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# Medicinal Plants to Calm and Treat Psoriasis Disease

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Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/67062>

## Abstract

Psoriasis is a chronic and inflammatory multifactorial disease. For psoriasis treatment, topical chemical agents are applied, in spite of inefficient effects or less effectiveness. But medical plants can be one of the alternative treatment methods. In the field, herbal creams are the most used. In fact, they are helping to inhibit leukotriene formation, inflammation and blocks cyclooxygenase enzymes, then heal skin wounds due to the plant's flavonoids and tannins. The aim of this study is the making of new herbal cream for treating psoriasis. In the mentioned cream, synergistic effects of medicinal herbals extracts were evaluate on damaged skin. Some of these extracts include *Santalum album*, *Arctium lappa*, *Matricaria chamomilla*, *Glycyrrhiza glabra*, *Lavandula angustifolia*, *Avena sativa*, *Aloe barbadensis*, *Pinus eldarica* and *Cydonia seed-Mucus*. Cream was prepared by mixing water-in-oil (W/O) and was proposed to five patients who suffer from psoriasis. Results were remarkable. All five patients were satisfied from itching inhibition and skin inflammation in first week. After 2 weeks applying cream, fading skin redness and increasing skin flexibility and repair were noticeable. An important point in this cream was the mixed herbal extract with high effectiveness than each of them alone. In fact, *S. album* and *L. angustifolia* were caused softening of skin corneous layer. Flavonoids and tannins in *G. glabra*, *A. lappa*, *P. eldarica* and *A. sativa* are effective for treating skin lesions such as psoriasis. Polysaccharides in *A. barbadensis* and mucilage in *C. seed-Mucus* not only are healing skin wounds but also their malic acid make peeling skin dead cells. Moreover, pectin and provitamins (A) act as antioxidants and prevent damage of skin healthy cells. Herbal  $\beta$ -sitosterols are factor of fading skin redness and anti-itching, a-bisabolol (*M. chamomilla*) as anti-inflammation; blocks cyclooxygenase enzymes and inhibits leukotriene formation to prevent redness. In fact, this treatment cream is effective for collagen synthesis, wound improvement, epidermal-moisture maintenance, inflammation relief and boost immune system and will inhibit psoriasis common symptoms in shortest time and no side effect.

**Keywords:** psoriasis, herbal extract, therapeutic cream, skin inflammation

## 1. Introduction

In most societies, especially the third world, the importance of skin diseases is often overlooked. This is on the terms that they are usually not life threatening, but they are beauty threatening and a significant problem all over the world.

Some skin diseases are as follows: eczema, fungal/yeast infections, bacterial infections, viral infections, parasitic infections, autoimmune disease and miscellaneous skin disease [1]. Among the types of the mentioned skin diseases, psoriasis and eczema (such as seborrhoeic eczema) can be one of the varieties of autoimmune diseases that environmental factors intensify their symptoms [2–7]. Also, these diseases, especially psoriasis, are so important, throughout the world due to the direct impact on quality of life. So, 1 day of the year is allocated to it—World Psoriasis Day Consortium [8, 9].

According to NORD (National Organization for Rare Disorders) definition, psoriasis can be classified as a rare inflammatory chronic recurrent skin disease [7, 8]. It can say that 125 million people worldwide (about 2–3% of the total population) have psoriasis. Moreover, statistics of the national psoriasis foundation in 2014 showed that psoriasis prevalence in African Americans was 1.3% compared to 2.5% of Caucasians, while in Bulgaria, it was 0.2–3% [8, 10].

Psoriasis is the diseases that has great impact on patient's life (physically, psychologically and socially) and studies have shown that the impact of this disease on quality of life is similar to diseases such as diabetes, hypertension, heart diseases, the type of cancers, arthritis and depression [11, 12]. So, talking about this disease, its symptoms and treatment of common types and novel such as herbal extracts (alternative of chemical drugs), is important. But, it is firstly necessary to explain the structure and function of skin. In fact, knowing the skin structure helps better treatment disease.

## 2. Structure and functions of the skin

### 2.1. Skin definition

The definition of skin in English and Medical dictionary describes as the external layer of the body. But this description is inadequate. In fact, the skin is external covering that holds organs and protection of human tissues against environmental factors [13, 14]. In a normal state, the immune system within the skin is quiet and relatively inactive. If the skin is challenged in any way (bacteria, fungus, etc.), a range of immunological cascades are set in motion. In some conditions such as psoriasis disease, these immunological changes are not within a normal range and cause severe inflammation and hyper-proliferation of skin cells [15]. The skin plays an important role in all fields, especially in the esthetics. Also, the skin color represents the racial disparity and it is symbolic of different cultures and ethnic differences.

### 2.2. Biology of the skin

The skin is the largest organs in the body, with surface area of  $1.8\text{m}^2$  and making up about 16% of body weight (between 2 and 6kg) [13, 14]. It has many functions such as a barrier to protect

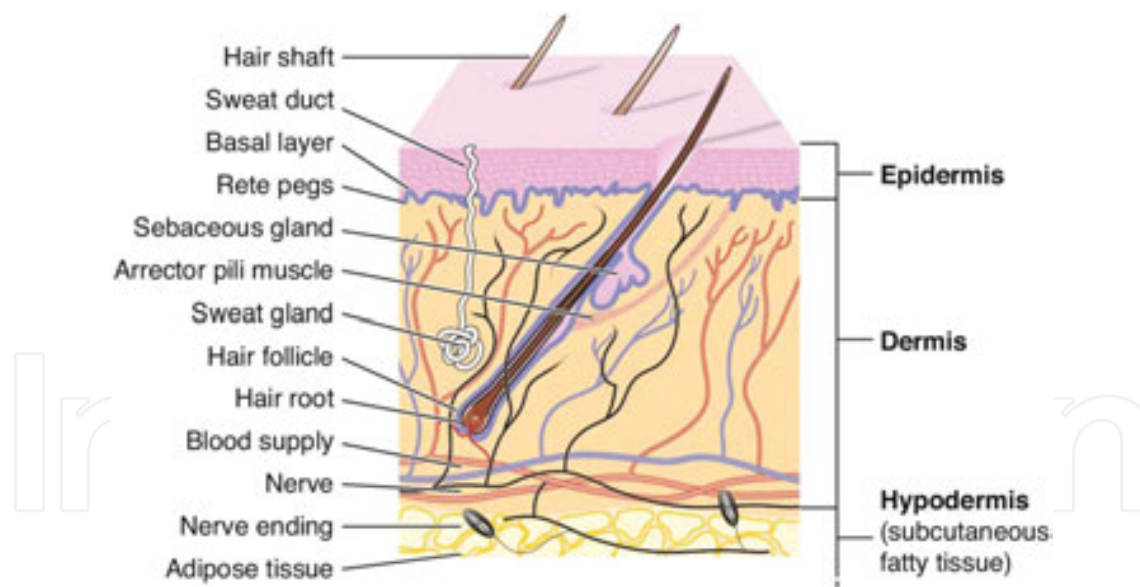
the body from noxious external factors and to keep the internal systems intact, protection of tissues against microorganisms, ultraviolet radiation and mechanical pressers [13, 16]. The skin is also responsible of many body functions such as sense, regulation of body temperature and elimination of waste products by sweating, producing vitamin D, etc. Moreover, skin can prevent the entry of harmful substances in the body and control vital substances of body. Therefore, skin is important to perform the mentioned essential functions.

### 2.3. Skin anatomy

Skin is the dynamic organ in a constant state of change, as cells of the outer layers are continuously shed and replaced by inner cells moving up to the surface [17]. The skin contains the number of accessory organs which assist in its protective role and there are three structural layers to the skin:

- Epidermis
- Dermis
- Subcutis (hypodermis)

Also, hair, nails, sebaceous, sweat, apocrine glands, etc. are regarded as derivatives of skin (**Figure 1**). The thickness of the skin varies depending on the site, with thicker skin being present on areas of the body such as the soles of the feet and palms of the hand. In fact, this thickness depends on epidermis layers such as stratum granulosum [14, 18].

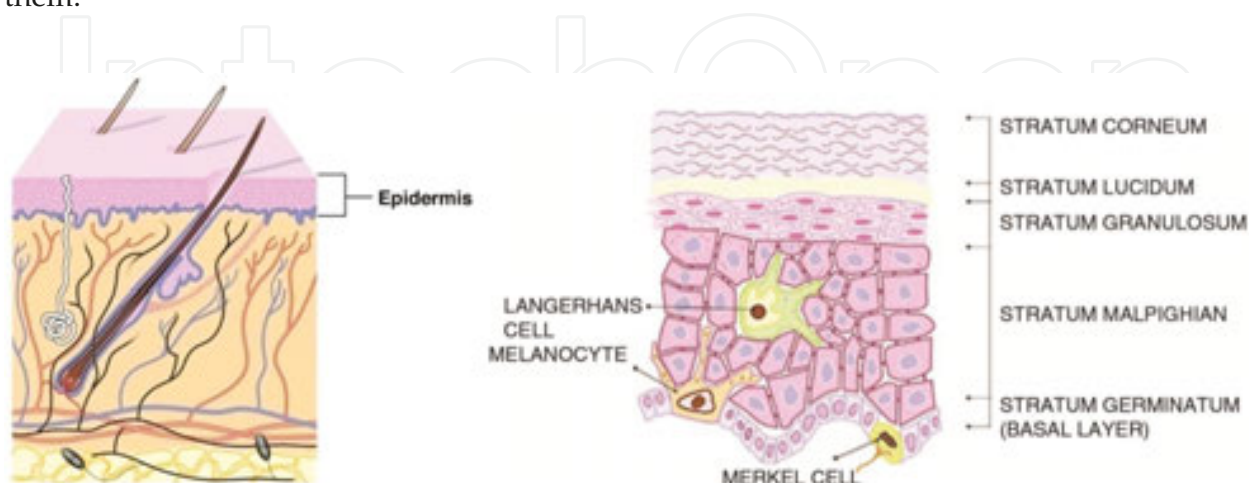


**Figure 1.** Cross section of the skin.

#### 2.3.1. Epidermis

The epidermis is the top layer of skin with about 0.1–1.4mm thick (on areas of the body). The main cells of the epidermis are keratinocytes, which produce the protein keratin. This layer is also containing other cells such as Langerhans, Melanocyte and Merkel cells. This layer is

constantly proliferating and shedding millions of dead cells [14, 17]. It is estimated that normal skin sheds at the rate of a million cells (every 40min), which equates to around 18kg over a lifetime. This process of skin cell shedding is known as desquamation. It could be noted that desquamation (from stratum basale to stratum corneum) in epidermis is between 28 and 30days [13, 19]. **Figure 2** shows different layers of the epidermis and **Table 1** describes them.



