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Biology and Treatment Strategies of Psoriasis with reference to Medicinal Plants

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Abstract

Psoriasis is a multifactorial inflammatory disorder that has a negative impact on one's quality of life. Around 80% of patients with plaque psoriasis have mild-to-moderate disease that can be treated with topical therapies in primary care, especially through pharmacies. Psoriasis was once thought to be merely a skin condition; however, it is now more accurately defined as a multifactorial, inflammatory disorder. While psoriasis is not life-threatening, it is associated with a substantial reduction in quality of life, affecting work, family, and sexual relations, as well as psoriasis is thought to affect between 2% and 4% of the population in Westernised countries. In the Present paper various treatment strategies were highlighted for the treatment of psoriasis. Also, some of the medicinal plants were discussed that are widely used in the treatment of psoriasis.

Key-words: Psoriasis, Treatment, Medicinal Plants

Introduction

A skin disease is the most common disease and is mainly ignored in our societies. Eczema, bacterial infections, fungal/yeast infections, viral infections, parasitic infections, autoimmune disease, and other skin diseases are very prone and common in present day [1]. Psoriasis and eczema (such as seborrhoeic eczema) are the type of autoimmune disorder. [2–7]. Since it will lead to direct impact on quality of life, psoriasis is important all around the worlds and World Psoriasis Day is celebrated. [8, 9].

Psoriasis is listed as a rare inflammatory chronic persistent skin disease by the National Organization for Rare Disorders (NORD) [7, 8]. Psoriasis affects an estimated 125 million people worldwide (roughly 2–3% of the total population). Furthermore, according to the national psoriasis foundation's figures from 2014, psoriasis prevalence in African Americans was 1.3 percent compared to 2.5 percent in Caucasians, while it was 0.2–3 percent in Bulgaria. [8-10].

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Psoriasis affects patient life physically, mentally and socially and soe recent data reveal the impact on quality of life as diseases namely diabetes, camcer, hypertension, depression etc. [11-12].

There are several formulation indented to be used for the treatment of diseases at local site or top layer of the skin. Among them topical formulations are basically preferred due to more penetration of the drug.

On the other hand topical formulation have few drawbacks viz., less dermal or fungal bioavailability, poor penetration of drug in to the layers of skin, viable drug levels at the site of infections etc. Due to ointments and cream and due to the same novel topical formulations are at the demand. The novel formulations such as Microemulsions, nanoemulsions, niosomes, dendrimers, solid lipid nanoparticles, liposomes, ethosomes, lipid nanoparticles, and polymeric nanoparticles are at the great demand for the treatment of skin diseases.Psoriasis is a skin condition that causes red, itchy scaly patches on the knees, elbows, trunk, and scalp, among other places. Psoriasis is a chronic (long-term) condition that has no cure.

Common signs and symptoms include:

- Red patches of skin covered with thick, silvery scales
- Small scaling spots (commonly seen in children)
- Dry, cracked skin that may bleed or itch
- Itching, burning or soreness
- Thickened, pitted or ridged nails
- Swollen and stiff joints

Most cases of psoriasis have flare-ups that last a few weeks or months before subsiding or even going into remission. [28-30]

Biology of psoriasis disease

Psoriasis is characterized as a disease with over proliferation of keratinocytes such as skin cells (around 3–4days) and cell development with abnormal keratinocyte differentiation. Proliferation of cells is in the basal layer doubles and the normal cell cycle (which is around 28days) and hyperkeratosis (the hyperkeratosis leads to induration or skin thickening) and parakeratosis develop (the granular layer is either absent or reduced) [33]. The color of the psoriatic plaque may be masked by a covering of silvery, white skin scales. Also, high level of vascular activity within the psoriatic plaques, there is the change in color of the skin and inflammation, itching and redness of skin [13].

In fact, psoriasis is a hyper-proliferative disorder with significant inflammatory components and belies a complex cascade of immune reactions, finally, stimulation of the skin. Indeed, psoriasis is recognized as the most prevalent T-cell-mediated1 inflammatory condition in humans [13, 15, 34]. Moreover, TNF plays an important role in inflammatory processes of psoriasis (Figure 6) [35].

