin stimulates the release of substance-P. Therefore, capsaicin can control the release of inflammatory mediators by macrophages and exhibit anti-inflammatory properties[30,31].

10. Cassia fistula

Cassia fistula is referred to as the Indian Laburnum Golden Shower. *Cassia fistula* is indigenous to Sri Lanka, the Amazon, and India. Raquinone compounds as rhein and flavonoids. In addition to being a naturally occurring derivative, anthraquinone molecules have anti-inflammatory bioactivities. Rhein has successfully reduced the generation of free radicals and tissue edema in inflammatory circumstances.
The fruit pulp of *Cassia fistula* has a hydroalcoholic extract that exhibits antioxidant activity through the inhibition of hydroxyl radicals and 2,2-Diphenyl-1-picrylhydrazyl. It also has reducing power activities[19,32].

11. Cassia tora

Its leaves are roughly 10 cm long and pinnate. Three opposing pairs of leaflets—ovate, oblong, and oblique at the base—are present on its leaf. *Cassia tora* is a member of the family Fabaceae. It has long been used to treat psoriasis and other skin conditions. In the area, it is also referred to as charota, chakunda, and sickle senna. Glycoside-rich *Cassia tora* leaves also contain aloe emodin, which may help with skin conditions[19]. From the extract of Cassia tora leaves, three flavonoids—luteolin-7-O-β-glucopyranoside, quercetin-3-O-β-D-glucuronide, and formononetin-7-O-β-D-glucoside—have been found to have antipsoriatic properties. The cream is derived from Cassia tora ethanolic extract.

Leaves contain polyphenolic compounds which TNF-α (tumor necrosis factor) which activate inflammatory mechanisms that are active[33,34].

12. Coleus forskholii

Coleus forskholii is a South Asian herb. It belongs to the family Lamiaceae. The ethanolic extracts of *Coleus forskholii* root possess anti-psoriatic activity. Forskolin is the active constituent that exerts its therapeutic potential and increases cyclic adenosine monophosphate[35]. Forskolin's capacity to control cAMP levels in skin cells has been demonstrated to have therapeutic advantages for psoriasis patients[36].

13. Curcuma longa

Curcuma longa, with the common name Turmeric, belongs to Zingiberaceae. Turmeric, obtained from the rhizome of the *plant,* has been used to treat infections for a very long time. Phosphorylase kinase (PhK) is an enzyme that contains calmodulin and is expressed at significantly higher levels in patients with psoriasis. In association with increased psoriatic activity, higher amounts of glycogenolysis, phosphorylation, and phosphorylase kinase activity are observed. Decrease in PhK (Phosphorylase kinase) activity in the curcumin corresponds to severity of parakeratosis, decreases in keratinocyte transferring receptor expression, and density of epidermal CD8+T cells[22]. Curcumin is a strong phosphorylase kinase (PK) inhibitor that is non-competitive, selective, and it has been demonstrated to lower PK levels in psoriatic individuals. Thus, it shows anti-inflammatory effects in psoriasis[37].

14. Leucas aspera

Leucas aspera is a type of plant that belongs to mint family, known as Lamiaceae. It is most commonly known as Thumbai or Thumba. The plant consists of Flavonoid compounds such as Catechin. Diterpene alcohol is the primary chemical group in the *Leucas aspera* plant[38]. The extract from *Leucas aspera* causes mast cells to release their contents (a process called degranulation). The ethanolic extract of its leaves also shows strong antioxidant effects, meaning it can effectively neutralize harmful free radicals and superoxide anions[39]. *Leucas aspera* roots are known for their prostaglandin (PG) inhibitory, antioxidant activities, and radical scavenging effect. Significant anti-inflammatory activity was attributed to the inhibition of histamine and serotonin by *Leucas aspera*[40].

15. Mahonia aquifolium

The flowering plant species *Mahonia aquifolium* belongs to the Berberidaceae family. It is a common plant used to treat skin conditions, especially psoriatic plaque. Keratinocyte development is inhibited by the aqueous extract of *Mahonia aquifolium* fruits. Oxyacanthine and berbamine, two benzylisoquinoline alkaloids, were becoming more potent inhibitors[20].

16. Matricaria recutita

It is a member of the Asteraceae family and is frequently referred to as chamomile. The flowers have traditionally been used medicinally to alleviate digestive disorders. The chamomile flower's active ingredients also include the flavonoids quercetin and apigenin. The non-volatile oil extract, called matricin, is known to have anti-inflammatory properties by inhibiting lipoxygenase, which lowers the synthesis of leukotriene B4 (LTB4). Chamazulene and quercetin is the reason for its usage in psoriasis. There is proof that psoriatic plaques are caused by increased LTB4 (leukotriene B4) synthesis, which inhibits the disease and improves it. Lipoxygenase and, to a lesser extent, cyclooxygenase are both strongly inhibited by quercetin. Quercetin exhibits good skin penetrating properties[30].

