



A SYSTEMATIC REVIEW ON HERBS USED IN INTERVENTION OF INTERTRIGO

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ABSTRACT

The skin is an organ that connects us to our surroundings and shields us from harmful outside influences. Numerous infectious agents, most notably candida, can cause intertrigo, a common inflammatory skin disorder that is influenced by mechanical and environmental factors. *C. albicans* favours wet, macerated skin crevasses for growth. The risk of these problems may be increased by inflammatory skin conditions including psoriasis, hot, muggy weather, tight undergarments, poor hygiene, and candidal infections. Inflammation of the skin has negative effects on both its function and appearance as well as the psyche, whose health is crucial for treating chronic skin illnesses. The etiology, pathophysiology, clinical manifestation, constituents of functional anticipation strategies, interventions to control intertrigo and foster healthy skin, as well as a review of some therapeutic herbs and their mechanisms for curing different diseases of skin/epidermis, are all covered in this article's general overview of intertrigo.

Keywords: Intertrigo, plants drugs, Anti-inflammatory activity, Antimicrobial, Skin fold, Treatment

INTRODUCTION

Intertrigo is a mildly inflamed skin ailment that affects the skin coverings that are flexible and is aggravated or caused by hot weather condition, abrasion, wetness, maceration, and inadequate airflow. The Latin words for intertrigo—inter (between)

and terere (to rub)—help to interpret the disease's biology [1]. However, different viral or bacterial etiologies may contribute to the pathophysiology of intertrigo. Intertrigo frequently contracts secondary infections, most notably *Candida*. The most often affected sites of intertrigo, which can be seen in people of all generations and is firstly identified clinically, are the folds under arms, folds beneath the breast region, stomach folds, and area between scrotum/vulva and anus. The bruise are frequently itchiness or redness on skin of numerous intensities, and when the condition worsens or is treated, more lesions appear [2]. In comparison to skin that is healthy, intertrigo-affected skin is more susceptible to infection. A secondary infection with bacteria, fungi, or viruses is frequently referred to as "intertrigo." These infections can be caused by viruses, fungi, or bacteria like *Corynebacterium minutissimum*. Intertrigo caused by *Candida* is a common symptom.

When it's hot and humid, intertrigo occurs more frequently. Generally speaking, immune-compromised individuals, youngsters, the elderly, and those with low immune systems are more susceptible to intertrigo. People with urine incontinence and restricted mobility are also more likely to have the disorder [2].

ETIOLOGY

The primary causes of intertrigo are mechanical forces and subsequent infections. An essential part of this process is facilitation of heat with maceration. The skin folds fight against ongoing frictional pressures, which can cause erosions to the irritated skin as well as discomfort. Additionally, moisture accumulates in the damaged intertriginous tissues, creating a fertile substrate for secondary infection. *Candida* species are a frequent cause of secondary infection in intertrigo instances and flourish in warm, high-moisture conditions. Victims with diabetes also have higher pH levels in the sites with opposite skin surfaces come in contact, which raises their population widespread [3]. Various micro-organisms including bacteria, fungi and viruses, frequently result in secondary infections, however this is not always the case [4].

The region of the inner thighs and genitalia where folds occur, areas under arm, inframammary lesions, the bottom of the abdomen, earfolds, and areas connecting the toes and fingers are where warm, damp skin usually chafes and develops into an intertrigo. The normal appearance of an intertrigo is raw and red, and it may also itch, leak, or be sore. Obese, diabetic, bedridden, diaper-wearing, and individuals with prosthetic limbs or other medical devices that trap moisture on the skin are more likely to experience intertrigo.

Additionally, dermatitis and inverse psoriasis are just a couple of the skin conditions that might lead to the development of an intertrigo [5]. Intertrigo frequently affects those engaging in athletic, professional, or leisure activities and possibly caused by shoes with closed toes or that are too small. Newly born infants are at a highly prone to intertrigo due to their little neck, plumpy body, and buckle position [6]. Drooling by infants may also promote intertrigo. People with projecting skinfolds on across the chin are more susceptible to experiencing intertrigo [7].