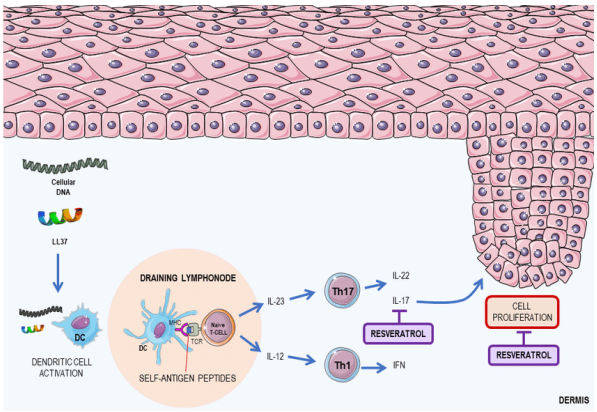

Fig. 1: Psoriasis disease mechanism

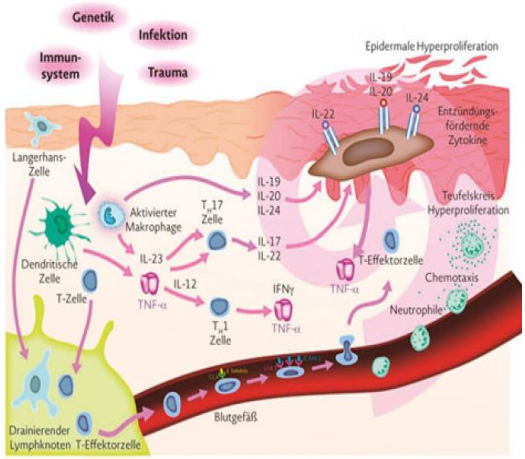

Fig. 2: TNF stimulates keratinocyte proliferation and the expression of other inflammatory mediators

Types of psoriasis

Plaque psoriasis: The most common form, plaque psoriasis causes dry, raised, red skin patches (lesions) covered with silvery scales. The plaques might be itchy or tender, and there may be few or many. They usually appear on elbows, knees, lower back and scalp.

Nail psoriasis: Psoriasis can affect fingernails and toenails, causing pitting, abnormal nail growth and discoloration. Psoriatic nails might loosen and separate from the nail bed (onycholysis). Severe cases may cause the nail to crumble.

Guttate psoriasis: This type primarily affects young adults and children. It's usually triggered by a bacterial infection such as strep throat. It's marked by small, drop-shaped, scaling lesions on the trunk, arms or legs.

Inverse psoriasis: This mainly affects the skin folds of the groin, buttocks and breasts. Inverse psoriasis causes smooth patches of red skin that worsen with friction and sweating. Fungal infections may trigger this type of psoriasis.

Pustular psoriasis: This rare form of psoriasis causes clearly defined pus-filled lesions that occur in widespread patches (generalized pustular psoriasis) or in smaller areas on the palms of the hands or the soles of the feet.

Erythrodermic psoriasis: The least common type of psoriasis, erythrodermic psoriasis can cover your entire body with a red, peeling rash that can itch or burn intensely.

Psoriatic arthritis: Psoriatic arthritis causes swollen, painful joints that are typical of arthritis. Sometimes the joint symptoms are the first or only symptom or sign of psoriasis. And at times only nail changes are seen. Symptoms range from mild to severe, and psoriatic arthritis can affect any joint. It can cause stiffness and progressive joint damage that in the most serious cases may lead to permanent joint damage.

The evaluation of any patient with psoriasis should include a thorough medical history and physical examination of skin, scalp and nails. Doctors may take a small sample of skin (biopsy) for examination of psoriasis.

Treatment Strategies Used for Psoriasis

Treatments for psoriasis help to slow down the growth of skin cells and remove scales. Topical treatment (creams and ointments), phototherapy (light therapy), and oral or injected medicine are all options. The treatments vary depending on the severity of the psoriasis and how well it has responded to previous treatments. Corticosteroids, Vitamin D analogues, Retinoids, Calcineurin inhibitors, Salicylic acid, Coal tar, Anthralin, Psoralen plus ultraviolet A (PUVA), Methotrexate, and other drugs or combinations of drugs must be tried.

Psoriasis treatment

Psoriasis treatments are divided into two groups [13].

Topical: Topical therapies are generally used to manage mild-to-moderate psoriasis. This type of therapy may be also used to treat more severe psoriasis in combination with systemic regimes, for example, coal tar or short-contact dithranol in combination with UV light.

Systemic: Systemic therapies used to the more severe spectrum of the disease.

