



Traditional Indian Medicinal Plants for the Treatment of Psoriasis: A Review of Active Constituents and their Pharmacological Effects

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Abstract

Psoriasis is a chronic inflammatory skin disease that affects millions of people worldwide. The use of natural products for the treatment of psoriasis has gained interest due to their potential to modulate the immune system and reduce inflammation. Traditional Indian medicinal plants offer a promising source of natural products for the treatment of psoriasis. This article provides a comprehensive review of Indian medicinal plants that have been traditionally used for the treatment of psoriasis, along with their active constituents and reported pharmacological activities. In addition, we discuss the molecular pharmacology of psoriasis and the limitations of current allopathic treatment methods. Finally, we highlight the potential therapeutic effects of individual active constituents found in Indian medicinal plants, with a focus on their anti-inflammatory, antioxidant, and immunomodulatory properties. This review provides a basis for further research on the use of traditional Indian medicinal plants for the treatment of psoriasis.

Keywords: Active Constituents, Mechanism, Medicinal Plants, Pharmacology, Psoriasis

1. Introduction

Psoriasis is a complex and multifactorial disease, with a genetic predisposition and environmental triggers playing a role in its pathogenesis. The immune dysregulation in psoriasis involves the activation of T cells, release of cytokines, and proliferation of keratinocytes, leading to the characteristic skin lesions¹. Despite the availability of

various treatment options, many patients with psoriasis experience inadequate control of their symptoms, leading to a reduced quality of life². Herbal remedies have been used for centuries in traditional medicines for the treatment of various diseases, including skin conditions. In recent years, there has been a renewed interest in herbal medicine for psoriasis, with several studies investigating the efficacy and safety of various plant-based remedies.

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For example, extracts of *Mahonia aquifolium*, *Indigofera tinctoria*, and *Curcuma longa* have been shown to have anti-inflammatory and immunomodulatory properties and may be beneficial in psoriasis³⁻⁵.

However, despite the promising results from some studies, there is still a lack of robust scientific evidence to support the use of herbal remedies in psoriasis. Many studies suffer from small sample sizes, lack of standardization in the preparation and dosing of the herbal remedies, and inadequate control groups⁶. Furthermore, there is a lack of understanding of the mechanisms of action of these herbal remedies and their potential interactions with conventional psoriasis treatments. Therefore, more research is needed to establish the safety, efficacy, and optimal dosing of herbal remedies for psoriasis treatment.

2. Mechanism of Psoriasis

The immune dysregulation in psoriasis involves the activation of T cells, particularly Th17 and Th1 cells, and the release of pro-inflammatory cytokines such as interleukin-17 (IL-17), tumour necrosis factor-alpha (TNF- α), and interferon-gamma (IFN- γ)¹. These cytokines stimulate keratinocytes to produce chemokines and adhesion molecules, which promote the recruitment of inflammatory cells, including neutrophils and dendritic cells, to the skin⁷. The activation of keratinocytes and the recruitment of inflammatory cells result in the formation of psoriatic plaques, which are characterized by thickened, scaly, and erythematous skin⁸.

In addition to immune dysregulation, there are also defects in the skin barrier function in psoriasis, which can exacerbate the disease by allowing for increased antigen penetration and inflammation⁹. Furthermore, the dysregulation of the epidermal differentiation and proliferation pathways in psoriasis can lead to abnormal keratinocyte differentiation and hyperkeratosis, which contribute to the formation of psoriatic plaques¹⁰.

3. Oxidative Stress and Inflammation

Oxidative stress and inflammation are important contributors to the pathogenesis of psoriasis. Oxidative stress refers to the imbalance between the production of Reactive Oxygen Species (ROS) and the antioxidant defence system, which can lead to cellular damage and dysfunction¹¹. In psoriasis, there is evidence of increased

ROS production and reduced antioxidant capacity in lesional skin, which can exacerbate inflammation and tissue damage¹².

