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Synergistic Effects of Some Medicinal Plants for the Treatment of Psoriasis

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Abstract: *Psoriasis is a chronic autoimmune skin disorder characterized by rapid proliferation of skin cells, leading to red, scaly, and inflamed patches on the skin. Conventional treatments provide symptomatic relief but are often associated with side effects and long-term dependency. Therefore, there is growing interest in herbal medicine as a safer and more sustainable alternative*

This study focuses on the synergistic effects of selected medicinal plants such as Aloe vera, Neem (Azadirachta indica), Turmeric (Curcuma longa), Tulsi (Ocimum sanctum), Amla (Emblica officinalis), and others in the management of psoriasis. These plants possess antiinflammatory, antioxidant, antimicrobial, and immunomodulatory properties that help reduce skin inflammation, control excessive cell growth, and promote skin healing.

The combination of these medicinal plants enhances therapeutic effectiveness through synergism, where the combined effect is greater than individual action. The study highlights the potential of herbal formulations in improving psoriasis symptoms while minimizing side effects.

Overall, medicinal plant-based therapy offers a promising, natural, and cost-effective approach for the long-term management of psoriasis.

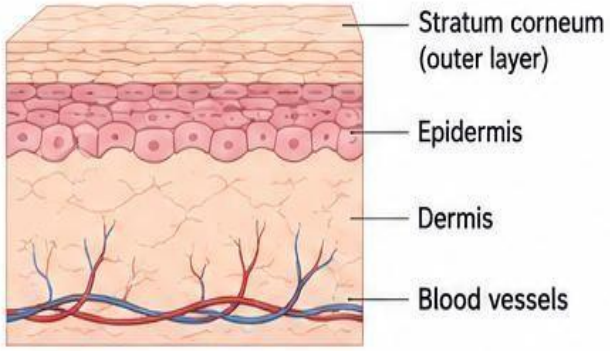
Keywords: Synergistic Effects of Some Medicinal Plants for the Treatment of Psoriasis

I. INTRODUCTION

Anatomy and Physiology of Skin

The skin is the largest organ of the human body and acts as a protective barrier against environmental hazards, microorganisms, and chemical substances. It also plays a vital role in thermoregulation, sensation, and immune defense. Due to its accessibility and large surface area, the skin serves as an attractive route for drug delivery.

Topical drug delivery refers to the application of drug formulations directly onto the skin to achieve localized or systemic effects. This route offers several advantages such as avoidance of first-pass metabolism, ease of application, improved patient compliance, and targeted delivery.



However, the outermost layer of the skin, the stratum corneum, acts as a major barrier that limits drug penetration. Therefore, advanced drug delivery systems like liposomes are used to enhance drug permeation through the skin.

The skin consists of three main layers:

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1. Epidermis
2. Dermis
3. Hypodermis (Subcutaneous tissue)

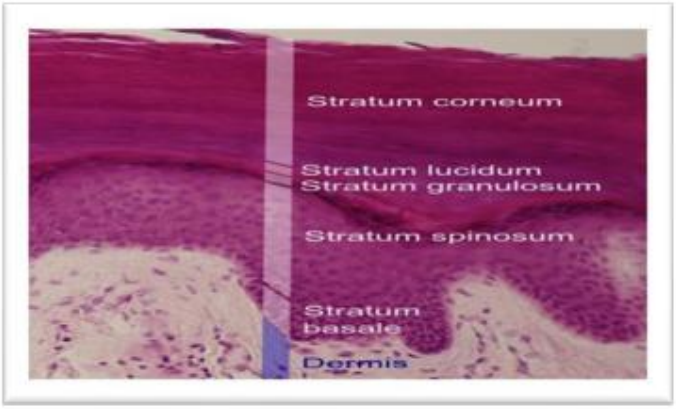
1. Epidermis

The epidermis is the outermost layer of the skin and is primarily responsible for barrier function. It consists of multiple sub-layers:

- Stratum corneum
- Stratum lucidum
- Stratum granulosum
- Stratum spinosum
- Stratum basale

Stratum corneum

The stratum corneum is the most important barrier layer composed of dead keratinized cells embedded in a lipid matrix. It consists of 15-20 layers of flattened, dead skin cells called corneocytes, which lack nuclei and organelles. These cells are embedded in a lipid matrix of ceramides, cholesterol, and fatty acids, creating a "bricks-and-mortar" structure that provides cohesion and flexibility.



2 Dermis

The dermis lies beneath the epidermis and contains:

- Blood vessels
- Nerve endings
- Hair follicles
- Sweat glands

It provides structural support and nourishment to the epidermis.