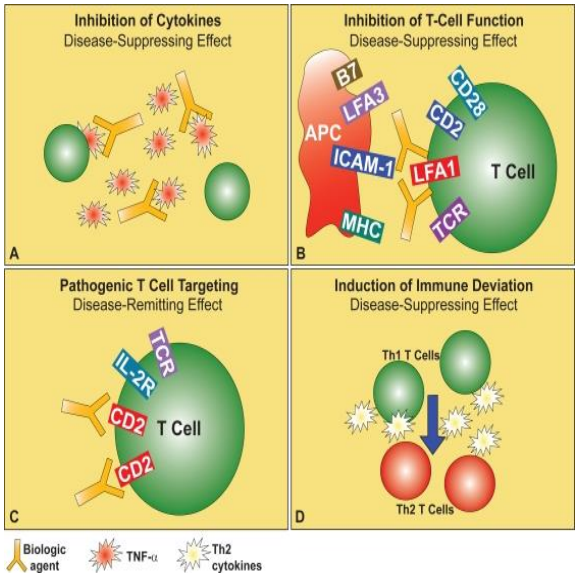

Fig. 3: Strategies for targeted biological therapy of psoriasis

Herbal Medicine for the treatment of Psoriasis

People have used herbs to treat skin conditions for centuries, and recent research has supported the idea that some herbal treatments may improve psoriasis symptoms.

Psoriasis is an inflammatory autoimmune condition that affects the skin and causes red, scaly patches of skin to develop, often on the elbows, knees, or scalp. Psoriasis affects at least 2 percent of the population and is often accompanied by a related condition called psoriatic arthritis. Psoriasis treatment methods vary, from topical creams to light therapy to oral medication. There is no cure for psoriasis, though treatments and natural remedies can help people to manage their symptoms. Many herbs have the potential to reduce inflammation or slow down skin cell growth, which can help with psoriasis symptoms. Several researches are being done and is going on to discover natural remedies for the treatment of psoriasis. Some of the prominent herbs used to treat the disease are mentioned below:

Mahonia aquifolium

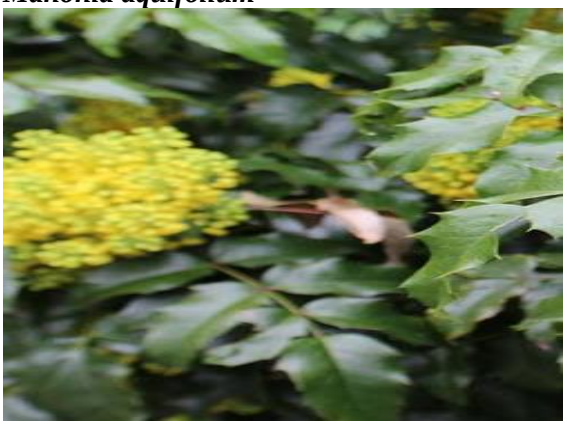

Fig. 4: *Mahonia aquifolium*

It is a flowering plant that comes from the mahonia shrub. It is also known as Oregon grape. This herb has a history of use in treating inflammatory conditions, including psoriasis. It *c*ontains berberine, which may help to suppress some of the inflammation that psoriasis causes. The plant also has antiproliferative effects, meaning it can slow down the growth of skin cells. This ability helps with psoriasis because the condition causes the skin cells to divide too rapidly, which leads to scaly skin and plaques. According to the National Center for Complementary and Integrative Health (NCCIH), *Mahonia aquifolium* has one of the strongest evidence bases trusted Source of all herbal remedies for treating psoriasis.

Indigo naturalis

Fig. 5: *Indigo naturalis*

Also known as qing dai, is a traditional Chinese herbal medicine that people use for treating skin conditions. Recent clinical trials suggest that the treatment can help with psoriasis, and a systematic review from 2015 found that, along with *Mahonia aquifolium*, indigo naturalis was an effective herbal remedy for psoriasis.

Aloe vera

Fig. 6: *Aloe vera*

Creams and gels containing extract from the *Aloe vera* plant have antibacterial and anti-inflammatory properties. They may help soothe the skin and fight bacteria that could cause infections.The NCCIH state that there is some evidence that *Aloe vera* could help with psoriasis, though less evidence than for *Mahonia aquifolium* and indigo naturalis. There are many methods of using *Aloe vera*, which people can find in many different products. For psoriasis, apply a topical aloe vera gel to areas of the skin that psoriasis affects.