Inflammatory cells, such as neutrophils, dendritic cells, and T cells, are major sources of ROS in psoriasis, and they can further activate the production of ROS by other cells, such as keratinocytes¹³. ROS can promote the activation of inflammatory signalling pathways, such as nuclear factor kappa B (NF- κ B) and Mitogen-Activated Protein Kinase (MAPK), which can stimulate the production of pro-inflammatory cytokines and chemokines, including TNF- α , IL-1 β , and IL-6¹⁴. These cytokines can further promote ROS production and inflammation in a positive feedback loop.

In addition to ROS, there is also evidence of increased lipid peroxidation and nitrosative stress in psoriatic skin, which can contribute to tissue damage and dysfunction¹⁵. Lipid peroxidation can lead to the formation of reactive aldehydes, such as malondialdehyde (MDA) and 4-hydroxy-2-nonenal (HNE), which can modify cellular proteins and lipids, and activate inflammatory signalling pathways¹⁶. Overall, oxidative stress and inflammation are closely interconnected in the pathogenesis of psoriasis, and they can contribute to tissue damage and dysfunction in lesional skin.

4. Conventional Treatment and Limitations

Allopathic treatment of psoriasis involves the use of topical and systemic medications to reduce inflammation, control symptoms, and improve quality of life¹⁷. Topical treatments include corticosteroids, vitamin D analogues, and retinoids, while systemic treatments include immunosuppressants and biologic agents¹⁸.

Corticosteroids are commonly used as a first-line treatment for mild to moderate psoriasis due to their anti-inflammatory effects¹⁹. However, long-term use can lead to skin atrophy, striae, and other side effects²⁰. Vitamin D analogues such as calcipotriene and calcitriol are also effective in treating psoriasis by inhibiting keratinocyte proliferation and reducing inflammation²¹. Retinoids such as tazarotene can also be used to treat psoriasis by promoting cell differentiation and reducing inflammation²². Systemic treatments for psoriasis include immunosuppressants such as methotrexate, cyclosporine, and azathioprine. These medications work by suppressing the immune system and reducing inflammation²³.

Table 1. A few herbal plants used for the treatment of psoriasis

Plant's Scientific Name	Family	Common Name	Traditional Uses	References
<i>Adhatoda vasica</i>	Acanthaceae	<i>Vasaka</i>	Used topically to treat psoriasis and other skin disorders	26
<i>Allium sativum</i>	Amaryllidaceae	<i>Garlic</i>	Used topically to reduce inflammation and redness in psoriasis	27
<i>Boerhavia diffusa</i>	Nyctaginaceae	<i>Punarnava</i>	Used topically to treat psoriasis and other skin conditions	28
<i>Cassia tora</i>	Fabaceae	<i>Chakramarda</i>	Used topically to relieve itching and inflammation in psoriasis	29
<i>Cinnamomum tamala</i>	Lauraceae	<i>Tejpatra</i>	Used topically to reduce inflammation and itching in psoriasis	30
<i>Commiphora mukul</i>	Bursaceae	<i>Guggulu</i>	Used topically to reduce inflammation and redness in psoriasis	31
<i>Coscinium fenestratum</i>	Menispermaceae	<i>Tree turmeric</i>	Used topically to treat psoriasis and other skin disorders	32
<i>Eclipta prostrata</i>	Asteraceae	<i>Bhringraj</i>	Used topically to relieve itching and inflammation in psoriasis	33
<i>Fagonia arabica</i>	Zygophyllaceae	<i>Dhamasa</i>	Used topically to reduce inflammation and redness in psoriasis	34
<i>Hemidesmus indicus</i>	Apocynaceae	<i>Anantmool</i>	Used topically to relieve itching and inflammation in psoriasis	35
<i>Lawsonia inermis</i>	Lythraceae	<i>Mehndi</i>	Used topically to treat psoriasis and other skin conditions	36
<i>Melia azedarach</i>	Meliaceae	<i>Bakain</i>	Used topically to reduce inflammation and itching in psoriasis	37
<i>Moringa oleifera</i>	Moringaceae	<i>Sahijan</i>	Used topically to relieve itching and redness in psoriasis	38
<i>Ocimum sanctum</i>	Lamiaceae	<i>Tulsi</i>	Used topically to treat psoriasis and other skin disorders	39
<i>Picrorhiza kurroa</i>	Plantaginaceae	<i>Kutki</i>	Used topically to relieve itching and inflammation in psoriasis	40
<i>Plumbago indica</i>	Plumbaginaceae	<i>Chitrak</i>	Used topically to reduce inflammation and itching in psoriasis	41
<i>Psoralea corylifolia</i>	Fabaceae	<i>Bakuchi</i>	Used topically	42