3 Hypodermis

The hypodermis or subcutaneous layer consists of adipose tissue and connective tissue. It acts as a cushion and helps in thermoregulation.

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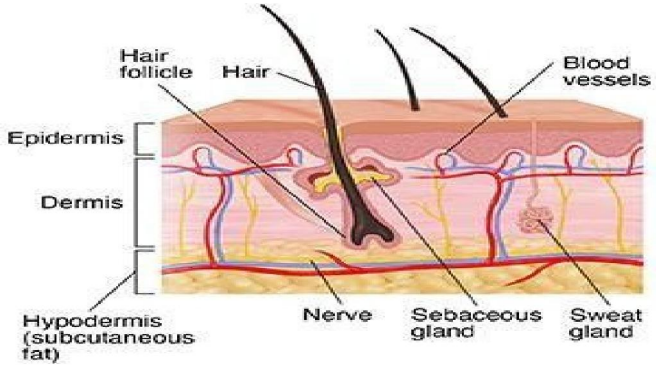
Structure of Skin Layers



1. Barrier Function of Skin

This structure restricts the entry of drugs, especially hydrophilic and large molecules. This structure significantly limits drug penetration, making it the rate-limiting step in topical drug delivery.

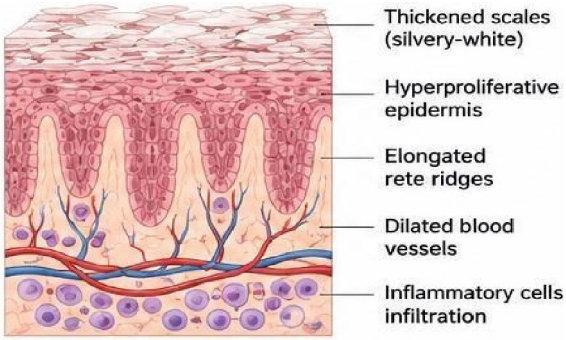
2. Skin disorder

Skin disorders are abnormalities affecting the structure and function of the skin. These disorders may occur due to bacterial infection, fungal infection, inflammation, autoimmune reactions, hormonal imbalance, genetic factors, or environmental conditions. Common skin disorders include acne vulgaris, psoriasis, eczema, dermatitis, and fungal infections. Conventional topical therapies often suffer from poor skin penetration, irritation, and reduced therapeutic efficacy. Therefore, advanced topical drug delivery systems such as liposomal gels are developed to improve localized drug delivery and therapeutic response.

- Psoriasis
- Acne vulgaris
- Eczema
- Dermatitis
- Rosacea
- Seborrheic dermatitis

Psoriasis

Psoriasis is a chronic autoimmune skin disease that causes red, itchy, dry, and scaly patches on the skin. It occurs when the immune system increases the speed of skin cell production, leading to the accumulation of thick skin plaques. Psoriasis affects millions of people worldwide and can reduce the quality of life due to discomfort, pain, and emotional stress.



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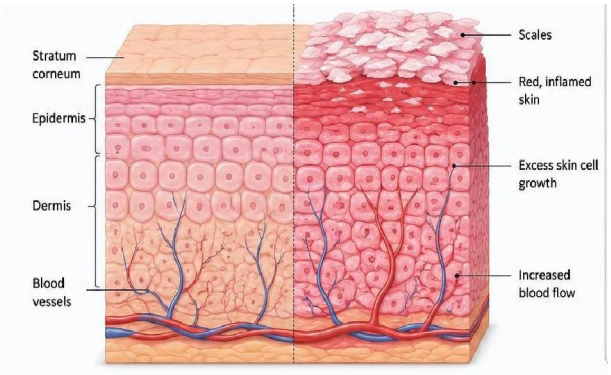
Modern treatments such as corticosteroids and immunosuppressive drugs help control symptoms, but long-term use may cause side effects. Therefore, medicinal plants are gaining importance as natural and safer alternatives for psoriasis treatment. Herbal plants like Neem, Aloe Vera, Turmeric, and Tulsi contain anti-inflammatory, antimicrobial, antioxidant, and skin- healing properties that help reduce psoriasis symptoms.

The synergistic effect of medicinal plants refers to the combined action of two or more herbs that work together to improve therapeutic effectiveness. Herbal combinations can provide better healing, reduce inflammation, prevent infections, and support skin regeneration more effectively than single plant therapy. This project focuses on the synergistic effects of medicinal plants in the treatment and management of psoriasis.