**Figure 2.** Epidermal layers.

The name of epidermis layers	Description
Stratum basale	The basal cell layer of the epidermis is composed keratinocytes, which are either dividing or nondividing. These cells contain keratin tonofibrils and melanocytes (to synthesize melanin). Also, Merkel cells are also found in the basal cell layer (to create a sensation in the skin such as sense of touch)
Stratum spinosum (Malpighian)	Daughter basal cells migrate upwards to form this layer of polyhedral cells, which are interconnected by desmosomes. Langerhans cells (immunologically active cells) are mostly found in this layer
Stratum granulosum	In these layers, cells become flattened and lose their nuclei. In fact, there is high lysosomal activity (to digest the cell contents and to disintegrate cells) and the keratohyalin granules become more prominent within the cell and the lipid-filled membrane coating vesicles. These lipids include 40% ceramides, fatty acids, cholesterol and cholesterol sulfate
Stratum lucidum	This layer, in which their cells are nucleated, lies between the stratum granulosum and stratum corneum and can be found in the palms and soles, where the skin is very thick
Stratum corneum	The end result of keratinocyte maturation found in the horny layer. In this layer, sheets are overlapping, which are polyhedral cornified cells and no nuclei (corneocytes)

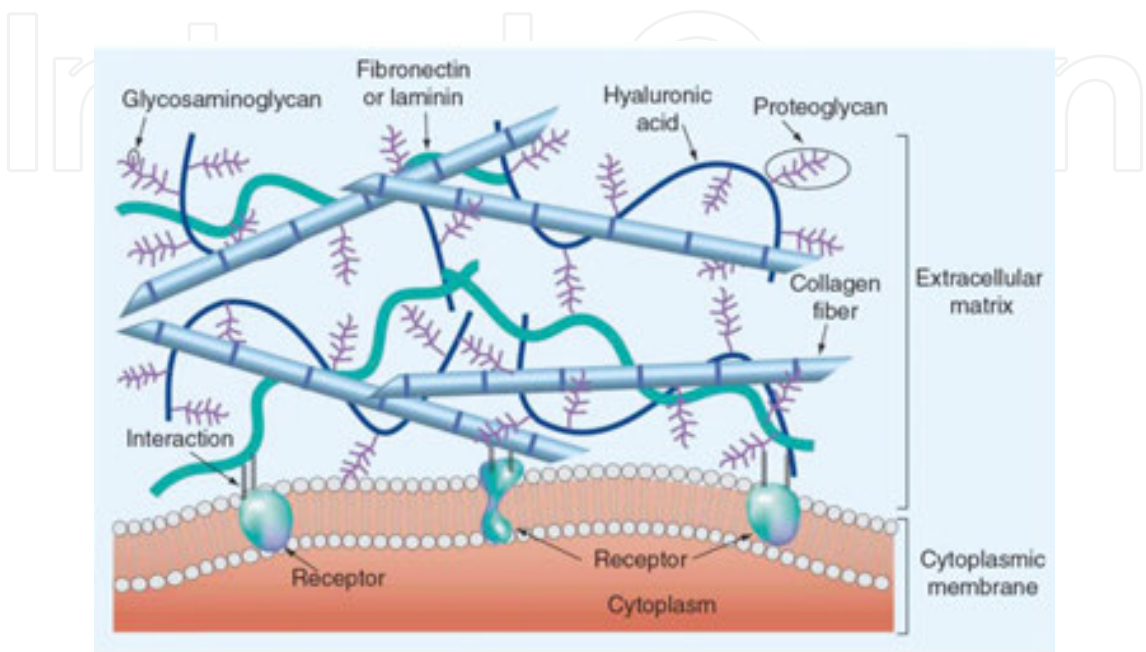
**Table 1.** Description of epidermis layers.

### 2.3.2. Dermis

The dermis is defined as a tough supportive connective tissue matrix, with physical support and nutrients to the epidermis. Connective tissue consists of a ground substance with protein



fibers that contains water and a mixture of large organic molecules (combination of polysaccharides as complex carbohydrates and proteins). The most common type of polysaccharides in this tissue is glycosaminoglycans (GAGS) that include hyaluronic acid [13, 16]. In fact, this tissue matrix is called the extracellular matrix that its structure has been shown in **Figure 3** [20].



**Figure 3.** Model of complex 3D structure of the natural extracellular matrix and the interactions between cells and the extracellular matrix components.

Dermis found immediately below the epidermis and it varies in thickness (about 0.6mm on the eyelids and 3mm or more on the back, palms and soles). The two layers identified within the dermis are the papillary layer and the reticular layer (**Table 2**). Also, dermis includes elastin, fibrillin, collagen and laminin (**Figure 3**). This layer also contains nerve endings, sweat glands, sebaceous glands, hair follicles and blood vessels [17, 19]. **Figure 4** shows a cross section of dermis layer.

The types of cells	Definitions
Fibroblasts cells	An important cell that is involved to repair damaged tissues
Mast cells	These cells are playing an important role to fight infection
Lymphatic vessels	The lymphatic system as body's defense system has an important role to fight infection
Epidermal appendages (rete pegs)	epidermal appendages are way to link epidermis and dermis for preventing skin damages
Ground substance	This substance as a gel-like component is supporting the dermis cells and helping to provide its structure

**Table 2.** Cell types in the reticular layer of dermis.

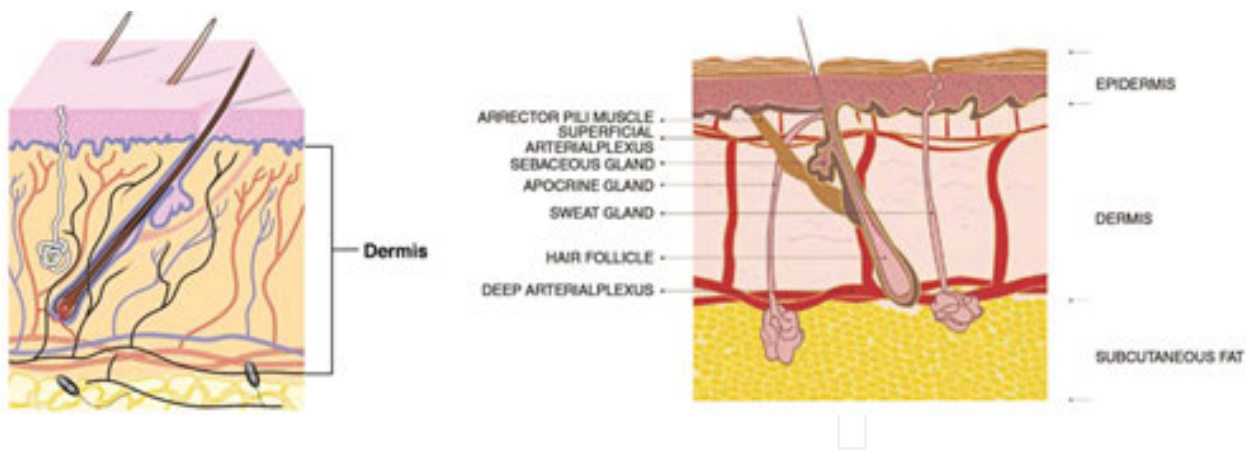


Figure 4. Dermal annexes.

2.3.3. Subcutaneous tissue or the hypodermis layer

This layer lies below the dermis and provides support for it. Hypodermis is made up largely of fat cells and connective tissue for protection of internal structures. Moreover, this layer acts as a heat insulator and can be useful against trauma [13, 16, 19]. Hypodermis schematic has been shown in **Figure 5**.

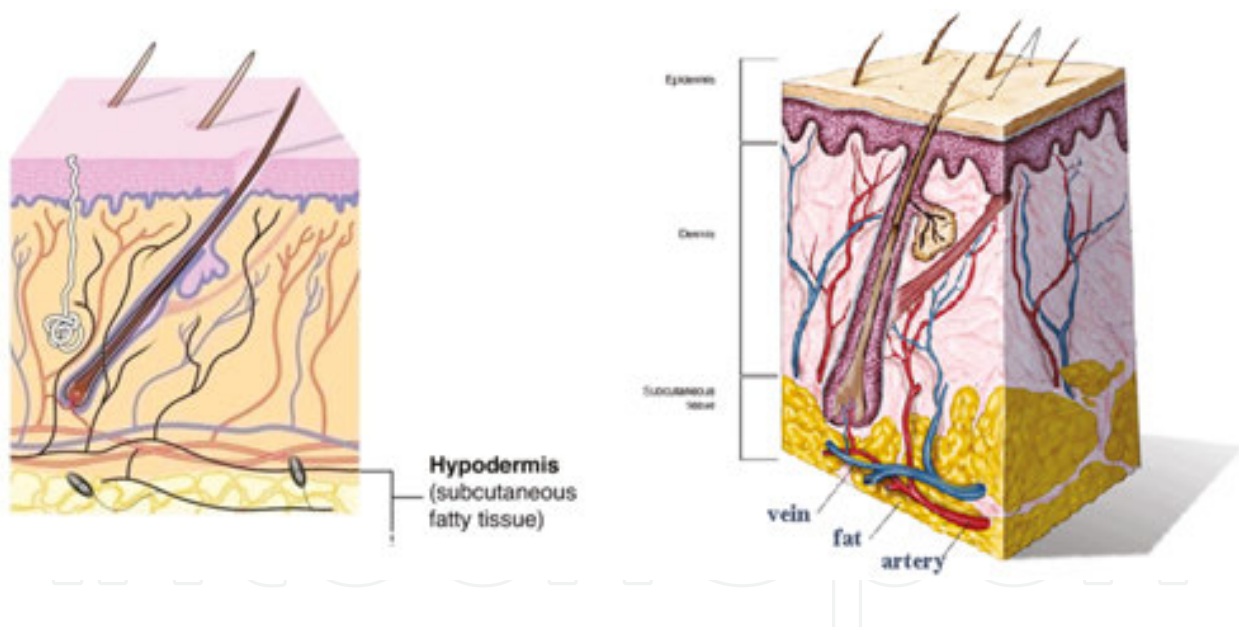


Figure 5. Hypodermis layer.

3. Psoriasis disease

Psoriasis was first distinguished and diagnosed as a chronic inflammatory disease in nineteenth century; prior to, this disease was often mistaken for other disease such as leprosy. Nowadays, psoriasis patients are estimated to be about 2–3% at all world [13, 21]. Severity ranges this disease from a fingernail pit to skin lesions (on a part of the skin to a

total body that can be associated with arthritis) [13]. **Tables 3** and **4** show the types of psoriasis disease. 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. The cause of this vexing disease is still not known and clinical studies show hyperproliferation and abnormal differentiation of the epidermis, although this disease can be hereditary [22, 23].