17. Melaleuca alternifolia

It is often known as tea tree oil and is well-known for its ability to heal injuries. It belongs to the Myrtaceae family. Oil from bark is used for healing. Alpha-terpineol, terpinen-4-ol, and 1,8-cineole are the

three primary factors that contribute to the development of antibiotic resistance. However, it shows a role in urticarial reactions and control of swelling. Terpinen-4-ol, the primary ingredient, has strong anti-inflammatory qualities. Therefore, it is designed to assess its anti-psoriatic efficacy[19]. The terpinen-4-ol-containing water-soluble fraction of tea tree oil was able to decrease the production of prostaglandin E2, IL-1, IL-8, IL-10 (interleukin), and tumour necrosis factor-α (TNF-α) by lipopolysaccharide-activated monocytes. Additionally, both stimulated neutrophils and monocytes produce less reactive oxygen species when tea tree oil is present, while non-primed neutrophils and monocytes produce more reactive oxygen species[41].

18. Nigella sativa

It is referred to as black cumin. The Ranunculaceae family includes the annual plant *Nigella sativa*. Fats, vitamins, proteins, carbs, minerals, and vital amino acids are among the components found in *Nigella sativa* seeds. Pharmacological analyses of the seed's ethanolic extract show a variety of properties, such as antifungal, antibacterial, and anti-inflammatory properties. They are applied to eruptions of the skin. They are used for psoriasis with the eruption of patches and pain[19]. Patients with psoriasis have low levels of linoleic acid, which is contained in *Nigella sativa*. An essential component that prevents the synthesis of leukotriene B4 and prostaglandin E2, two substances implicated in the pathophysiology of psoriasis, is linoleic acid, an unsaturated fatty acid[42].

19. Pongmia pinnata

Native to eastern and tropical Asia as well as Australia, *Pongmia pinnata* is a species of tree belonging to the Fabaceae family, which includes peas. It is a legume tree with a large canopy that spreads equally wide and reaches a height of roughly 15 to 25 meters (50 to 80 feet). The primary component of this plant that helps treat psoriasis is flavonoids. The ethanolic extracts of *Pongamia pinnata* seeds have synergistic action on anti-bacterial and anti-psoriatic arthritis studies[19]. In psoriasis arthritis, *Pongamia pinnata* aids in the suppression or inhibition of NF-κB p65 nuclear translocation and tumor necrosis factor-α (TNF-α). The biflavonyloxy methane extract of the plant has antioxidant and radical quenching activity.

20. Psoralia corylifolia

The herb *Psoralia corylifolia* is a member of the Fabaceae family. It is an upright shrub with compressed yellow or bluish-purple flowers, mucronate seeds, and widely elliptic leaves. *Psoralia corylifolia* has been used to treat psoriasis, leucoderma, and leprosy in China and India. Historically, *Psoralia corylifolia* has been used as an anti-psoriatic medication[30]. Psoralens, which are found in *Psoralia corylifolia,* can absorb radiant energy. Psoralens, photo-activation in the UV range (200–320 nm) is known to improve several skin conditions, including psoriasis. PUVA (psoralen UVA) contains psoralens mostly in the form of 4,5,8-trimethylpsoralen (TMP), 5-methoxypsoralen (5-MOP), and 8-methoxypsoralen (8-MOP). According to studies, applying an emulsion cream with an 8-MOP microemulsion improves skin penetration and psoralens'-controlled release qualities while also aiding in the drug's localization at the intended location[43].

21. Rosmarinus officinalis

It is a member of the Labiatae family and is generally referred to as rosemary. In many regions of the world, rosemary is a common household plant. Caffeic acid and its derivatives, including rosmarinic acid, are the most significant components of rosemary. These substances have antioxidant properties. Psoriasis and acne are combated by rosemary essential oil's antimicrobial properties. When rosemary leaf methanol extract is

applied, benzo(a)pyrene [B(a)P] cannot covalently attach to epidermal DNA. It stimulates the regeneration of damaged skin, has anti-inflammatory, antioxidant, and revitalizing effects[39].