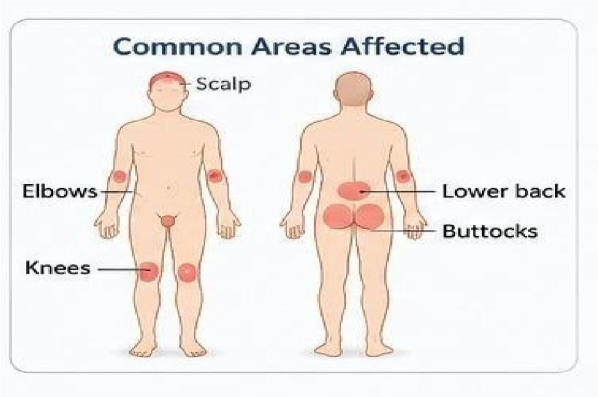
Definition of Psoriasis



Psoriasis is a chronic, non-contagious autoimmune skin disease in which the body's immune system becomes overactive, causing rapid multiplication of skin cells, leading to red, inflamed, and scaly patches on the skin.

Psoriasis is a skin condition where skin cells grow too fast and form thick, dry, itchy patches. Psoriasis is a chronic skin disease in which the immune system causes skin cells to grow too quickly. Normally, skin cells take about a month to grow and shed, but in psoriasis this process happens within a few days. Because of this, thick, red, dry, and scaly patches develop on the skin.

It is a non-contagious disease, which means it does not spread from one person to another. Psoriasis commonly appears on the elbows, knees, scalp, back, and hands. It may cause itching, burning, pain, and skin cracking.



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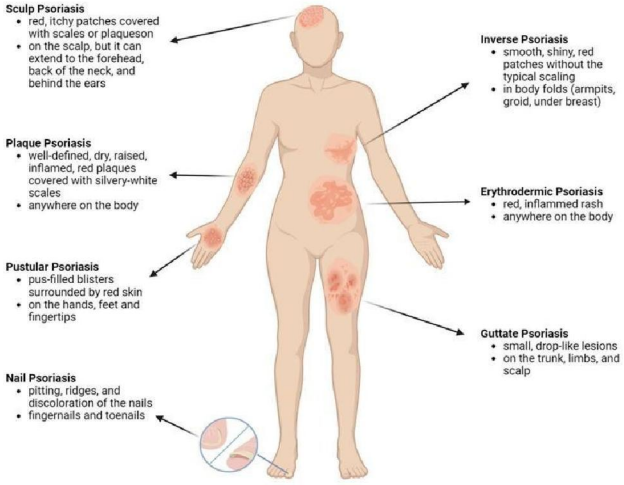
Types of Psoriasis



1. Plaque Psoriasis (Psoriasis Vulgaris)

Plaque psoriasis is the most common form of psoriasis, accounting for nearly 80–90% of cases. It is characterized by raised, red, inflamed patches of skin covered with thick silverywhite scales. These plaques commonly appear on the elbows, knees, scalp, and lower associated with psoriatic arthritis. Nail involvement may interfere with daily activities and negatively affect quality of life.

7. Psoriatic Arthritis

Psoriatic arthritis is an inflammatory joint disorder associated with psoriasis. It causes joint pain, swelling, stiffness, and reduced mobility, particularly in the fingers, toes, knees, and spine. If untreated, it may lead to permanent joint damage and deformity. Early diagnosis and treatment are important to prevent disability.

Common Symptoms

- Red skin patches
- Silver or white scales
- Dry and cracked skin
- Itching and irritation
- Swollen joints in severe cases

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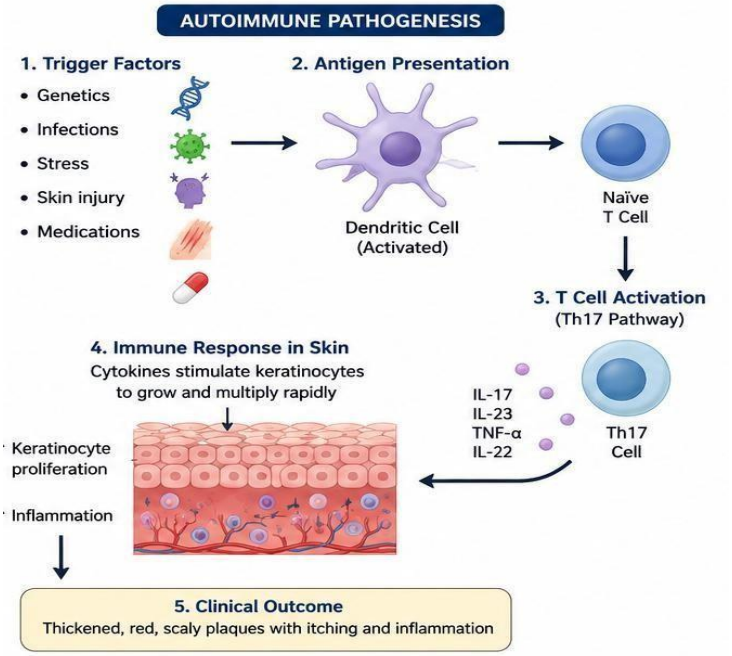