Types of psoriasis	Description of the disease	An example of disease picture	References
Skin psoriasis	This disease is one of the types of psoriasis. Skin psoriasis known as a papulosquamous disease that includes the types of vulgaris (common type of skin psoriasis), guttate (spots of drop like), inverse (in the underarms, navel, buttocks, etc.), pustular with symptoms of yellowish pus on the skin and small blisters and erythrodermic psoriasis. <b>Table 4.</b> shows completely them		[24–27]
Nail psoriasis	The common signs of nail psoriasis are pitting and distal onycholysis. Also, pitting, yellowish discoloration and paronychia, hyperkeratosis, onycholysis and severe onychodystrophy are other signs of the disease. Approximately 50% of all patients with psoriasis develop characteristic nail changes as a clinical correlate of psoriatic inflammation of the nail matrix and/or nail bed		[28, 29]
Psoriatic arthritis	Psoriatic arthritis (PsA) is a chronic inflammatory joint disease occurring in 6–39% of patients with psoriasis (about 0.1–0.25% of world population). This type of arthritis can develop slowly or rapidly. Psoriasis arthritis (PsA) can be also as severe arthritis similar to rheumatoid arthritis (RA). Moreover, this disease specifications are focal bone erosions at the bones junction		[30–32]


**Table 3.** Types of psoriasis disease.

### 3.1. 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



Skin psoriasis		Description of the disease	Disease pictures
Vulgaris psoriasis	1 Chronic stationary psoriasis	This type of psoriasis disease is known by characteristics such as inflamed and red lesions that covered by silvery white scales. These lesions typically found on the elbows, knees, scalp and lower back. Also, it is the most common type of psoriasis (about 80% of those who have psoriasis, suffer from this type)	
	2 Plaque-like psoriasis		
	3 Scalp psoriasis		
	4 Seborrhoeic psoriasis		
Guttate psoriasis		This type of psoriasis often starts in childhood or young adulthood. Their lesions seen as small, pink, individual spots on the skin of the torso, arms and legs. These spots are not usually as thick as plaque lesions	 
Inverse psoriasis		This type of disease found in the armpits, in the groin, under the breasts and in other areas such as skin folds of the genitals and the buttocks. In this type of psoriasis, lesions appear as bright red that are smooth and shiny	 
Pustular psoriasis		This type of psoriasis disease more seen in adult patients. Pustular psoriasis has common symptoms such as rubefaction, white blisters and pus without infection that seen on the hands and feet, or most areas	 

Skin psoriasis	Description of the disease	Disease pictures
Erythrodermic psoriasis	A particularly form of psoriasis is erythrodermic psoriasis, which affects on the body as an inflammatory disease. The emergence of erythrodermic is to periodically and its symptoms include widespread red lesions	

**Table 4.** Different types of skin psoriasis.

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-mediated<sup>1</sup> inflammatory condition in humans [13, 15, 34]. Moreover, TNF plays an important role in inflammatory processes of psoriasis (**Figure 6**) [35].

**3.2. Psoriasis treatment**

Psoriasis treatments are divided into two groups [13].

- Topical

Topical therapies are generally used to manage mild-to-moderate psoriasis (**Table 5**). 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 (**Table 6**).

**3.3. Psoriasis and skin's barrier function**

Although the psoriasis is a multifactorial disease, the studies show that disruption the homeostasis in skin's barrier can be one of the important factors.

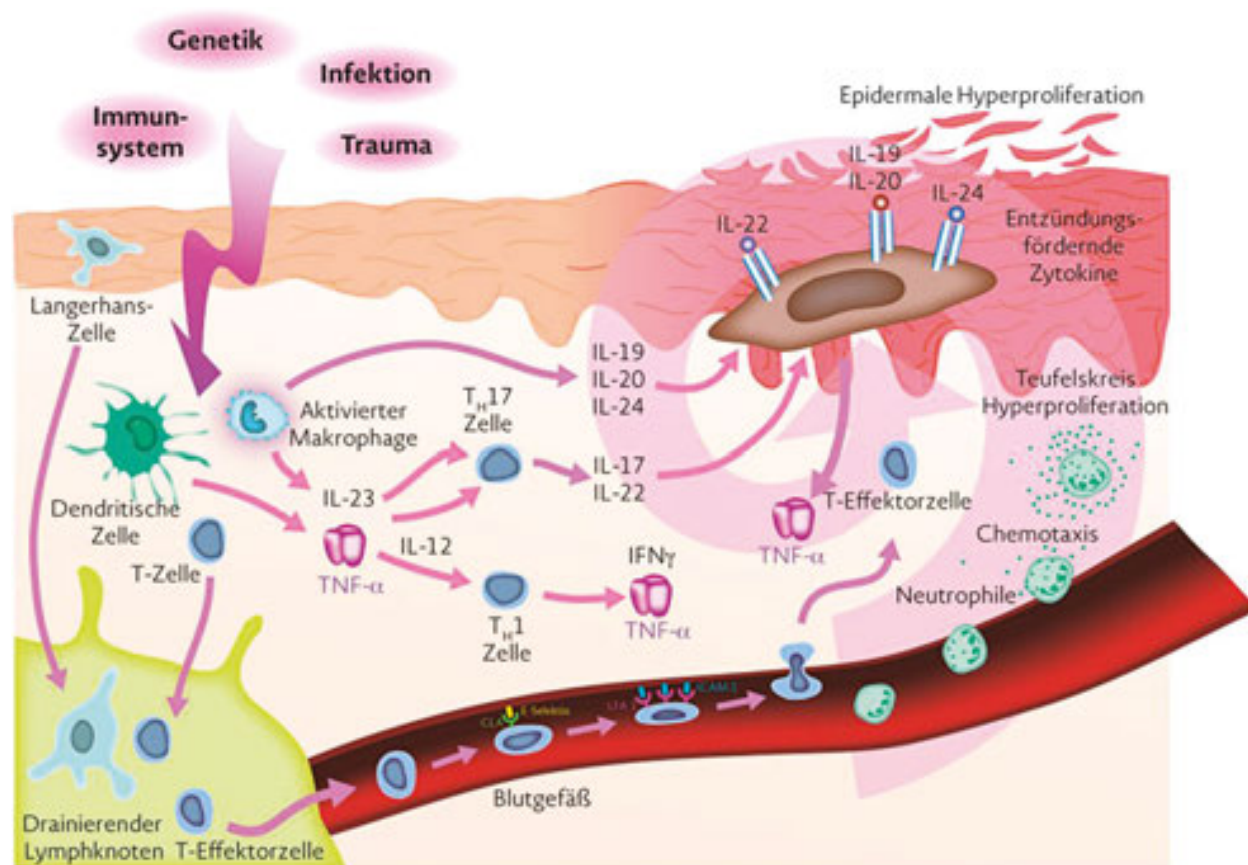
In fact, several factors are effective on the hemostatic [35]:

<sup>1</sup>A T cell or T lymphocyte is a type of lymphocyte (a subtype of white blood cell) that plays a central role in cell-mediated immunity.

1. Structure of heterogeneous from lipid/protein can be one of the main causes in hemostasis. The lipid/protein structure is renewed continuously. So, if this barrier is damaged, the lipid/protein structure causes its rapid regeneration.
2. Several key proteases for desquamation.
3. Epidermal junction (EJ) is important in the formation and maintain of barriers such as epithelial and endothelial and desmosomes bands. The studies show that raising calcium concentration stimulates keratinocytes to form strong cell-cell adhesions.
4. In epidermal keratinocytes, both extracellular and intracellular  $\text{Ca}^{2+}$  can be important to cell differentiation and proliferation.

According to the above-mentioned descriptions, the choice of drug for treating disease plays an important role. In the meantime, there are certain groups of drugs will in some cases trigger an onset or aggravate psoriasis such as lithium, chloroquine-based antimalarials, beta-blockers, etc.

For example, one of the effective therapeutics for people with severe bipolar disease is lithium, which makes sometimes discontinuing it because of worsening psoriasis. The studies show



**Figure 6.** TNF stimulates keratinocyte proliferation and the expression of other inflammatory mediators such as IL-1 and IL-6. Also, TNF stimulates growth factor (vascular endothelial growth factor), VEGF (for angiogenesis) by the induction of adhesion molecules on the vascular endothelium and the immigration of other immune cells.

Topical therapies	Definition
Vitamin D analogs	Vitamin D3 is naturally synthesized in the epidermis. The mechanism involves natural UVB falling on the skin and converting 7-dehydrocholesterol into vitamin D, which then binds with vitamin D binding protein. The synthetic vitamin D analogs (calcipotriol, tacalcitol and calcitriol) inhibit cell proliferation and encourage the skin cells to mature normally
Vitamin A	Vitamin A also known as a topical retinoid and suitable for mild-to-moderate plaque psoriasis. It seems that vitamin A can modulate cell proliferation and increase differentiation. Its main side effect is skin irritation
Emollients	As psoriasis is a dry skin condition, a key of treatment for all types of psoriasis (except perhaps inverse psoriasis) is emollient therapy. Emollients will not stop hyper-proliferation; however, they reduce the signs of scaling and may be applied topically and/or used for washing
Coal tar	Coal tar is one of the oldest treatments for psoriasis. The studies have shown that mechanism of coal tar may be by reducing epidermal thickness and by suppressing epidermal DNA synthesis. The main potential side effects associated with coal tar include skin irritation and folliculitis. (In the some of the studies, coal tar is as mutation factor)
Dithranol	Dithranol affects the synthesis of cell DNA and has a pronounced anti-proliferative effect. It also appears to have a rapid effect on the normalization of epidermal proliferation. Its side effects include irritation and staining

**Table 5.** The types of topical therapies.

Systemic therapies	Definition
Phototherapy UVB PUVA	In psoriasis disease, exposure to ultraviolet radiation can be improved lesions. But, around 10% of patients, who have light sensitive, exposure to UV radiation can cause their psoriasis to worsen or develop. UVA and UVB are an example of this type of treatment. In fact, they suppress the immune response within the skin and thus dampen down the cascade of immunological changes, which occur to trigger psoriasisPossible side effects of PUVA and UVB include nausea, pruritus, dizziness, headache, erythema (burning), skin cancer, malignant melanoma, squamous cell carcinoma (SCC) and basal cell carcinoma
Methotrexate	Methotrexate is a relatively old treatment (since the late 1960s) and its efficacy is relatively few. In fact, it is an anti-proliferative drug and it affects cell DNA, so stops proliferation skin cells. Side effects of methotrexate include leukopenia and thrombocytopenia, oral and plaque ulceration, lower levels of folic acid, teratogenicity, hepatotoxicity and pulmonary toxicity
Cyclosporin	Cyclosporin is as a relatively modern treatment for psoriasis. Mechanism of Cyclosporin is through effect on the T-cells and helping to inhibit the stimulation of cytokines and cell proliferation. But, like methotrexate, it does have potent systemic side effects that most concern is those related to nephrotoxicity and the resultant kidney function damage and hypertension
Retinoids	Retinoid which is known as acitretin, by altering keratinization and epidermal differentiation, is used as anti-proliferative, anti-inflammatory and anti-keratinizing effects on. Retinoids are complex drugs with many possible side effects. They can affect hepatic function and lead to hyperlipidemia. Also highly teratogenic and therefore not suitable for pregnant women or women who are considering becoming pregnant. Other side effects include dry mucous membranes including eyes, lips and throat

**Table 6.** The types of systemic therapies.

that supplement inositol (found in plants) can be used as alternative therapy to decrease severity of both diseases compared to lithium. So, therapeutic methods and new medicines such as stem cell therapy, use of herbal extracts, etc. can be effective in reducing or eliminating this disorder [36].