22.Ricinus communis

The castor bean is the scientific name for *Ricinus communis*. It is a type of perennial flowering plant belonging to the Euphorbiaceae family. The seeds of castor plants are shiny and a little larger than pinto beans. It has very beautiful and intricate designs. Flavonoids, tannins, and other phytochemicals are abundant in Ricinus communis. Additionally, bioactive phytochemicals like kaempferol-3-O and kaempferol-3-O- β -D-glucopyranoside, quercetin and gallic acid, a thujone, camphor, and beta thujone, ricin, epicatechin, gentisic acid, catechin, linoleic acid and ricinoleic acid, kaempferol-3-O- β -D-glucopyranoside, and quercetin-3-O- β - monoterpenoids. The anti-inflammatory and pro-inflammatory activity was found to be mediated by ricinolein in *Ricinus communis.* Gallic acid, quercetin, gentisic acid, rutin, epicatechin, and ellagic acid are among the substances that give leaves their antioxidant properties[44].

Nitric oxide (NO), superoxide, and 2,2-dipehnyl-picrylhydrazyl (DPPH) radicals are all susceptible to the powerful radical scavenging properties of *Ricinus communis*. The extract of leaves showed a very significant DPPH radical scavenging activity. The stem and leaf extract contains flavonoids and exhibits antioxidant activity[40,47].

23. Rubia cordifolia

The perennial climbing herb *Rubia cordifolia* is a member of the Rubiaceae family. It can reach a height of 1.5 meters. The whole, pointy, ovate-heart-shaped leaves are rarely rounded, have a heart-shaped base, a rough top surface, palmate veins, and are hairless. Rubiadin, quinine, morphine, aspirin, iridoids, glycosides, bicyclic hexapeptides, triterpenes, and numerous other bioactive secondary metabolites are among its chemical components. PAF (platelet-activating factor) receptor antagonism in intact neutrophils causes anti-proliferative effects on HaCaT (Cultured Human Keratinocyte) cells[9]. The ethanolic extracts of the roots of Rubia cordifolia are used to treat psoriasis and various skin diseases[19].

24.Silybum marianum

Cardus marianus, or milk thistle, is another name for *Silybum marianum*. It belongs to the Asteraceae family and is an annual plant. It features crimson to purple flowers and glossy, pale green foliage with white veins. It originated in a native of Southern Europe and spread to Asia. Alcohol consumption, anti-psoriatic drugs, and the direct effects of psoriasis itself are among the factors contributing to liver illness in psoriasis sufferers. Psoriatic patients have been found to have elevated levels of cAMP and leukotrienes; restoring these levels could help the condition. The potential of silymarin to enhance the liver's elimination of endotoxins may account for its importance in the treatment of psoriasis. Leukotriene production and cAMP phosphodiesterase are also inhibited[22]. Silymarin has cytoprotection activities attributed to its antioxidant activity, radical scavenging, and also anti-inflammatory effects through reduction of TNF-α[30].

25. Smilax china

Smilax china, commonly known as China root, belongs to the family Smilacaceae. *Smilax China* contains kaempferol 7-O-glucoside, a flavonol glucoside. Chronic nervous disorders, epilepsy, gout, rheumatism, skin disorders, constipation, dyspepsia, syphilis, colic, neuralgia, flatulence, psoriasis, and seminal weakness are among the conditions for which it is used. They separate the flavonoid quercetin from the rhizome's methanolic extract. Additionally, they used HaCaT (Cultured

Human Keratinocyte) cell lines to demonstrate an anti-psoriatic activity. There is evidence of a notable decrease in epidermal thickness accompanied with a decrease in leucocyte migration[23]2.

26.Tribulus terristris

Tribulus terrestris is a member of the Zygophyllaceae family and is an annual plant in the caltrop family. It is extensively dispersed globally. Saponins and flavonoids found in *Tribulus terrestris* fruit extract help treat chronic inflammatory skin conditions by preventing macrophage cells from producing TNFα and Th1 (T helper type 1) cells from producing interferon-γ. Vascular cell adhesion molecule-1, cyclo-oxygenase-2, and IL-6 (interleukin-6) are among the pro-inflammatory genes that have been activated in endothelial cells and macrophages as a result of its treatment, which has also decreased cytokines. Both the induction of TNF-α (tumor necrosis factor alpha) and IL-1 (interleukin-1) and their subsequent effects on other skin cells may have anti-inflammatory effects[19,41,42].