Anatomy of Skin and Sebaceous Glands

Structure of Skin

Skin is the largest organ of the body. Acts as a protective barrier.

Consists of three layers:

- Epidermis
- Dermis
- Hypodermis

Epidermis

- Outermost layer of skin.
- Contains stratum corneum.
- Acts as major barrier to drug penetration.

Dermis

- Middle layer containing:
- Hair follicles
- Sebaceous glands
- Blood vessels
- Nerves

Hypodermis

- Innermost fatty layer.

Certain medications can trigger the onset of psoriasis or worsen existing symptoms in susceptible individuals. These drugs may alter immune system activity or increase inflammatory responses, leading to psoriatic flare-ups. Common medicines associated with psoriasis include beta-blockers used for hypertension, lithium prescribed for psychiatric disorders, antimalarial drugs, nonsteroidal anti-inflammatory drugs (NSAIDs), and sudden withdrawal of corticosteroids. In some patients, biologic or immune-modulating therapies may also induce psoriasis-like lesions. Drug-induced psoriasis may appear shortly after starting medication or after prolonged use, and symptoms often improve once the triggering medicine is discontinued under medical supervision.

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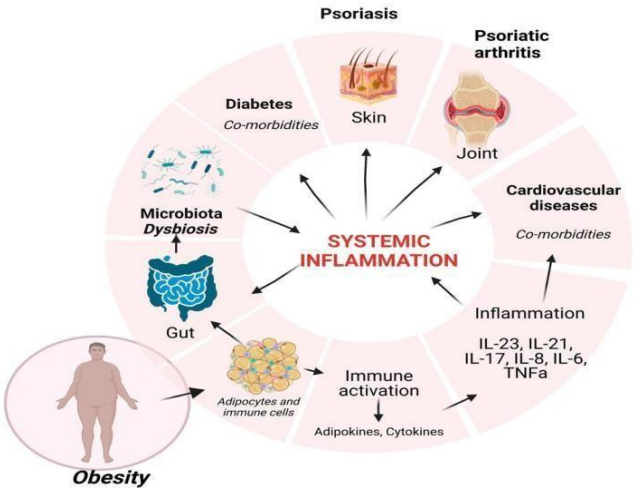
Some medicines may trigger psoriasis, such as:

- Beta blockers
- Lithium
- Antimalarial drugs

9. Obesity



Obesity is an important risk factor that can increase both the development and severity of psoriasis. Excess body fat promotes chronic low-grade inflammation by releasing inflammatory cytokines such as TNF-α and interleukins, which contribute to immune system activation and worsening of psoriatic lesions. Obese individuals often experience more extensive skin involvement, frequent flare-ups, and reduced response to treatment. Skin folds associated with obesity may also increase friction, sweating, and irritation, further aggravating symptoms. In addition, obesity is closely linked with metabolic syndrome, diabetes, and cardiovascular diseases, which are commonly associated with psoriasis. Weight management through healthy diet and regular physical activity can help improve disease control and overall quality of life. Excess body weight increases inflammation in the body.

10. Hormonal Changes

Hormonal changes can influence the onset, progression, and severity of psoriasis by affecting immune system activity and skin cell growth. Fluctuations in hormone levels during puberty, pregnancy, menstruation, and menopause may trigger psoriasis flare-ups or alter disease symptoms. Many women experience improvement in psoriasis during pregnancy due to increased anti-inflammatory hormone activity, while symptoms may worsen after childbirth when hormone levels rapidly decline. Hormonal imbalance can also increase stress and inflammation, further aggravating the condition. These variations suggest that endocrine factors play an important role in the regulation of psoriatic disease activity. Hormonal imbalance during puberty or pregnancy may affect psoriasis.