## 4. Alternative therapeutical method

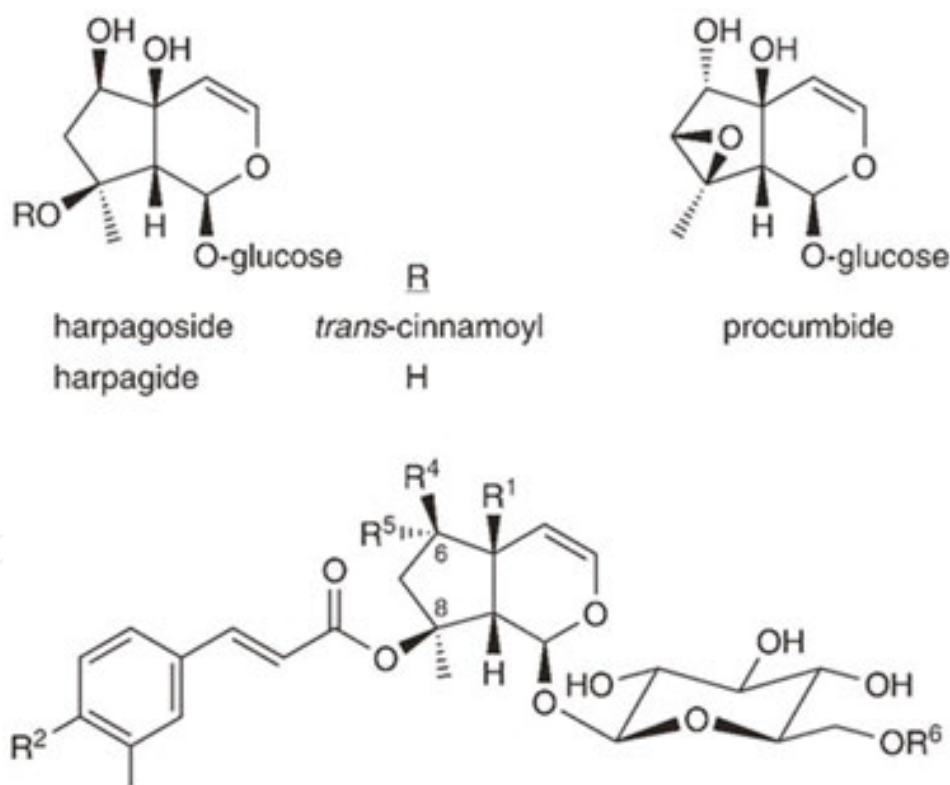
Plants have been used by men from prehistoric times to get rid of suffering and curing ailments such as skin disease.

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 [37].

### 4.1. Therapeutical plants for skin

#### 4.1.1. *Aloe vera*

*Aloe vera* (L.) Burm. f. syn. *Aloe barbadensis* Miller is most biologically active among 400 species [38]. According to report of World Health Organization, this medicinal herb is the best source to prepare natural drugs (**Figure 7**). The plant is native to southern and eastern Africa. Then, it was introduced into area of northern Africa and other countries.



**Figure 7.** The main constituents of *devil's claw* root.

*Aloe vera* is from the lily family (*Liliaceae*). Different parts of the plant, especially its gel, are effective on the body.



Gel from the *Aloe vera* plant can help to reduce redness and scaling associated with psoriasis. *Aloe vera* contains anthraquinones, steroids, saponins, mucopolysaccharides and salicylic acid. Active ingredients *Aloe vera* include anthraquinone and acemannan that have antibacterial activity and therapeutic of psoriasis disease. Moreover, salicylic acid as a component in this plant has keratolytic effect to remove psoriatic plaques [39–41].

#### 4.1.2. *Silybum marianum*

*Silybum marianum* (L.) Gaertn., common name milk thistle, of the family Asteraceae is a herbaceous annual species of considerable medicinal importance. Having origin in Mediterranean regions of North Africa, middle East and Europe, the species is now found distributed as a weed worldwide. All parts of the plants are edible. Germinated seed raised as sprouts and young fleshy stems and leaves have been in use as antioxidant-rich salad. Seeds of the plant are known to be used in traditional medicine for more than 2000 years for the treatment of liver and gallbladder ailments and to protect live from poisoning by toxins, such as from alcohol, toxic mushrooms, insect stings and snake bites [42].

This plant is very well known for its hepatoprotective activity. Since the numerous changes have been detected in the liver of patients with psoriasis, including steatosis, periportal inflammation, fibrosis, necrosis and cirrhosis, *Silybum marianum* can be affect for skin disorders such as psoriasis [38]. Since the abnormally high levels of cyclic adenosine monophosphate (cAMP) and leukotrienes seen in psoriatic patients, one of the therapies methods can be regulate these levels. The role of silymarin in treating psoriasis is improvement of endotoxin removal by the liver, inhibition of cAMP phosphodiesterase and leukotriene synthesis [43–46]. This plant oil has been also suggested a vitamin E,  $\alpha$ -linolenic acid and linoleic acid reach source [47, 48].

#### 4.1.3. *Burdock*

Medicinal species of Burdock are *Arctium lappa*, *Arctium minus*, *Lappa major* or *Bardanae radix*. This plant is derived from the Greek with common names of akujitsu, arctii, bardana, beggar's buttons, burdock root, great burdock, burr, burr seed, chin, clot-burr, hardock, hare burr, hurrburr, kletterwurz, lampaza, lappa and lappola. Burdock is in the family of compositae/Asteraceae (daisy). Burdock has been also used in numerous countries throughout history to treat problems arthritis and skin disorders. This plant is one of the key herbal ingredients in the twentieth-century cancer remedies [49].

The Chinese used burdock to treat upper respiratory infections. In fourteenth-century Europe, a combination of burdock and wine was used to treat leprosy. Also, Burdock is used for fevers, a variety of dermatologic conditions (eczema, psoriasis, scrapes and burns), syphilis, etc.

Active ingredients in *Arctium lappa* include:

- Sulfur about of 00.1–0.002%.
- Polysaccharides and mucilages such as xyloglucan.
- Lignans such as arctigenin.

- Other components such as organic acids that includes acetic, butyric, caffeic, chlorogenic, isovaleric, linoleic, linolenic, myristic, oleic, palmitic, propionic, stearic, tiglic, aldehydes, carbohydrates, sesquiterpene lactones and phytosterols.

This plant acts as anti-inflammatory, antimicrobial (antibacterial, antiviral), antineoplastic (antimutagenic, antitumor) and antioxidant.

#### 4.1.4. Devil's claw

*Harpagophytum procumbens* (Pedaliaceae) or *Devil's claw* found in southern Africa (South Africa, Namibia, Botswana). Preparations of the secondary roots have gained a reputation as an anti-inflammatory and antirheumatic agent to relieve pain and inflammation in people with arthritis and similar or skin disorders.

The main constituents of *devil's claw* root are a group of decarboxylated iridoid glycosides (about 3%), including harpagoside (at least 1.2%) as the main component and smaller amounts of procumbide, harpagide and 8-(4-coumaroyl) harpagide (**Figure 7**).

#### 4.1.5. Feverfew

*Feverfew* is one of the traditional plants to treat arthritis, contact dermatitis, skin difficulties, etc. *Feverfew* is an aromatic herb of the *Compositae/Asteraceae* family. Studies have been shown its effectiveness for treating migraine. This herb inhibits blood platelet aggregation and the release of 5-hydroxytryptamine from platelets. The active ingredients in the herb dried leaves are germacrene and guianane. Parthenolide is also known to be capable of causing some allergic effects, for example, contact dermatitis.

#### 4.1.6. Liquorice

*Liquorice* (licorice; *glycyrrhiza*) is the dried unpeeled rhizome and its root. *Liquorice* is cultivated in Spain, Italy and France. The liquorice extract is usually prepared by extraction with alcohol or maceration in water. The roots of this plant contain about 20% of water-soluble active ingredients and Glycyrrhizic acid, which is comprised 3–5% of the root [46].

The bright yellow color of liquorice root is due to 1–1.5% of flavonoids such as liquiritigenin and isoliquiritigenin. The roots of this plant also include 5–15% of sugars (glucose and sucrose) (**Figure 8**). Its anti-pain properties have also been caused that was used as demulcent natural drugs [46].

The recent researches indicate the corticosteroid-like and anti-inflammatory activities in liquorice extracts. Glycyrrhetic acid of liquorice extracts is playing a key role for inhibiting enzymes that is important to convert prostaglandins and glucocorticoids into inactive metabolites and increase levels of prostaglandins such as PGE2 and PGF2 $\alpha$  [46].

**Table 7** shows various herbs that used in the treatment on skin disorders such as inflammation, eczema, psoriasis, scrapes and burns.

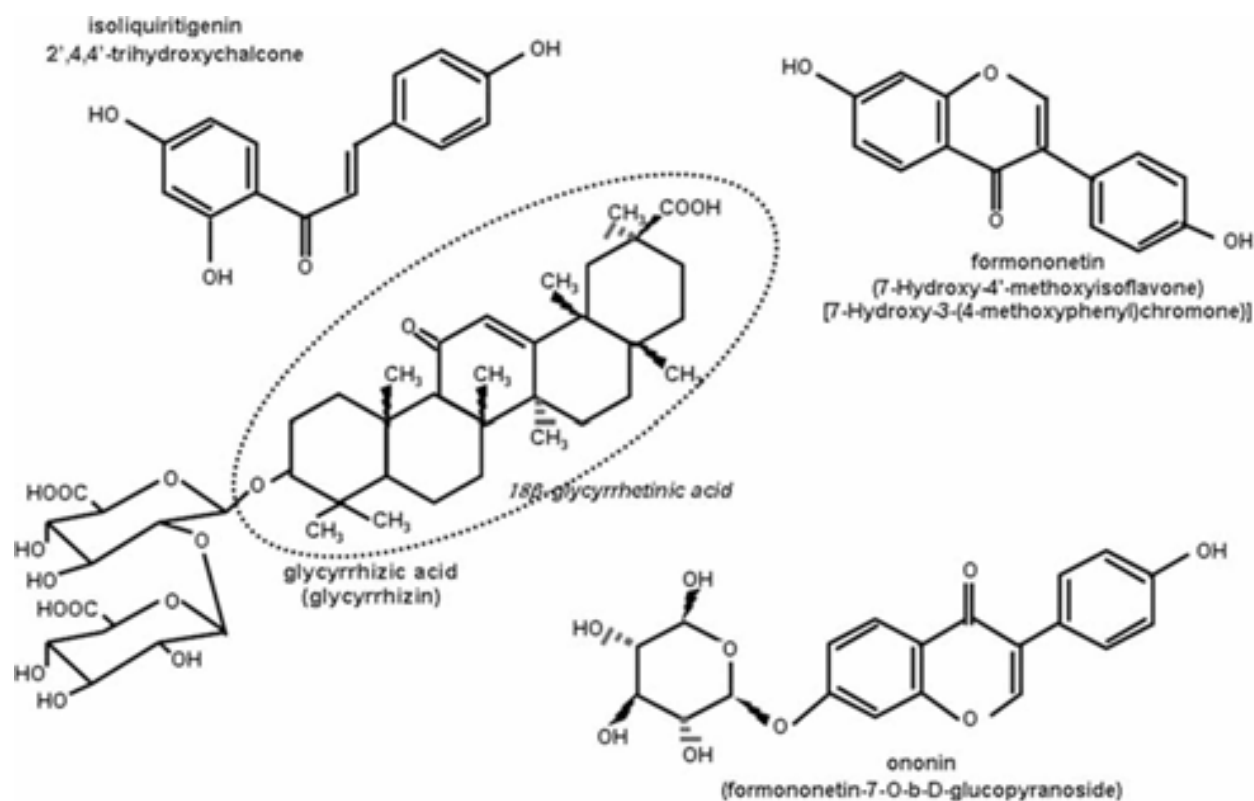










Figure 8. The main constituents of *Liquorice*.