Curcuma longa

Fig. 7: *Curcuma longa*

Turmeric is part of the same family as the ginger plant. Its active ingredient is called curcumin. Turmeric has unique anti-inflammatory and antibacterial properties, which have led scientists to study it as a treatment for psoriasis. A gel that contained curcumin was used in

a study of people with psoriasis. This treatment was mixed with topical steroids and a low-dairy diet. The people in the study reported a dramatic improvement in their psoriasis symptoms.

Capsaicin

Fig. 8: Capsaicin

Capsaicin is the active ingredient in chili peppers. It's the reason you feel a burning sensation when you eat food seasoned with chilies. The ability to create a "burning" of cells might actually help heal psoriasis flares. Moderate and severe psoriasis that was treated with topical capsaicin cream during a six-week study.

Other natural treatments

There is currently not enough evidence that other herbal remedies are effective treatments for psoriasis. However, herbs that may be useful treatment options for people to try include:

- Neem
- Extracts of sweet whey
- Witch hazel
- Licorice extract
- Dandelion tea

Other Possible treatments

Vitamin D

Colecalciferol or cholecalciferol, which is known as vitamin D3, is a vitamin the fat soluble. This vitamin is found in animals and its derivatives such as vitamin D2 or ergocalciferol are found in plants [46]. Vitamin D deficiency leads to rickets, an inability to calcify the collagen matrix of growing bone and is characterized by a lack of rigidity in the bones, particularly in children. In adults, osteoporosis may occur. Moreover, based on studies in 1982, increased pigmentation of the skin may reduce and mediate factor (ultraviolet radiation) for synthesis of vitamin D [51].

Vitamin A

VitaminA1 (retinol) and vitaminA2 (dehydroretinol) are fat-soluble vitamins found only in animal products, particularly eggs, dairy products and animal livers and kidneys. Dehydroretinol has almost 40%of retino activity. In fact, there is carotenoid as one of the provitamin in the plants and vegetables, which are changed into retinol in the liver [46]. Vitamin A was applied in the control of psoriasis disease. Derivatives of this vitamin influence on the proliferation rate and the differentiation of epithelia keratin and regulate its disturbances in autoimmune disease such as psoriasis [54]. Vitamin A or retinoic acid is relatively unstable and sensitive to oxidation and light. Antioxidant stabilizers such as vitamin E and vitamin C are sometimes added.

Vitamin C

Ascorbic acid is known as vitamin C (Figure 10). However, this vitamin is an outstanding antioxidant in human blood plasma [55], but it is synthesized in the body of most animals except human. Also, it is in fresh fruit and vegetables. Vitamin C is a water soluble and can very fast degrade during cooking or in the presence of air [46, 55]. Deficiency of this vitamin leads to scurvy disease, muscular pain, skin lesions, etc. Vitamin C is known as essential vitamin for the formation of collagen in skin, bone, tendons and ligaments [46]. Skin lesions characteristic in scurvy disease arises from low levels of hydroxylation in the collagen structure due to the lack of vitamin A [56]. Various doses of vitamin C used for skin burns and help to promote healing wound. This vitamin is very important for the prevention of cancer and its therapy. Finally, should be added, vitamin C works as an antioxidant and helps to provide renewal vitamin E [46].

Vitamin E

Tocopherol is known as vitamin E. It is one of the fat-soluble vitamins, which are found in more plants. Tocopherols exist in seed oils such as wheat, corn, safflower and soybean [46]. The vitamin has antioxidant properties and it can prevent the tissue destruction by radical. So, it

can be effective for treating psoriasis (Figure 11). Vitamin E and its derivative reduce the effects of aging and help to prevent heart disease [46].

Vitamin B5

Pantothenic acid is known as vitamin B5 (Figure 12). This vitamin is water-soluble vitamin. Pantothenic acid, as part of the structure o coenzyme A, is important in metabolisms of carbohydrate, fat and protein. Also, this vitamin can help to treat wound and psoriasis lesions [46].

Conclusion

Psoriasis is diagnosed as a chronic inflammatory disease in nineteenth century; prior to, this disease was often mistaken for other disease such as leprosy. Psoriasis plays an important role on a patient's quality of life and its negative effect can be seen on the beauty of patient and their mental and physical functioning.

Plants have been used by men from prehistoric times to get rid o suffering and curing ailments such as skin disease especially psoriasis. Nowadays, herbal resources play a very important role in the management of the skin and inflammatory diseases and herbal medicine is promoted as one of the alternative therapeutical methods for healing skin diseases such as psoriasis.

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