Global Prevalence of Psoriasis

Psoriasis is a chronic autoimmune skin disorder affecting millions of people worldwide. The global prevalence of psoriasis varies significantly across different geographic regions, ethnic groups, and age populations. On average, psoriasis affects approximately 2–3% of the world's population, although prevalence rates may range from less than 1% in certain Asian and African populations to over 8% in some Northern European countries. The disease occurs in both males and females and can develop at any age, with peak onset commonly observed between 15–35 years.

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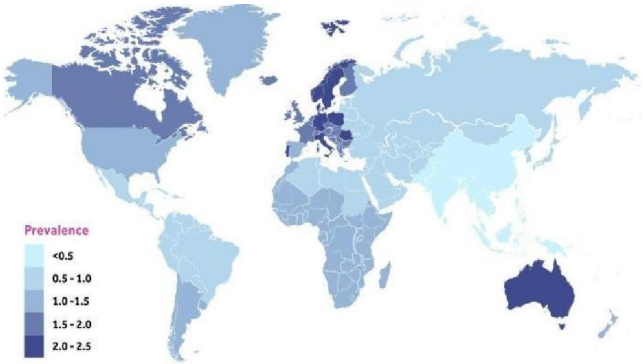

Overview

Psoriasis is a chronic autoimmune skin disease found worldwide. It affects both males and females and can appear at any age, but most commonly starts between 15–35 years.

Global Prevalence

- Worldwide prevalence: ~2% to 3% of the population
- That means around 100–125 million people globally are affected
- Higher rates in:
  - Europe (up to 3–4%)
  - North America (around 2–3%)
- Lower rates in: o East Asia (around 0.3–1%) Symptoms of Psoriasis

Psoriasis is a long-term skin condition where the immune system causes skin cells to grow too quickly, leading to visible skin changes and discomfort.

Common Body Areas Affected

Elbows and knees

- Scalp
- Lower back
- Nails and fingernails
- Sometimes face and hands

Nail Symptoms

- Pitting (small dents in nails)
- Nail discoloration (yellow or brown)
- Thick or crumbling nails
- Nail separation from skin

Scalp Symptoms

- Flaky, dandruff-like scaling
- Itching and irritation
- Thick crusty patches

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Severe Symptoms (in some cases)

- Painful swollen joints (called psoriatic arthritis)
- Widespread skin involvement
- Severe redness and inflammation

Complications of Psoriasis

1. Psoriatic Arthritis

Psoriatic arthritis is one of the most common complications of psoriasis. It causes joint pain, stiffness, swelling, and inflammation, particularly in the fingers, toes, knees, and spine. If untreated, it may lead to permanent joint deformity and reduced mobility.

2. Skin Infections

Cracked, dry, and inflamed psoriatic skin is more susceptible to bacterial and fungal infections. Excessive scratching and skin damage can allow microorganisms to enter the skin, increasing the risk of secondary infections.

3. Cardiovascular Diseases

Chronic inflammation associated with psoriasis increases the risk of cardiovascular disorders such as hypertension, heart attack, stroke, and atherosclerosis. Patients with severe psoriasis are more likely to develop metabolic and heart-related complications.

4. Metabolic Syndrome and Obesity

2. Phototherapy (light treatment)

- UVB therapy (controlled ultraviolet light exposure)
- PUVA therapy (psoralen + UVA light)

3. Systemic medications (moderate to severe cases

- Methotrexate (slows immune response)
- Cyclosporine (reduces immune activity)
- Acitretin (vitamin A derivative)
- Biologics (targeted immune drugs like TNF-α inhibitors)

Introduction to Herbal Medicine

Herbal medicine is one of the oldest systems of healthcare that utilizes plants and plant-derived substances for the prevention, treatment, and management of diseases. Medicinal plants contain bioactive compounds such as alkaloids, flavonoids, terpenoids, tannins, glycosides, and phenolic compounds that possess therapeutic properties. Herbal remedies have been widely used in traditional systems of medicine including Ayurveda, Traditional Chinese Medicine, Unani, and folk medicine for centuries. In recent years, herbal medicine has gained increasing scientific and clinical attention due to its natural origin, lower incidence of side effects, affordability, and suitability for long-term use. Herbal medicines exhibit various pharmacological activities including anti-inflammatory, antioxidant, antimicrobial, immunomodulatory, analgesic, and wound-healing effects. In chronic inflammatory skin disorders such as psoriasis, medicinal plants may help reduce inflammation, oxidative stress, itching, redness, and excessive skin cell proliferation. Common medicinal plants used in psoriasis management include Aloe vera, Curcuma longa, Azadirachta indica, Ocimum tenuiflorum, and Mahonia aquifolium. Herbal medicine is therefore considered an important complementary and alternative therapeutic approach in modern healthcare systems.