Common name	Family	Parts used	Useful forms	Chemical constituents	Application
<i>Licorice</i>	Fabaceae	Root, Rhizome	Extract, oil	Glycyrrhizin	Antibacterial
<i>Calendula</i>	Asteraceae	Flower	Infusion	Triterpenoids, Flavanoids	Softener
<i>Rosewood</i>	Arecaceae	Nut	Oil	Linalool	Refreshing
<i>Tea tree</i>	Myrtaceae	Leaves	Oil	Terpinens, EGCG	Antioxidant
<i>Wintergreen</i>	Ericaceae	Fruit, leaves	Oil	Methyl Salicylate, a-pinene, Limonene	Anti-inflammation
<i>Slippery elm</i>	Ulmaceae	Leaves	Extract, seed	Flavanoids	Regeneration
<i>Chamomile</i>	Compositae	Flower, Stalk	Extract, oil, Compress	Flavanoids	Anti-inflammation

Table 7. Various herbs to treat skin disorder.

Therefore, various herbs are used in pharmaceutical, food, cosmetic, etc. In this regard, there are a lot of researches to produce natural therapeutical products such as creams, lotions, etc. One of these researches was the making of new herbal cream for treating psoriasis by Izadyari et al. [50]. The herbal extract and oil in the mentioned cream were combined with vitamins. Then, the cream was given to five patients who suffer from psoriasis disease. An important point in this study was combined herbal extracts and vitamins. **Table 8** shows the used herbal extracts and oils in this study. Also, Section5 has explained its method.

The scientific name of the plant	Important properties (in dermatology)	Active ingredients	Plant Pictures
<i>Santalum album</i>	To treat skin disorders (such as psoriasis, etc.), relaxing and calming	Contains high amounts of alpha- and beta-santalol	
<i>Avena sativa</i>	High Repairing properties and collagen synthesis	Linoleic acid, oleic acid, Saponins (steroid, terpenes), alkaloids, vitamins D, E & A	
<i>Cydonia seed-Mucus.</i>	Moisturising and filling skin	Mucilage, various vitamins	
<i>Pinus eldarica</i>	Improving the structure of damaged skin, antioxidant & prevents normal cell death	Containing vitamin A, Magnesium, protein and essential amino acids to repair skin	
<i>Ziziphus spina christi</i>	Improves the structure of the epidermis and skin freshness, antimicrobial	Alpha-pinene, essential oil, flavonoids, tannin	
<i>Aloe barbadensis</i>	Restoration properties and moisturizing effects, removing psoriatic plaques	Contains anthroquinones, steroids, saponins, mucopoly-saccharides and salicylic acid	
<ul style="list-style-type: none"><li>• <i>Silybum marianum</i></li><li>• <i>Matricaria chamomilla</i></li><li>• <i>Foeniculum vulgare</i></li></ul>	Anti-inflammatory and antioxidant properties	<ul style="list-style-type: none"><li>• Silybin, flavonolignans</li><li>• Apigenin, quercetin, patuletin, luteolin, coumarin, essential oil &amp; terpene bisabolol</li><li>• Mucilage, limonene, flavonoids, alpha-pinene, trans-anethole</li></ul>	 






The scientific name of the plant	Important properties (in dermatology)	Active ingredients	Plant Pictures
<i>Rosa damascena</i>	Healthy skin, antioxidant, antiallergy	Flavonoids, anthocyanins, quercetin, tannin, fatty oil, organic acid, vitamin C	
<ul style="list-style-type: none"><li>• <i>Achillea millefolium</i></li><li>• <i>Lavandula</i></li><li>• <i>Angustifolia</i></li></ul>	Soothing, relaxing and healing of damaged skin, anti-inflammatory	<ul style="list-style-type: none"><li>• Alkaloids, coumarins, flavonoids (apigenin, luteolin, quercetin), salicylic acid, volatile oil, tannins, sterols and plant acids</li><li>• Geraniol, tannin, volatile oil, borneol, linalyl acetate</li></ul>	 
<ul style="list-style-type: none"><li>• <i>Arctium lappa</i></li><li>• <i>Glycyrrhiza glabra</i></li></ul>	Regenerative properties, antibacterial and moisture supply to the skin	<ul style="list-style-type: none"><li>• Mucilage, polyacetylenes, guaianolide-type &amp; contain vitamins C, E, B<sub>3</sub> &amp; K</li><li>• Glycyrrhizinic acid, isoflavones, coumarins, triterpene sterols</li></ul>	 

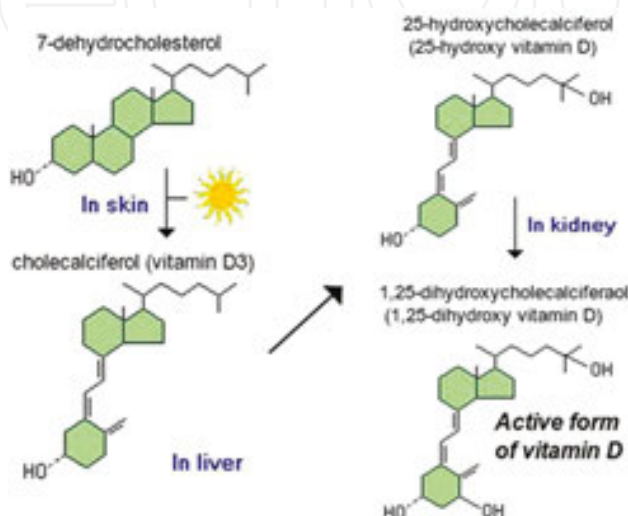
Table 8. The used various herbs.

#### 4.1.7. Vitamin D

Colecalciferol or cholecalciferol, which is known as vitamin D<sub>3</sub>, is a vitamin the fat soluble. This vitamin is found in animals and its derivatives such as vitamin D<sub>2</sub> 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].



In fact, when light energy or UV is absorbed by a precursor 7-dehydrocholesterol, vitamin D<sub>3</sub> is synthesized. But, this form of vitamin D<sub>3</sub> is not active. So, it becomes firstly to 25-hydroxyvitamin D<sub>3</sub> (calcidiol) by the enzyme 25-hydroxylase in the liver. Then, within the kidney, 25-hydroxycholecalciferol acts as a substrate for 1- $\alpha$ -hydroxylase and producing 1,25-dihydroxycholecalciferol, which is the biologically active form of vitamin D<sub>3</sub> (**Figure 9**). Calcitriol is then transported to the bones, intestine and other organs [46, 52, 53].



**Figure 9.** Structure and synthesis of vitamin D.

This form of vitamin D binds to intracellular receptors and function as one of the transcription factors to modulate gene expression in autoimmune disease such as psoriasis, because vitamin D acts as suppressor of immune system. Therefore, it can use in the topical treatment of psoriasis, for inhibiting the cell proliferation [46, 52].

#### 4.1.8. Vitamin A

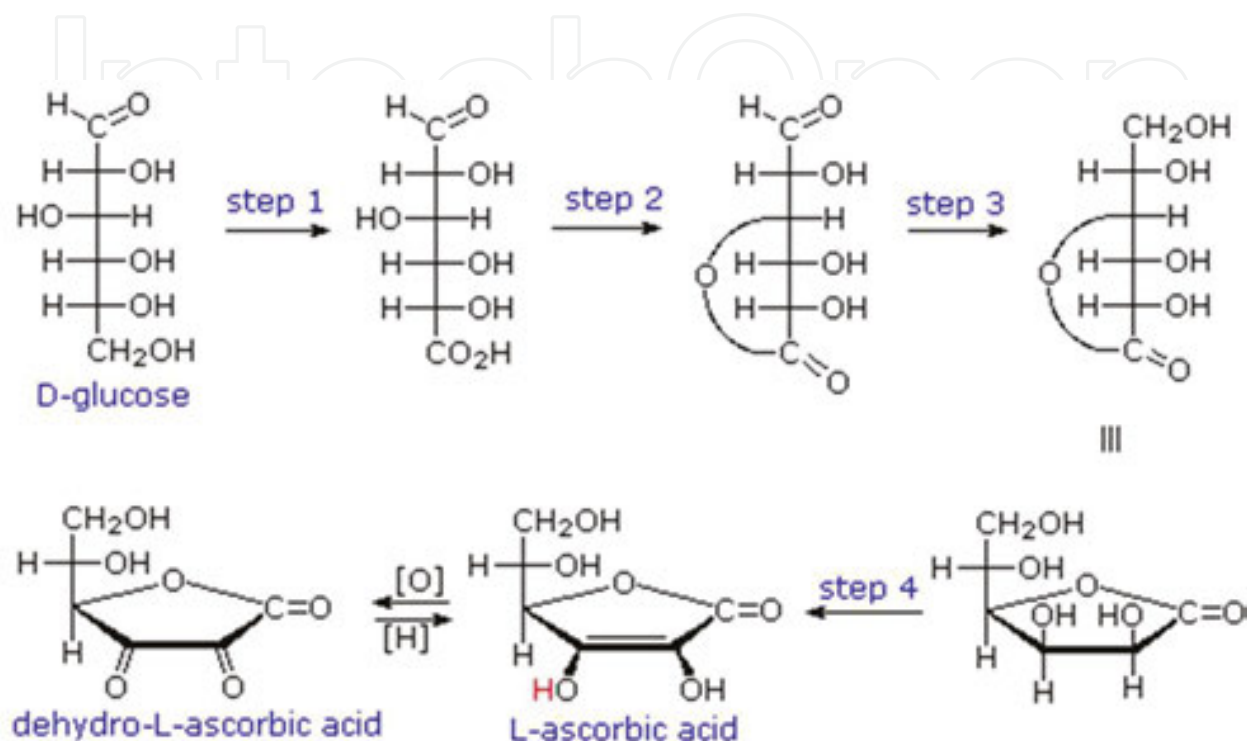
Vitamin A<sub>1</sub> (retinol) and vitamin A<sub>2</sub> (dehydroretinol) are fat-soluble vitamins found only in animal products, particularly eggs, dairy products and animal livers and kidneys. Dehydroretinol has almost 40% of retinol activity. In fact, there is carotenoid as one of the provitamin 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.