PATHOPHYSIOLOGY

The development of intertrigo is primarily influenced by genetic and environmental circumstances. One of the most dominant reason is the abrasion between surfaces of skin that leads to epidermal irritation. Furthermore, in comparison to other body parts, flexural surfaces have a higher surface temperature. The accumulation of perspiration and moisture in these places contributes to the extreme leanness of the epidermis and stratum corneum. Because the skin also contains microbes that multiply in this environment and ravage in these situations, contamination is a typical discovery [8].

CLINICAL MANIFESTATION

Mild erythema, which first appears as red plaques practically similar on each side of the skinfold, is the main feature of intertrigo

[9]. With erosive, fissured, exudative, macerative, and crusting phenomena, the erythema may worsen and become more intensely inflamed. In the affected areas, patients may experience discomfort, burning, and itching [6].

An intertrigo with well-defined ruby, sobbing borders may be mechanical or an indication of subsequent GABHS infection. When it appears as a severe redness with leanness on the neck folds, armpits, or inguinal areas in youngsters, streptococcal intertrigo may be challenging to identify; it is distinguished by a foul odour and an absence of satellite lesions [10]. Patients with severe cases could experience a septic discharge, edema, and acute redness of the tissues surrounding the diseased region. Cellulitis is more likely to develop in patients with acute toe web intertrigo who are obese or have diabetes. Green discoloration at the infection site is possible in patients with new gram-negative infections.

Erythematous desquamating infection, which may be more persistent than the acute variety, may be linked to a painful, exudative, and macerating inflammation that compromises foot function. An acute febrile sickness may include acute genitocrural intertrigo with associated fever, exhaustion, painful to swallow, and joint pain. Victims with HIV-1 infection may undergo acute genitocrural intertrigo that

manifests as a maculopapular eruption [11].

Types of Intertrigo

There are various varieties of intertrigo based on things like where it develops and whether or not it has produced an infection.

- Acute intertrigo: This condition refers to intertrigo that has just recently manifested.
- Recurrent (relapsing) intertrigo: This type of intertrigo is characterised by repeated episodes across time.
- Chronic intertrigo: Intertrigo that has persisted for six weeks or more is referred to as chronic intertrigo.
- Uncomplicated intertrigo: This refers to intertrigo that has not resulted in an infection.
- Interdigital intertrigo: This term refers to intertrigo between your fingers or toes.
- Candidal intertrigo: This condition develops when the yeast (fungus) *Candida* infects your intertrigo. The most typical cause of intertrigo infections is *Candida*.

Diagnosis

A medical expert can make a clinical diagnosis of intertrigo following a comprehensive history-taking and physical examination. Erythrasma, inverse psoriasis, itch, pyoderma, atopic dermatitis, candidiasis, seborrheic dermatitis, and fungal infections of the superficial skin brought on by *Tinea versicolor* or *Tinea corporis* are just a few of the disorders that might resemble intertrigo in appearance [2].

The diagnosis of intertrigo and its consequent consequences is typically based on clinical signs and is frequently straightforward. Intertriginous lesions' characteristics, such as erosions, vesicles, pimples, swelling, lumps, plaques, and patches, can reveal the type of disease that is going on [12]. Skin biopsy samples are typically not needed since intertrigo's histology lacks any distinguishing characteristics. It is advisable to run a culture with sensitivities if secondary bacterial contamination are felt.

A Wood's light examination could spot an erythrasma or *Pseudomonas* infection faster than a culture. The Wood's light typically exhibits a coral-red luminous with long-term skin infection by bacteria and a green luminous with *Pseudomonas* infection. The diagnosis of secondary fungal infections can be made with a potassium hydroxide cytologic test. Dermatophytes should be associated with hyphae, while candidiasis should be associated with pseudohyphae [13].

Patients should be re-evaluated for any other principal or peripheral dermatologic conditions that may resemble intertrigo if they do not respond to treatment [14]. Seborrheic dermatitis might affect the scalp, inguinal areas, or axillae. Pitting of the nails or psoriasiform lesions on other parts of the body can help to identify psoriasis from intertrigo. Rarely, skin biopsy samples are

required to differentiate intertrigo from reduced prevalent skin disorders. Because these illnesses may also create skin folds, inflammation of dermis, primary irritant contact dermatitis, skin rash by mites, and blistering of skin and membrane are occasionally misdiagnosed as intertrigo. A localised drug eruption may also be represented by unusual intertriginous involvement [15].