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Importance in Modern Life

Today, herbal medicine is still widely used as:

- A complementary therapy along with modern medicine
- A natural option for long-term health support
- A way to promote immunity and wellness Herbal / Plant-Based Treatments for Psoriasis

Herbal remedies are mainly used to reduce inflammation, itching, and skin irritation:

Common medicinal plants:

1. Aloevera

Inflammation stimulates formation of new blood vessels beneath the skin, making lesions appear red and inflame

Aloe vera is a medicinal plant widely used in herbal medicine for skin care and healing. It contains bioactive compounds such as:

- Aloin
- Aloe-emodin
- Vitamins
- Amino acids
- Polysaccharides

These compounds provide anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties.

1. Anti-inflammatory Activity

Medicinal plants contain bioactive compounds that help reduce inflammation by suppressing inflammatory cytokines such as TNF-α, IL-17, and IL-23 involved in psoriasis pathogenesis.

Aloe vera reduces inflammation by inhibiting inflammatory mediators such as prostaglandins and cytokines.

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2. Moisturizing Effect

Its gel contains high water content that hydrates and soothes dry skin.

3. Wound Healing

Aloe vera promotes collagen synthesis and accelerates tissue repair.

Aloe vera is widely used for the treatment of skin disorders due to its soothing, moisturizing, anti-inflammatory, and wound-healing properties. Aloe vera gel helps reduce redness, itching, scaling, and irritation associated with psoriasis. It also promotes skin hydration and supports regeneration of damaged skin tissues.

4. Antioxidant Property

It neutralizes free radicals and protects skin cells from oxidative stress.

2. Neem (Azadirachta indica)

Turmeric (Curcuma longa) is a well-known medicinal herb widely used in Ayurveda and herbal medicine.

Its main active compound is curcumin, which possesses:

- Anti-inflammatory activity
- Antioxidant properties
- Antimicrobial effects
- Immunomodulatory action
- Wound-healing ability

Turmeric is commonly used for skin diseases, including psoriasis, eczema, and acne. Anti-inflammatory Activity

Curcumin inhibits inflammatory cytokines such as TNF-α, IL-17, and IL-23 involved in psoriasis.

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2. Antioxidant Property
Turmeric neutralizes free radicals and protects skin cells from oxidative stress.

3. Antimicrobial Effect
It helps prevent bacterial and fungal skin infections.

4. Immunomodulatory Action
Curcumin helps regulate immune system overactivity associated with autoimmune diseases.
Curcuma longa contains curcumin, a bioactive compound known for its potent antiinflammatory and antioxidant effects. Curcumin inhibits inflammatory cytokines such as TNFα and IL-17, which play important roles in psoriasis pathogenesis. Turmeric may help reduce plaque formation, redness, and swelling.

4. Amla (Indian gooseberry)

Amla (Indian Gooseberry) is a highly valued medicinal plant in Ayurveda and herbal medicine. It is rich in:

- Vitamin C
- Polyphenols
- Flavonoids
- Antioxidants
- Tannins

Amla is widely used for improving immunity, skin health, and healing inflammatory disorders including psoriasis.

1. Antioxidant Property
Amla contains strong antioxidants that protect skin cells from oxidative stress and free radical damage.
2. Anti-inflammatory Activity
It helps reduce inflammation by inhibiting inflammatory mediators involved in skin diseases.

3. Immunomodulatory Action
Amla supports immune balance and helps regulate autoimmune responses.

4. Skin Nourishment
Its rich vitamin C content promotes collagen production and healthy skin regeneration.
Phyllanthus emblica is rich in vitamin C, polyphenols, and antioxidants that help protect the skin from oxidative stress and inflammation. Amla supports immune regulation, improves skin texture, and enhances wound healing. It is commonly used in Ayurvedic medicine for maintaining healthy skin.

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5. Tulsi (Ocimum sanctum)

Ocimum tenuiflorum is a well-known Ayurvedic medicinal plant used for skin health due to its anti-inflammatory, antioxidant, and antimicrobial properties. These effects make it helpful as a supportive natural remedy for psoriasis.

How Tulsi May Help in Psoriasis

Psoriasis is an autoimmune skin condition that causes red, scaly, itchy patches due to rapid skin cell growth and inflammation.