Despite the effectiveness of these treatments, they have limitations. Topical treatments are often limited by their application site, and systemic treatments can cause significant side effects such as immunosuppression, infections, and malignancies²⁴. Moreover, the long-term safety of biologic agents is still under investigation, and their high cost can limit access to treatment²⁵.

5. Role of Herbal Drugs in the Treatment of Psoriasis

Herbal drugs used for the treatment of psoriasis include a range of plants and natural substances such as aloe vera, turmeric, and chamomile. These herbal remedies work by targeting different aspects of the immune system and reducing inflammation, which is a key factor in the development and progression of psoriasis. A few drugs used for the treatment of psoriasis are listed in Table 1.

6. Few natural Compounds are used for the Treatment of Psoriasis

Curcumin, is found in turmeric (*Curcuma longa*). Curcumin has been shown to have anti-inflammatory and antioxidant properties that may be beneficial in the

treatment of psoriasis⁴³. In a randomized controlled trial, topical application of a curcumin gel was found to significantly improve psoriasis symptoms compared to placebo⁴⁴.

Another active constituent is quercetin, which is found in plants such as onion (*Allium cepa*) and apples (*Malus domestica*). Quercetin has been shown to have anti-inflammatory and immunomodulatory effects that may be beneficial in the treatment of psoriasis⁴⁵. In a mouse model of psoriasis, treatment with quercetin reduced inflammation and improved skin barrier function⁴⁶.

Resveratrol is another active constituent found in grapes (*Vitis vinifera*) and other plants. Resveratrol has been shown to have anti-inflammatory and immunomodulatory effects that may be beneficial in the treatment of psoriasis⁴⁷. In a randomized controlled trial, oral supplementation with resveratrol significantly improved psoriasis symptoms compared to placebo⁴⁸.

Ellagic acid is an active constituent found in fruits such as pomegranate (*Punica granatum*). Ellagic acid has been shown to have antioxidant and anti-inflammatory effects that may be beneficial in the treatment of psoriasis⁴⁹. In a mouse model of psoriasis, treatment with ellagic acid reduced inflammation and improved skin barrier function⁵⁰.

Overall, these active constituents have shown promising potential in the treatment of psoriasis

due to their anti-inflammatory, antioxidant, and immunomodulatory effects. Further research is needed to better understand their mechanisms of action and to determine their efficacy in human trials.

7. Discussion

Psoriasis is a chronic inflammatory skin disease that affects millions of people worldwide. The pathogenesis of psoriasis involves complex interactions between genetic, environmental, and immune factors⁵¹. In recent years, there has been a growing interest in using natural products for the treatment of psoriasis due to their potential to modulate the immune system and reduce inflammation⁵².

The use of traditional Indian medicinal plants for the treatment of psoriasis is supported by a growing body of scientific evidence. Table 1 provides a comprehensive list of Indian medicinal plants that have been traditionally used for the treatment of psoriasis, along with their active constituents and reported pharmacological activities. Many of these plants have been shown to possess anti-inflammatory, antioxidant, and immunomodulatory properties that may be beneficial in the treatment of psoriasis.

While the use of natural products for the treatment of psoriasis shows promise, allopathic treatment methods are still the mainstay of therapy for most patients.

8. Conclusion

In conclusion, traditional Indian medicinal plants offer a promising source of natural products for the treatment of psoriasis. The active constituents found in these plants have been shown to possess anti-inflammatory, antioxidant, and immunomodulatory properties that may be beneficial in the treatment of psoriasis. Further research is needed to better understand the mechanisms of action of these compounds and to determine their efficacy in human trials.

9. References

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