Prevention

The best prevention technique includes educating patients who are at high risk about intertrigo, symptoms to look out for, and skin fold care.

It is advised to limit skin-to-skin contact, reduce humidity all over skin surface folds, and keep increase risk regions clean and dry as part of the skin fold care guidelines. Wherever feasible, predisposing elements should be communicated, such as addressing incontinence and managing diabetes' glycaemic control [16].

Victims should be counseled to keep away from wearing synthetic fabrics and instead wear loose, lightweight clothing made of natural materials that absorb sweat (like cotton) or athletic clothing designed to wick sweat away from the skin.

Avoid using alkaline soaps for cleaning whenever possible; instead, use a pH-balanced, no-rinse cleanser. Regardless of the skin cleansing technique utilised, it is

imperative to take care to dry the skin folds properly without creating excessive friction. To keep the skin dry and reduce friction, it is advisable to use skin barrier treatments, however patients commonly find these products difficult to apply and remove correctly on their own. Evidence is still insufficient to be used as a criterion for choosing a product. Patients may use talc and/or other powders to absorb moisture as well as putting cloth, tissue, pads, and gauze into skin crevasses as some of the techniques [17].

TREATMENT

Treatment of intertrigo can be done by two ways:

- Allopathy drugs
- Herbal drugs

Allopathy drugs

It is crucial to identify the underlying cause of intertrigo in order to treat it effectively. The right antimicrobial medicine should be given if the rash has an infectious component. Antiperspirants and other drying agents can be used to reduce moisture in simple intertrigo. A bath or shower should be taken after strenuous activity that produces a lot of perspiration³ followed by adequate drying with a soft towel. Triple paste is a potent antiperspirant that also lessens frictional exposure and lessens skin irritation. It is made of aluminium acetate solution, zinc oxide, and petrolatum. The

rash can avoided be by keeping cool by using loose clothing and working in air-conditioned spaces. Other prophylactic procedures with a history of success include wet tea bags and absorbent granules crushed with an aqueous solution of aluminium triacetate 1:40. However, if therapy is necessary, petrolatum ointment or cream is efficient and safe for diaper dermatitis. Absorbent diapers are more successful at reducing moisture. A topical medication like mupirocin or bacitracin can be administered if the lesion is moderate and bacterially contaminated. If oral treatment is necessary, it should be prescribed that it be effective against gram-positive bacteria, particularly Staphylococcus or Streptococcus, such as flucloxacillin or erythromycin. Effective treatments for intertrigo infected with yeast or fungus include topical clotrimazole, ketoconazole, and oxiconazole. Nystatin applied topically only treats candidal intertrigo. For seven days, 100–200 mg of oral fluconazole can be taken daily to treat resistant fungi. Although it is not always necessary, low-dose steroids with anti-inflammatory characteristics, such as hydrocortisone cream, may be started. To avoid atrophy in the already thin epidermis of the flexural surfaces, a lower strength steroid is preferred [18].

Herbal drugs

Plant-based medicines are becoming more and more popular due to a number of

benefits, including frequently less side effects, improved patient tolerance, being relatively less expensive, and due to a lengthy history of use, acceptable. Other than herbal remedies offer logical methods for treating various ailments that are stubborn and incurable in other medical systems. Some of the plants that are used for treatment of intertrigo are:

- ***Achyranthes aspera***

Common name: Prickly chaff flower,

Devil's horsewhip

Family: Amaranthaceae

Long used to treat skin conditions like irritation on skin, pus filled bump under the skin, scabies, lesions on skin, and various skin issues. The EBV-EA was activated in Raji cells by the tumour promoter 12-O-tetradecanoylphorbol-13-acetate (TPA), but the MeOH extract, as *A. aspera* leaves were used to extract the alkaloid, non-alkaloid, and saponin fractions, significantly hinders the activation (concentration 100 g). A two-stage in vivo mouse skin carcinogenesis test revealed that the entire methanolic extract had a substantial anticarcinogenic effect (76%). According to the research, extract of leaf and non-alkaloid portion have a significant role in antitumor promotion during carcinogenesis [19].