Tulsi may help by:

- **Reducing inflammation**→ helps calm redness and swelling
- **Antioxidant action**→protects skin cells from damage
- **Antimicrobial effect**→ prevents infection in cracked skin
- **Immune modulation**→ may help balance overactive immune response
- **Skin soothing**→ reduces itching and irritation

How Tulsi is Used

- Tulsi leaf paste applied directly on affected skin
- Tulsi oil mixed with carrier oils (like coconut oil)
- Tulsi tea (supports internal detox and immunity)

Herbal combinations (Tulsi + Neem + Turmeric in Ayurveda)

Ocimum tenuiflorum, commonly known as Tulsi or Holy Basil, exhibits anti-inflammatory, antimicrobial, immunomodulatory, and antioxidant activities. Tulsi helps reduce skin inflammation, stress-related flare-ups, and microbial infections that may worsen psoriasis symptoms.

6. Mahonia aquifolium (Oregon grape)

Mahonia aquifolium is a medicinal herb traditionally used for chronic inflammatory skin disorders including psoriasis. It contains alkaloids such as berberine that possess antiinflammatory and antimicrobial properties. Topical preparations of Mahonia aquifolium may help reduce scaling, redness, itching, and plaque thickness in psoriasis patients.

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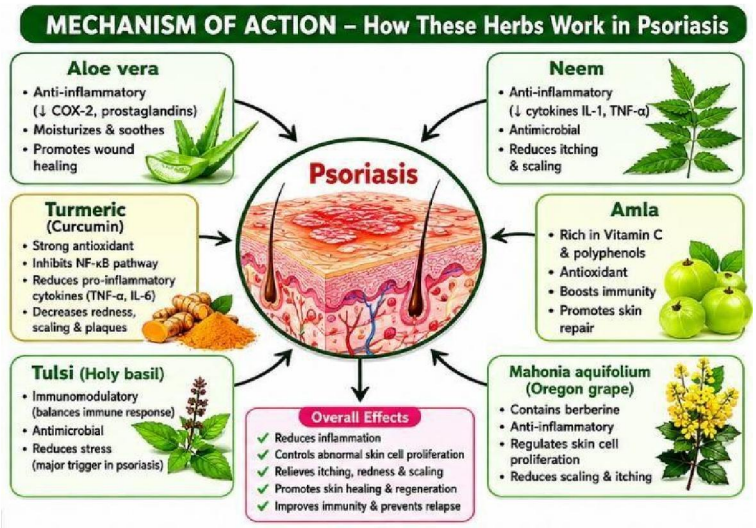
Mechanism of Action of Medicinal Plants on Psoriasis

Medicinal plants used in psoriasis management act through anti-inflammatory, antioxidant, immunomodulatory, antimicrobial, and wound-healing mechanisms. Plants such as Aloe vera, Curcuma longa, Azadirachta indica, Ocimum tenuiflorum, Phyllanthus emblica, and Mahonia aquifolium contain bioactive compounds that suppress inflammatory cytokines such as TNFα,

IL-17, and IL-23, which are involved in the pathogenesis of psoriasis. These medicinal plants help reduce abnormal keratinocyte proliferation, oxidative stress, redness, itching, and scaling of the skin. In addition, their antioxidant and immunoregulatory properties support skin repair, improve hydration, prevent microbial infections, and promote overall healing of psoriatic lesions.



Conventional and Herbal treatment

Parameter	Conventional Treatment	Herbal Treatment
Main Approach	Uses synthetic drugs and medical therapies to control symptoms and immune response	Uses plant-based natural remedies to reduce inflammation and promote skin healing
Examples	Corticosteroids, methotrexate, cyclosporine, biologics, phototherapy	Aloe vera, Neem, Turmeric, Tulsi, Amla, Mahonia aquifolium

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Mechanism of Action	Suppresses immune activity and reduces rapid skin cell proliferation	Provides anti-inflammatory, antioxidant, antimicrobial, and immunomodulatory effects

7. Preventive healthcare

Herbal treatments are widely used to improve immunity and prevent diseases before they develop, not just treat existing illness.

8. Traditional and cultural importance

Systems like Ayurveda use herbal medicine as a key part of holistic health practices that have been followed for generations.

Even though herbal treatments are natural, they are not always completely safe. Some may:

- interact with modern medicines
- cause allergic reactions
- have incorrect dosage if not guided properly Why Synergy Exists in Plants?