27. Woodfordia fruticosa

Woodfordia fruticosa is commonly known as Fire Flame Bush, Red Bell Bush. It is a big shrub with long, spreading branches that can reach a height of five meters. It belongs to the family Lythraceae. *Woodfordia fruticosa* consists of phenolics, hydrolysable tannins, and flavonoids. The crude alcoholic extract of flowers reduces erythema, redness, and also helps in a dose-dependent manner. *Woodfordia fruticosa* flowers have strong antipsoriatic properties and can be used to treat psoriasis. The powerful antioxidants, anti-inflammatory, antiproliferative, immunomodulatory, and free radical scavenging properties of flavonoids, triterpenoids, and polyphenolic substances are widely recognized. The treatment of psoriasis benefits from these properties of polyphenolic phytoconstituents. According to phytochemical screening, *Woodfordia fruticosa* flowers contain a wide variety of flavonoids and polyphenols[43].

28. Wrightia tinctoria

It belongs to Apocynaceae and is found in India, Southeast Asia, and Australia. Flavonoids, steroids, glycosides, tannins, phenolics, saponins, and sterols are all present in the plant. Phenolics have a number of biological characteristics, including anti-inflammatory and antioxidant effects. In DPPH (2,2-diphenyl-1-picrylhydrazyl-hydrate), nitric oxide, and hydrogen peroxide scavenging tests, the extract possessed antioxidant activity. *Wrightia tinctoria* leaf hydroalcoholic extract and plant pod emulsions exhibit a strong anti-psoriatic effect. Flavonoids reduce inflammation by blocking the cyclooxygenase enzyme[45]. In topical treatment, latex extract such as urea and polyethylene glycol from the *Wrightia tinctoria* leaves is effective against pain and inflammation in psoriasis.

VIII. Future Prospects

Niosomes in a novel drug delivery system can be used to achieve localized drug action. Combining a novel drug delivery system with herbal drugs, it provides an excellent method to treat psoriasis. In the market for better therapeutic ailments, an herbal drug loaded in niosomal gel can be introduced. In the formulation technology, the benefit of novel drug delivery in herbal drugs can be used[46]. The establishment of a herbal gel containing a hydroalcoholic extract of *Ricinus communis* is a very good attempt, as there is a growing demand for herbal formulations worldwide. *Ricinus communis* extract was suitable for use in a topical gel formulation[44]. CNF (Cellulose nanofiber) is a biocompatible biomaterial with film-forming properties and also has excellent mechanical properties. Curcumin-CNF (Cellulose nanofiber) improved psoriasis by reducing pro-inflammatory cytokines. And, also curcumin-loaded nanoparticles made of poly lactic-co-glycolic acid

exert a stronger anti-proliferative activity on human hair keratinocytes. Curcumin-loaded nanoparticles deliver more curcumin into the skin than curcumin hydrogel because of their penetration properties.

IX. CONCLUSION

Psoriasis is a persistent inflammatory condition. The synthetic pharmaceuticals used to treat psoriasis have negative effects; thus, most of the new medicines and treatments are directly or indirectly derived from herbs. Based on traditional knowledge, this article has highlighted numerous plant sources. Crude extracts of commonly used plants and herbs should be the subject of preliminary research on their anti-psoriatic properties. These extracts could be formulated in combination or individually as internal or external dosage forms. There is great scope for developing new herbal formulations for treating psoriasis using the above-mentioned herbal combinations.

Natural remedies are safe and have fewer side effects. Herbal formulations are highly sought after in the global market. Plant-based treatments are commonly used by psoriasis patients. The likely application of these treatment alternatives as well as the most recent data regarding their safety and effectiveness should be known to doctors. Aloe vera, capsaicin, chamomile, indigo naturalis, Mahonia aquifolium, Alpinia galangal, Annona squamosa, Camptotheca acuminate nut, Capsicum frutescens, Curcuma longa, Kukui nut, and Neem tree have been shown to have anti-inflammatory, anti-proliferative, and other benefits for psoriatic lesions, according to experiments. Despite the paucity of clinical trials, most of the data points to the preparations' good safety profile and positive efficacy, with no notable side effects noted. Due to the small size of most clinical studies and the scarcity of in vitro data, it is impossible to accurately define the appropriate scale of efficacy and safety. Therefore, the current optimistic results should encourage future scientific research analyzing the potential of these preparations. Future in vitro research and clinical assessments will provide additional scientific evidence of the efficacy of specific plant-based formulations in the treatment of psoriasis. Additionally, well-chosen combinations and innovative administration techniques with improved topical absorption and stability could increase the efficacy of these natural remedies. Plant-based treatments will be incorporated into the everyday clinical therapy of psoriasis as our understanding of their molecular mechanisms of action and scientifically demonstrated advantages grows.

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