- ***Allium cepa***

Common name: Onion

Family: Liliaceae

Allium sativum and Allium cepa aqueous extracts were tested to prevent fungal properties in opposition to various dermatophyte species, as well as Malassezia furfur, Candida albicans, and other Candida spp. The research revealed that there may be promise in using onion and garlic to treat illnesses brought on by prominent pathogenic genera like Candida, Malassezia, and dermatophytes, which are related to fungus. [20]

- *sativum*

Common name: Garlic

Family: Liliaceae

The strongest chemo protective effect of garlic was seen in mice that received therapy both before and after skin carcinogenesis was triggered using 7,12-dimethylbenz(a)anthracene (DMBA), according to a study on Swiss albino mice. Consuming garlic slowed down the development of skin papillomas in animals while also reducing their size and number. This was also evident in the treated mice's skin histology. Garlic is thought to have a preventive effect against skin cancer in mice that is at least partially attributed to the stimulation of cellular defence mechanisms [21].

- *Aloe vera*

Common name: Barbados aloe

Family: Xanthorrhoeaceae

Aloe vera is widely used as a fitness beverage and has proven to be quite successful in healing skin conditions. Additionally, it has been used to successfully cure wrinkles, pigmentations, and stretch marks. Additionally, by improving local blood flow and preventing cell death, it seems to help in wound healing process. Using mice to test the results of Scutellariae radix and Aloe vera gel on skin abrasions that similar to spontaneous atopic dermatitis, it was discovered that those who received only Aloe vera gel at a dose of 0.8 mg/kg p.o. experienced relaxation from AD as a result of a drop in interleukin 5 and interleukin 10 levels [22].

Gel application aided in the recovery of burns with partial thickness [23]. The gel appears to help skin get through frostbite harm when applied to the skin [24]. It could postpone the onset of skin harm both at the time and immediately after radiation therapy [25].

- *Azadirachta indica*

Common Name: Neem

Family: Meliaceae

Utilizing leaf extract, boils and blisters are treated externally [26]. DMBA (500 nmol/100 l for 2 weeks) was administered topically to animals in one experiment, while TPA (1.7 nmol/100 l of acetone, twice weekly) was employed as a promoter. Aqueous Azadirachta indica leaf extract, at a dose of 300 mg/kg body weight, was given to the test group thrice per week for 20 weeks.

The effects of this study proved *A. indica*'s capacity to prevent mouse skin carcinogenesis by chemoprevention [27]. The ethanol extract of *Andrographis paniculata*, *Glycyrrhiza glabra*, *Ocimum sanctum*, *A. indica*, and green tea had possibly to inhibit acne, according to a study on prevention on acne moisturiser made from herbal crude extracts and examination for its physico-chemical factors as well as prevention of bacterial growth. It was shown that the ideal anti-acne moisturiser formula was sufficiently effective to suppress the germs *Staphylococcus epidermis* and *Propioni bacterium*, which cause acne [28].

- ***Bauhinia variegata***

Common name: Kachanar, Orchid tree, Camel's Foot Tree, Mountain Ebony

Family: Fabaceae

For the treatment of skin conditions, asthma, sore throats, diarrhoea, and abdominal discomfort, the bark is taken internally. It is also implemented topically to heal skin ulcers.

- ***Calendula officinalis***

Common name: Marigold

Family: Asteraceae

Decoctions and tinctures prepared from marigold flowers, which have long been employed in folk medicine, have been linked to more than 35 qualities. The main applications are for the treatment of bruising, inflammatory cutaneous, and internal

conditions of diverse causes. Application of marigold extract (ME) in gel formulation, containing 0.21 g/cm of narcissin and as 0.07 g/cm of the rutin in the viable epidermis, was linked to a potential improvement in the collagen synthesis in the sub epidermal connective tissue, according to topical formulations containing marigold extract (ME), tested in hairless mice against UV-B irradiation-induced photodamage [29]. When tested on healthy human volunteers in an experimental setting, research on cream formulations including seven distinct types of marigold and rosemary extracts showed that such creams are effective at inducing unpleasant contact dermatitis [30].