#### 4.1.9. 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].



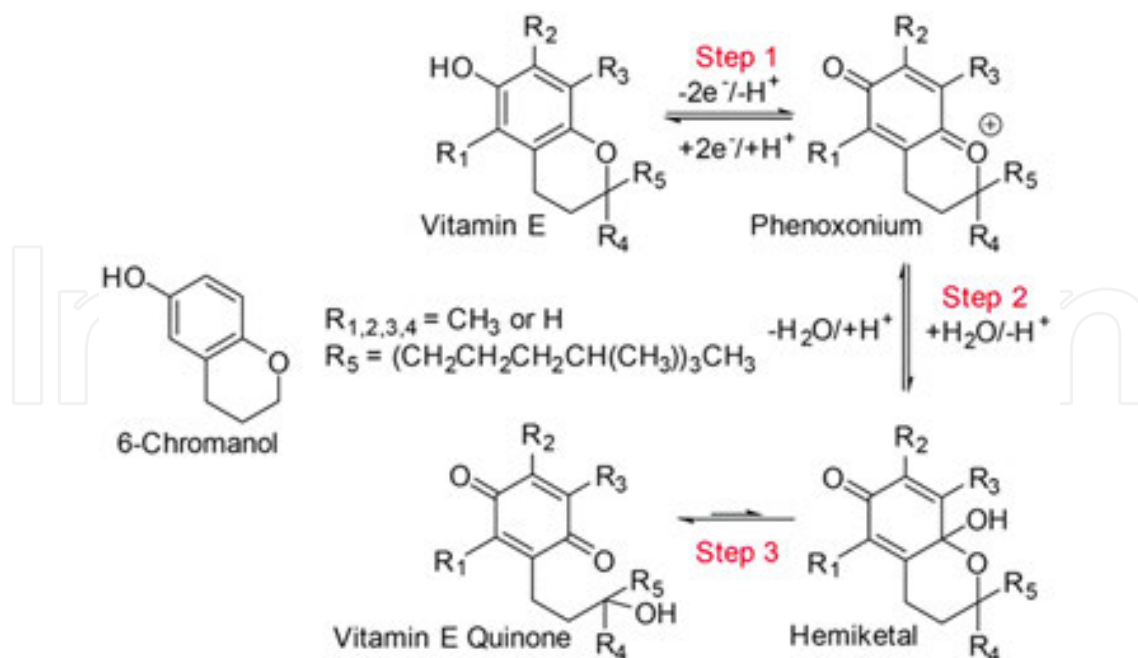
**Figure 10.** Structure of vitamin C.

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].

#### 4.1.10. Vitamin E

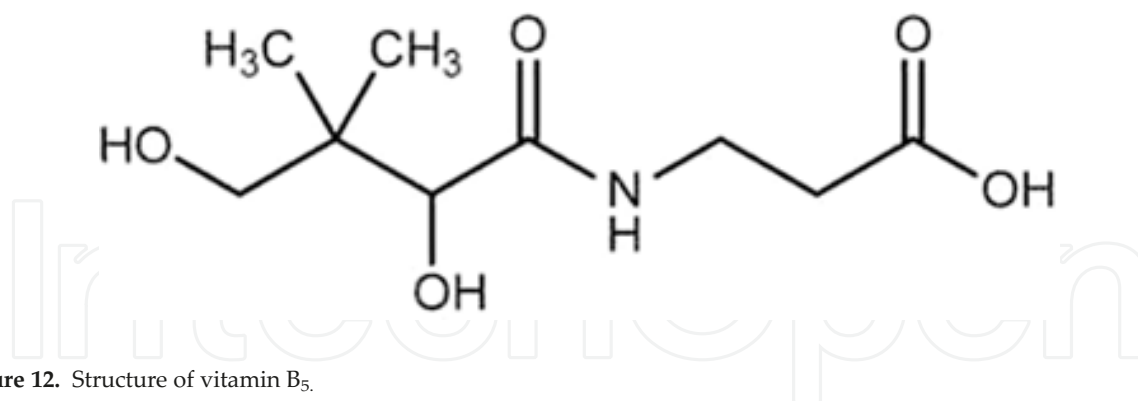
Tocopherol is known as vitamin E. It is one of the fat-soluble vitamins, which are found in more plants. Tocopherols exist in seed oils such as wheat, corn, safflower and soybean [46]. The vitamin has antioxidant properties and it can prevent the tissue destruction by radical. So, it can be effective for treating psoriasis (**Figure 11**). Vitamin E and its derivatives reduce the effects of aging and help to prevent heart disease [46].



**Figure 11.** Antioxidant effect of vitamin E.

#### 4.1.11. Vitamin B<sub>5</sub>

Pantothenic acid is known as vitamin B<sub>5</sub> (**Figure 12**). This vitamin is water-soluble vitamin. Pantothenic acid, as part of the structure of coenzyme A, is important in metabolisms of carbohydrate, fat and protein. Also, this vitamin can help to treat wound and psoriasis lesions [46].



**Figure 12.** Structure of vitamin B<sub>5</sub>.

## 5. Material and method

In the mentioned cream, oily and aqueous extracts of medicinal herbal were formulated with vitamins (E, D<sub>3</sub>, B<sub>5</sub>, C, F) to apply on damaged skin. Herbal extracts include oily extracts of *Santalum album*, *Rosa damascena*, *Arctium lappa*, *Matricaria chamomilla*, *Achillea millefolium*, *Glycyrrhiza glabra*, *Silybum marianum*, *Lavandula angustifolia*, *Foeniculum vulgare* and aqueous extracts of *Ziziphus spina christi*, *Avena sativa*, *Matricaria chamomilla*, *Aloe barbadensis*, *Pinus*

*eldarica* and *Cydonia seed-Mucus*. The cream was prepared according to the water-in-oil (W/O) method. Then, cream was proposed to patients and was suggested to use two times a day (Figure 13).

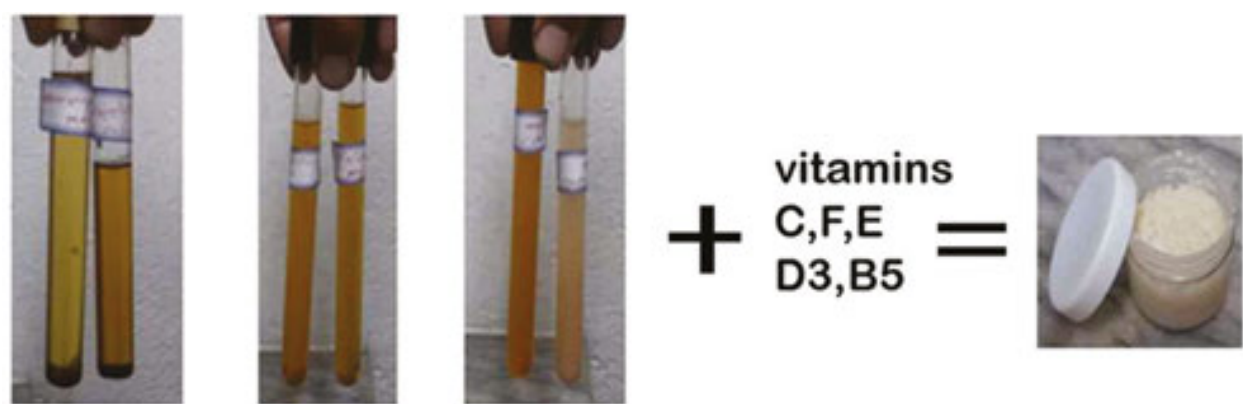


Figure 13. Making therapeutical cream includes oily extracts, aqueous extracts and vitamins.

6. Results

Results were remarkable. All five patients were satisfied from inhibition of itching and inflammation of skin in first week. After 2 weeks applying cream, fading skin redness and increasing skin flexibility and repair were noticeable. An important point of this cream no side effects and combining herbal extracts and vitamins that each alone has little effectiveness. These results are shown in Charts 1, 2, 3 and 4.

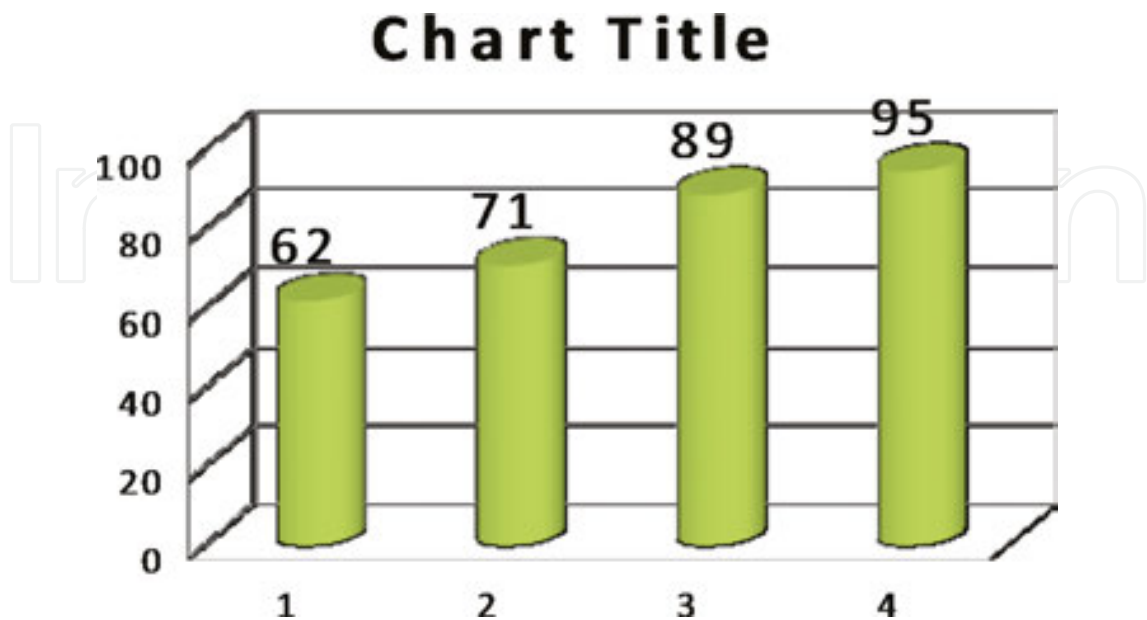


Chart 1. Inhibition of itching and inflammation for all patients, after 4 weeks (about 95%).

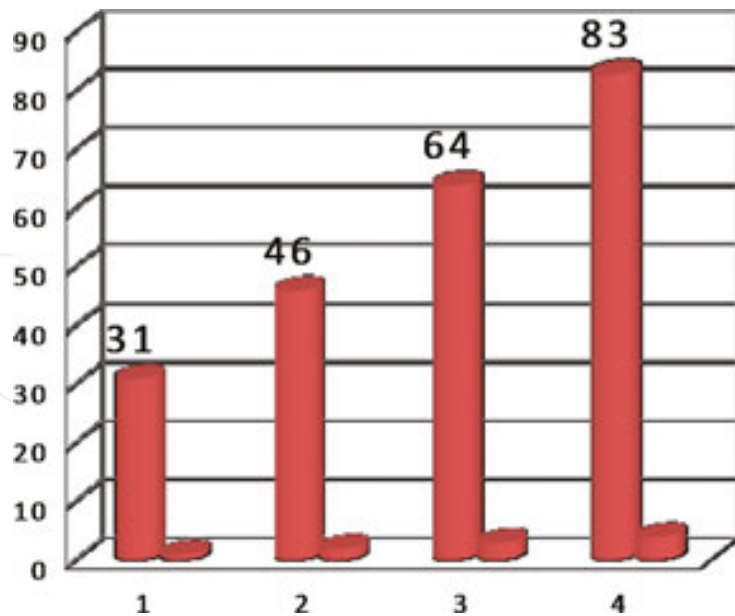


Chart 2. Improvement of psoriasis lesions (in about 83%) for every five patients at the end of 4 weeks.