Synergy exists in plants because medicinal plants naturally contain multiple bioactive compounds that work together to enhance therapeutic activity. These phytochemicals, including alkaloids, flavonoids, terpenoids, tannins, glycosides, and phenolic compounds, interact with different biological targets
simultaneously. Some compounds directly reduce inflammation, while others provide antioxidant, antimicrobial, immunomodulatory, or wound-healing effects. Certain plant constituents may also improve the absorption, stability, and bioavailability of other active compounds, resulting in greater overall effectiveness. This natural cooperative interaction helps plants produce broader and more balanced pharmacological actions than isolated single compounds alone. In diseases such as psoriasis, herbal synergy may improve anti-inflammatory activity, reduce oxidative stress, suppress abnormal immune responses, and promote faster skin healing with fewer side effects.

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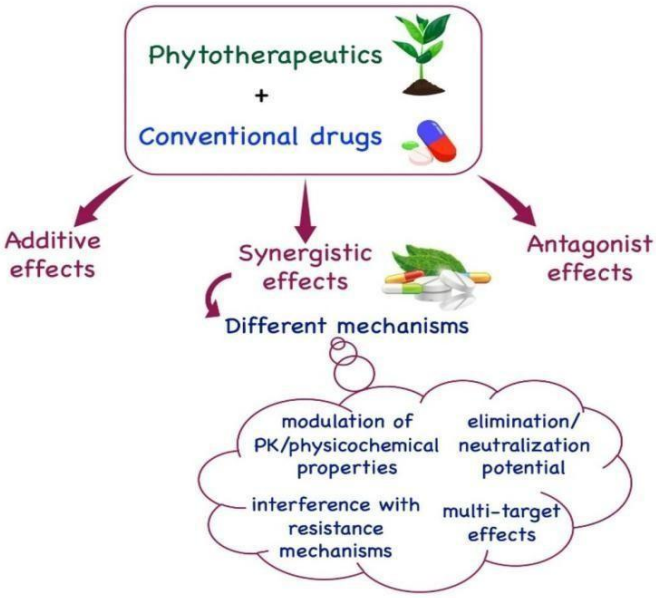

Herbal synergy refers to the phenomenon in which two or more medicinal plants or their bioactive compounds interact together to produce enhanced therapeutic effects compared to their individual actions alone. In psoriasis management, synergistic herbal combinations work through multiple mechanisms such as anti-inflammatory, antioxidant, immunomodulatory, antimicrobial, and wound-healing activities. Different phytochemicals present in medicinal plants may target various inflammatory pathways simultaneously, including inhibition of cytokines such as TNF-α, IL-17, and IL-23, reduction of oxidative stress, suppression of abnormal keratinocyte proliferation, and enhancement of skin repair processes. Some herbs improve the absorption, bioavailability, and stability of active compounds from other plants, thereby increasing overall therapeutic efficacy. Synergistic herbal interactions may also help reduce the required dosage of individual agents, minimize toxicity and side effects, and provide broader pharmacological action for chronic inflammatory diseases like psoriasis.

Advanced Nanotechnology Herbal Research

Recent experimental studies have combined medicinal plant extracts with nanotechnology for better drug delivery.
One 2025 study developed a topical gel containing:

Future Research Directions Scientists

are now exploring:
Nano-herbal delivery systems

- Polyherbal synergistic creams
- Cytokine-targeting plant compounds
- Standardized botanical extracts
- Personalized herbal dermatology

Overall Scientific Conclusion

Current evidence suggests medicinal plants such as:

- Aloe vera
- Turmeric

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- Neem
- Calendula
- Tulsi
- Licorice Root may help reduce psoriasis symptoms through:
- Anti-inflammatory action
- Antioxidant activity
- Immune modulation
- Skin barrier repair
- Moisturization

Role of Ayurveda in Psoriasis




Ayurveda plays an important supportive role in managing psoriasis naturally. Ayurveda considers psoriasis a disorder caused by imbalance of:

- Vata
- Pitta
- Kapha doshas Ayurvedic treatment focuses on:
- Reducing inflammation
- Detoxifying the body
- Improving skin health
- Balancing immunity
- Managing stress Common Ayurvedic Herbs
- Neem
- Turmeric
- Aloe Vera
- Tulsi
- Manjistha These herbs may help reduce:
- Redness
- Itching
- Dryness

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- Skin scaling
- Herbal therapies
- Healthy lifestyle
- Stress management

Research studies suggest that herbal and Ayurvedic treatments may help reduce:

- Redness
- Itching
- Scaling
- Skin irritation

Combination herbal therapy may provide better results because different plants act through multiple mechanisms such as:

- Immune modulation
- Cytokine reduction
- Skin repair
- Antioxidant protection

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