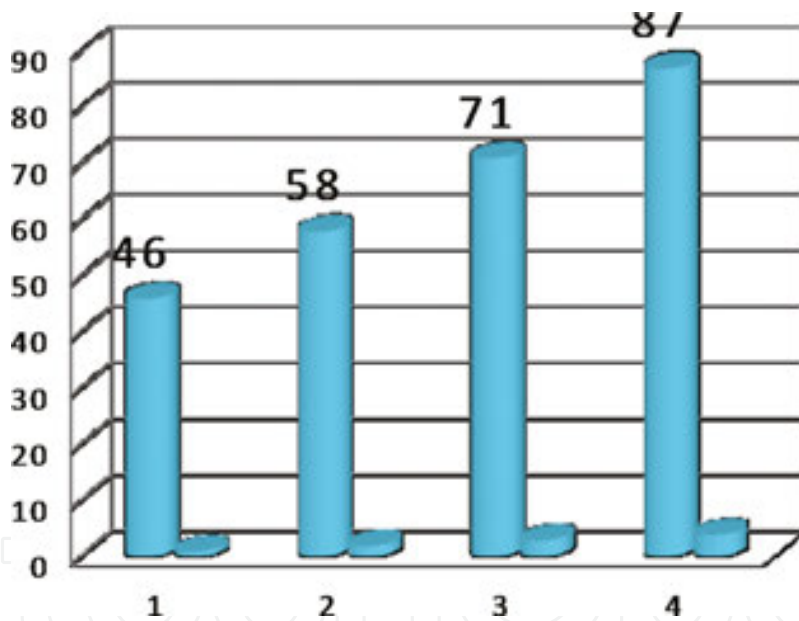


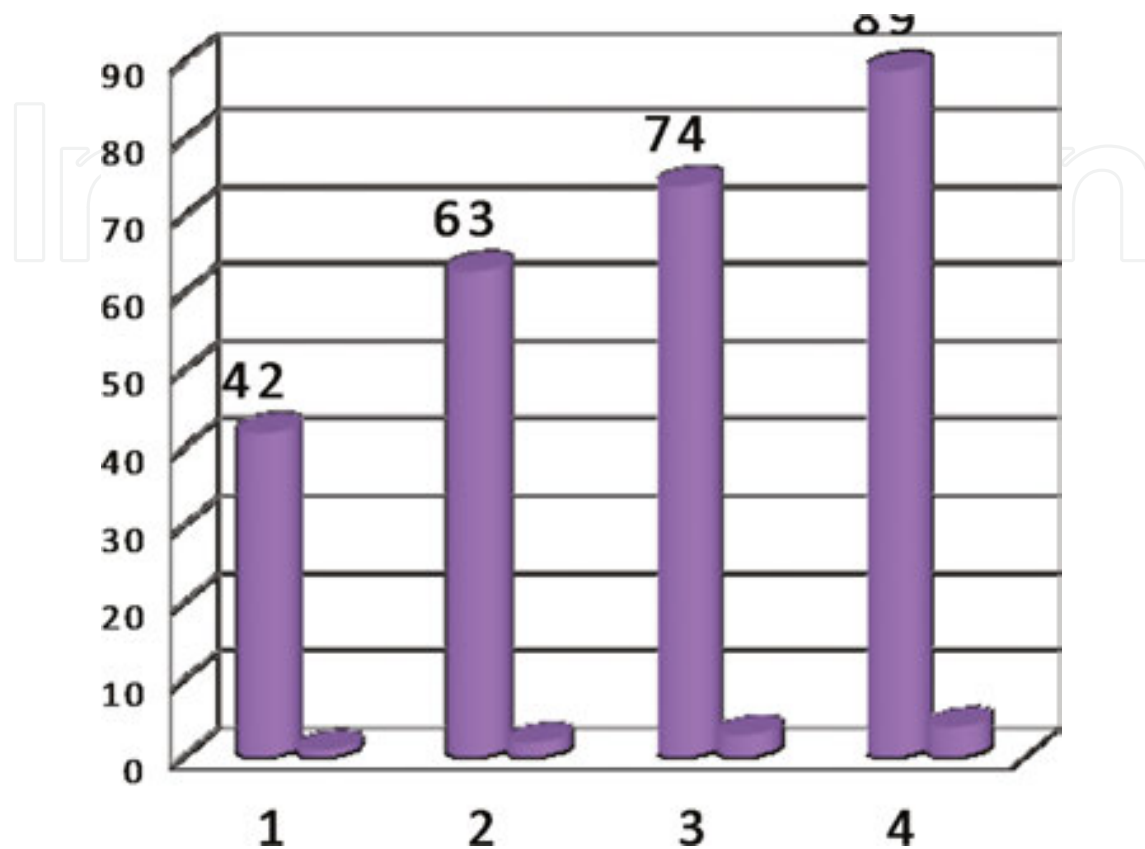
Chart 3. Estimated skin flexibility to be 87% which shows a significant increase after 4 weeks.

According to the results, it can say that the combination of herbal extracts (oily and aqueous) and vitamins is effective in improving the symptoms psoriasis disease.

For example, flavonoids and tannins in *Glycyrrhiza glabra*, *Arctium lappa*, *Pinus eldarica* and *Avena sativa* are effective to treat skin lesions such as psoriasis disease and polysaccharides in *Aloe barbadensis* and mucilage in *Cydonia seed-Mucus* not only are healing the skin wounds but also their malic acid make peeling skin dead cells. Moreover, provitamins such as vitamin A act as antioxidants and prevent damage of skin healthy cells [50]. Other herbal extracts were significant as collagen synthesis and wound improvement, antibacterial and epidermal-moisture



maintenance. Furthermore, vitamins E, B<sub>5</sub>, F, C and D<sub>3</sub> are used for skin recovery, inflammation relief and boost immune system. It could be noted that this herbal cream will probably inhibit common symptoms of psoriasis in the shortest time.



**Chart 4.** Fading skin redness with cream estimated about 80% in the end of 4 weeks.

Nowadays, the using plants developed in many industries. In this regard, the cosmetic industry is not without interest. **Tables 9 and 10** show, respectively, the common plants for skin and mostly used formulas for skin disorders.

No.	Scientific Name	English name	Used part	Application
1	<i>Acarus calamus</i>	Sweet flag	Rhizome	Aromatic, dusting powders, treating skin lotions
2	<i>Alhagi camelorum</i>	Jawasa	Leaves	Treating skin disorders
3	<i>Allium sativum</i>	Garlic	Bulb	Promotes wound healing, antibacterial properties
4	<i>Aloe vera</i>	Aloe vera	Leaf	Moisturizer, Sun screen, Emollient
5	<i>Alpinia galangal</i> (Zingiberaceae)	Galanga	Rhizome	Aromatic, dusting powders
6	<i>Avena sativa</i> (Gramineae)	Oat	Fruit	Moisturizer, skin tonic
7	<i>Azadiracta indica</i> (Meliaceae)	Neem	Leaf	Antiseptic, reduce dark spots, antibacterial
8	<i>Bauhinia racemosa</i> (Leguminosae)	Kanchivala	Bark and leaves	Skin disorders

No.	Scientific Name	English name	Used part	Application
9	<i>Calendula officinalis</i> (Compositae)	Marigold	Flower	Skin care, anti-inflammatory, antiseptic creams.
10	<i>Centella asiatica</i> (Apiaceae)	Brahmi	Plant	Wound healing, reduce stretch marks
11	<i>Mesua ferrea</i> (Guttiferae)	Cobras saffron	Flower	Astringent
12	<i>Panax ginseng</i> (Araliaceae)	Ginseng	Root	Stimulate blood flow to skin
13	<i>Zizyphus jujube</i> (Rhamnaceae)	Zizyphus	Fruit	Skin care
14	<i>Zingiber zerumbet</i> (Zingiberaceae)	Zamabad	Rhizomes	Skin care

Table 9. List of plants to apply in cosmetic [57].

Skin disorder	Herbal extract/oil	Quantity (ml)	% Ingredients in cream
Eczema	<i>Chickweed</i> succus	20	10
	<i>Calendula</i> tinct	10	5
	<i>Comfrey</i> leaf tinct	10	5
Seborrheic dermatitis	<i>Calendula</i> fresh tinct	20	10
	<i>Marshmallow</i> root tinct	10	5
	<i>Comfrey</i> leaf tinct	10	5
Dry skin	<i>Lemon</i> oil	4	10
	<i>Aloe vera</i>	2	5
	<i>Rose</i> water	1	2.5
	<i>Orange</i> oil	2	5
	<i>Almond</i> oil	1	2.5

Table 10. Used formulas for skin disorders.

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## References

- [1] SEMON H C G 2013 PSORIASIS: (PLATE LXXXIX, XCI) *An Atlas of the Commoner Skin Diseases (Fifth Edition)* ed H C G SEMON (Butterworth-Heinemann) pp 218–21.
- [2] Wu J J, Nguyen T U, Poon K Y T and Herrinton L J. 2012. The association of psoriasis with autoimmune diseases. *J. Am. Acad. Dermatol.* **67**: 924–30.
- [3] Swindell W R, Sarkar M K, Liang Y, Xing X and Gudjonsson J E. 2016. Cross-disease transcriptomics: unique IL-17A signaling in psoriasis lesions and an autoimmune PBMC signature. *J. Invest. Dermatol.*
- [4] Ohata C, Ishii N, Koga H, Fukuda S, Tateishi C, Tsuruta D, Furumura M and Hashimoto T. 2015. Coexistence of autoimmune bullous diseases (AIBDs) and psoriasis: a series of 145 cases *J. Am. Acad. Dermatol.* **73**: 50–5.
- [5] Drago L and Toscano M. 2015. *Probiotics: immunomodulatory properties in allergy and eczema*. Elsevier Inc.
- [6] Yang J, Sundrud M S, Skepner J and Yamagata T. 2014. Targeting Th17 cells in autoimmune diseases. *Trends Pharmacol. Sci.* **35**: 493–500.
- [7] Regehr C H. 1995. *The Cure for all Diseases*. (United States by New Century Press)
- [8] Petkova V B, Dimitrov M V, Nikolova I N, Voycheva C C, Valchanova V G and Andreevska K G. 2014. Psoriasis influence on the patients'quality of life. *World J. Pharm. Pharm. Sci.* **8**: 1942–8.
- [9] Shenefelt P D 2010 Psychological interventions in the management of common skin conditions. *Psychol. Res. Behav. Manag* **3**: 51–63.
- [10] Anon. 2014. The p is silent National Psoriasis foundation. Statistics prevalence, but we are not. National Psoriasis Foundation.
- [11] Akay A, Pekcanlar A, Bozdag K E, Altintas L and Karaman A. 2002. Assessment of depression in subjects with psoriasis vulgaris and lichen planus *J. Eur. Acad. Dermatol. Venereol.* **16**: 347–52.
- [12] Sampogna F, Tabolli S, Mastroeni S, Di Pietro C, Fortes C, Abeni D, Alotto M, Antonelli G, Bolli S, Chinni M L, Fazio M, Girolomoni G, Luchetti E, Mazzotti E, Salcedo N M, Moscatelli P, Pasquini P, Piazza P, Picconi O, Pilla M A, Primavera G, Puddu P, Ruatti P, Ruggiero G, Salvatori V, Sera F, Simoni R, Sordi D and Tiago A. 2007. Quality of life impairment and psychological distress in elderly patients with psoriasis. *Dermatology* **215**: 341–7.
- [13] Penzer R and Ersser S. 2010. *Principles of Skin Care: A Guide for Nurses and Health Care Practitioners*. (Wiley-Blackwell).
- [14] Gawkrödger D and Ardern-Jones M R. 2012. *Dermatology: an illustrated colour text*. Elsevier Health Sciences.

- [15] Terui T, Ozawa M and Tagami H. 2000. Role of neutrophils in induction of acute inflammation in T-cell-mediated immune dermatosis, psoriasis: a neutrophil-associated inflammation-boosting loop. *Exp. Dermatol.* **9**: 1–10.
- [16] Lanigan S . and Zaidi Z 2010. *Dermatology in Clinical Practice*. (London: Springer London)
- [17] Bensouilah J and Buck P. 2006. *Aromadermatology: aromatherapy in the treatment and care of common skin conditions*. Radcliffe Publishing.
- [18] Arens E A and Zhang H. 2006. The skin's role in human thermoregulation and comfort. *Center for the Built Environment*. ed N. Pan and P. Gibson edited by N. Pan and P. Gibson (Cambridge, England). pp. 560–602.
- [19] Montagna W. 2012. *The Structure and Function of Skin 3E*. Elsevier (Academic Press).
- [20] Zhu J and Marchant R E. 2011. Design properties of hydrogel tissue-engineering scaffolds. *Expert Rev. Med. Devices.* **8**: 607–26.
- [21] Camisa C. 2008. *Handbook of Psoriasis*, (Blackwell).
- [22] Rosbotham J L, Trembath R C, Glover M, Leigh J and Barker J N W N. 1994. An association between psoriasis and hereditary multiple exostoses. A clue for the mapping of a psoriasis susceptibility gene? *Br. J. Dermatol.* **130**: 671–4.
- [23] Cargill M, Schrodi S J, Chang M, Garcia V E, Brandon R, Callis K P, Matsunami N, Ardlie K G, Civello D, Catanese J J, Leong D U, Panko J M, McAllister L B, Hansen C B, Papenfuss J, Prescott S M, White T J, Leppert M F, Krueger G G and Begovich A B. 2007. A large-scale genetic association study confirms {IL12B} and leads to the identification of {IL23R} as psoriasis-risk genes. *Am. J. Hum. Genet.* **80**: 273–90.
- [24] Griffiths C E M, Christophers E, Barker J, Chalmers R J G, Chimenti S, Krueger G G, Leonardi C, Menter A, Ortonne J and Fry L. 2007. A classification of psoriasis vulgaris according to phenotype. *Br. J. Dermatol.* **156**: 258–62.
- [25] Henseler T, Ph D and Christophers E. 1985. Psoriasis of early and late onset: characterization of two types of psoriasis vulgaris. *J. Am. Acad. Dermatol.* **13**: 450–6.
- [26] Zanchi M, Favot F, Bizzarini M, Piai M, Donini M and Sedona P. 2008. Botulinum toxin type A for the treatment of inverse psoriasis. *J. Eur. Acad. Dermatol. Venereol.* **22**: 431–6.
- [27] Asumalahti K, Ameen M, Suomela S, Hagforsen E, Evans J, Munro M, Veal C, Allen M, Leman J, Burden A D, Kirby B, Connolly M, Gri E M, Trembath R C, Kere J, Saarialho-kere U, Jonathan N W and Barker N. 2003. Genetic analysis of PSORS1 distinguishes guttate psoriasis and palmoplantar pustulosis. *J. Invest. Dermatol.* **120**: 627–32.
- [28] Zangeneh F Z and Shooshtary F S. 2013. Psoriasis—types, causes and medication. *Psoriasis Types, Causes and Medication*. InTech, p. 1.
- [29] Kahl C, Hansen B and Reich K. 2012. Nail psoriasis—an ignored disorder. Pathogenesis, diagnosis and therapy. *Der Hautarzt* **63**: 184–91.

- [30] Moll J M H and Wright V 1973. *Psoriatic arthritis Semin. Arthritis Rheum.* **33**: 55–78.
- [31] Wilson F C, Icen M, Crowson C S, McEvoy M T, Gabriel S E and Kremers H M. 2009. Incidence and clinical predictors of psoriatic arthritis in patients with psoriasis: a population-based study. *Arthritis Rheum.* **61**: 233–9.
- [32] Takayanagi H. 2009. Osteoimmunology and the effects of the immune system on bone. *Nat. Rev. Rheumatol.* **5**: 667–76.
- [33] Farber E M and Cox A J. 1967. The biology of psoriasis. *J. Invest. Dermatol.* **49**: 348–57.
- [34] Coates L C, FitzGerald O, Helliwell P S and Paul C. 2016. Psoriasis, psoriatic arthritis and rheumatoid arthritis: Is all inflammation the same? *Semin. Arthritis Rheum.*
- [35] Arican O, Aral M, Sasmaz S and Ciragil P. 2005. Serum levels of TNF- $\alpha$ , IFN- $\gamma$ , IL-6, IL-8, IL-12, IL-17 and IL-18 in patients with active psoriasis and correlation with disease severity. *Mediators Inflamm.* **2005**: 273–9.
- [36] Alonso L. 2003. Stem cells in the skin: waste not, Wnt not. *Genes Dev.* **17**: 1189–200.
- [37] Brown A C, Hairfield M, Richards D G, McMillin D L, Mein E A and Nelson C D. 2004. Medical nutrition therapy as a potential complementary treatment for psoriasis—five case reports. *Altern. Med. Rev.* **9**: 297–307.
- [38] Singh K K and Tripathy S. 2014. Natural treatment alternative for psoriasis: a review on herbal resources. *J. Appl. Pharm. Sci.* **4**: 114–21.
- [39] Syed T A, Ahmad S A, Holt A H, Ahmad S A, Ahmad S H and Afzal M. 1996. Management of psoriasis with Aloe vera extract in a hydrophilic cream: a placebo-controlled, double-blind study. *Trop. Med. Int. Health.* **1**: 505–9.
- [40] Robson M C, Heggors J P and Hagstrom W J J. 1982. Myth, magic, witchcraft, or fact? Aloe vera revisited. *J. Burn Care Res.* **3**
- [41] Dhanabal S, Raj B and Muruganantham N. 2012. Screening of *Wrightia tinctoria* leaves for anti psoriatic activity. *Hygeia JD Med* **4**: 73–8.
- [42] Saleeby JP. 2006. *Wonder Herbs: A Guide to Three Adaptogens*. Google Books, USA.
- [43] Sabir S, Arshad M, Asif S and Chaudhari S K. 2014. An insight into medicinal and therapeutic potential of *Silybum marianum* (L.) Gaertn. *Int. J. Biosci.* **4**: 104–15.
- [44] Fiebrich F and Koch H. 1979. Silymarin, an inhibitor of lipooxygenase. *Experientia.* **35**: 1548–50.
- [45] Koch H P, Bachner J and Loffler E. 1985. Silymarin: potent inhibitor of cyclic AMP phosphodiesterase. *Methods Find. Exp. Clin. Pharmacol.* **7**: 409–13.
- [46] Demirci F. 2009. *Medicinal Natural Products: A Biosynthetic Approach, 3rd edition*. In: P.M. Dewick. John Wiley & Sons, Chichester, UK, vol 124.
- [47] Malekzadeh M, Mirmazloum S I, Mortazavi S N, Panahi M and Angorani H R. 2011. Physicochemical properties and oil constituents of milk thistle (*Silybum marianum* Gaertn. cv. budakalászi) under drought stress. *J. Med. Plants Res.* **5**: 2886–9.



- [48] El-Mallah M H, El-Shami S M and Hassanein M M. 2003. Detailed studies on some lipids of *Silybum marianum* (L.) seed oil. *Grasas y Aceites* **54**: 397–402.
- [49] Lin C-C, Lin J-M, Yang J-J, Chuang S-C and Ujiiie T 1996 Anti-inflammatory and Radical Scavenge Effects of *Arctium lappa*. *Am. J. Chin. Med.* **24**: 127–37.
- [50] Izadyari1 A, Bakhshadi R K, Motallebi1 S, Akbarzadeh A and Sharifzadeh Baei M 2015 Formulation of Herbal Cream For Psoriasis Treatment and Its Symptoms Inhibition. *Invest. Dermatol.* **135**: S1–37.
- [51] Clemens T L, Adams J S, Henderson S L and Holick M F. 1982. Increased skin pigment reduces the capacity of skin to synthesise vitamin D3. *Lancet (London, England)* **1**: 74–6.
- [52] Tryfonidou M A, Stevenhagen J J, Van Den Bemd G, Oosterlaken-Dijksterhuis M A, DeLuca H F, Mol J A, Van Den Brom W E, Van Leeuwen J and Hazewinkel H A W. 2002. Moderate cholecalciferol supplementation depresses intestinal calcium absorption in growing dogs. *J. Nutr.* **132**: 2644–50.
- [53] Robinson C J, Alanis M C, Wagner C L, Hollis B W and Johnson D D. 2010. Plasma 25-hydroxyvitamin D levels in early-onset severe preeclampsia. *Am. J. Obstet. Gynecol.* **203**: 366.e1–366.e6.
- [54] Orfanos C E, Pullmann H, Runne U, Kurka M, Strunk V, Künzig M and Dierlich E. 1979. Treatment of psoriasis using vitamin A, vitamin A acid and oral retinoids. *Hautarzt.* **30**: 124–33.
- [55] Darr D, Combs S, Dunston S, Manning T and Pinnell S. 1992. Topical vitamin C protects porcine skin from ultraviolet radiation-induced damage. *Br. J. Dermatol.* **127**: 247–53.
- [56] Offord E A, Gautier J-C, Avanti O, Scaletta C, Runge F, Krämer K and Applegate L A. 2002. Photoprotective potential of lycopene,  $\beta$ -carotene, vitamin E, vitamin C and carnolic acid in UVA-irradiated human skin fibroblasts. *Free Radic. Biol. Med.* **32** 1293–303.
- [57] Sumit K, Vivek S, Sujata S and Ashish B. 2012. Herbal cosmetics: used for skin and hair. *Inven. J.* **2012**: 1–7.