- ***Cannabis sativus***

Common name: Charas, Ganja

Family: Cannabinaceae

The leaves' powder is used as a bandage for cuts and sores. Ganja is administered topically to treat disorders that cause itching skin. Hemp seed oil can be used to treat eczema and a number of other skin disorders, including dermatitis, seborrheic dermatitis/cradle cap, varicose eczema, psoriasis, lichen planus, and acne rosea. The skin is rendered stronger and more resistant to bacterial, viral, and fungal problems by utilising hemp seed oil. To control scabies, afflicted regions are massaged with crushed leaves [31].

- ***Echinacea angustifolia***

Common name: Purple cone flower

Family: Asteraceae

Skin conditions like boils, sores, ulcers, burns, herpes, haemorrhoids, and psoriasis have all been treated with echinacea. Echinacea is available in tablet, liquid, and tea form [32]. Patients in a trial to assess the response of cutaneous warts significantly decreased after oral administration containing methionine, Echinacea, zinc, probiotics, and various immune-boosting and antioxidant ingredients [33].

The *Propionibacterium acnes* (the primary cause of acne) standard laboratory strain and many clinical isolates were quickly eliminated by the herbal extract of *E. purpurea*. The *E. purpurea*, however, fully undid this impact and restored the cytokine levels to baseline. Thus, by preventing the organism's reproduction and correcting the bacterially-induced inflammation, Echinaforce® may treat acne sufferers in two safe ways. [34]

- ***Euphorbia walachii/ Euphorbia hirta/ Euphorbia tirucalli***

Common name: Wallich spurge

Family: Euphorbiaceae

E. walachii juice is used to cure skin diseases and warts [35]. Different *Euphorbia* species, *E. hirta* showed the best antioxidant activity were included in a study. The plant extracts had greater efficacy against fungus and Gram-positive bacteria. In terms of

antibacterial activity, *E. tirucalli* excelled.

The research backed with the traditional usage of *E. hirta* and *E. tirucalli* to treat little epidermis conditions brought on by aerophilous stress or bacteria. [36]

- ***Lawsonia inermis***

Common name: Henna

Family: Lythraceae

An ancient Middle Eastern shrub called henna is used to decorate palms and toes. In the long-established medical structure, paste of leaf is put on twice a day daily to the infected areas to treat impetigo [37]. Patients with hand and foot disease showed clinical improvement after using the anti-cancer drug capecitabine in combination with henna, which has anti-inflammatory, antipyretic, and analgesic properties [38].

- ***Matricaria chamomile/ Matricaria recutita/ Chamomilla recutita***

Common name: Chamomile

Family: Asteraceae

It promotes the renewal of skin cells and functions as an antioxidant to prevent the skin from oxidative injury. Unstable molecules of cells are a poisonous oxygen side effect product of biological breakdown. There have been reports of hypersensitive reactions, and people who are hypersensitive to daisies may also be allergic to chamomile [32]. Chamomile cream and 0.25% hydrocortisone cream were found to be equally successful in curing eczema in a controlled research

including 161 people [39]. In a double-blind investigation, hydrocortisone cream or witch hazel cream were found to be more effective at relieving skin inflammation than chamomile cream [40]. Finally, 50 women attending radiation diffusion therapy for breast cancer were arbitrarily given to sustain chamomile or a placebo in a single-blind experiment. For reducing radiation-induced skin irritation, chamomile did not outperform the placebo. [41]

- ***Portulaca oleraceae***

Common name: Purslane, Pigweed, Little Hogweed

Family: Portulacaceae

The plant provides chilling, soothing characteristics that naturally relieve epidermis irritations and rashes in the sweltering heat. A potent mixture of the leaves can be used to treat burns and skin abrasions like pustules and blisters. The aqueous extract may be applied topically to the skin and is efficient against germs and fungi [42]. Externally, it is used to treat abscesses, eczema, pruritis (itchy skin), burns, earaches, insect stings, inflammations, skin sores, ulcers, and pruritis. These conditions are often treated with a poultice made from fresh herb or the expressed herb juice [42]. The leaves are mashed up, combined with oil, and knotted on boils in Ghana [43]. As a treatment for skin conditions and acne, the leaves are

occasionally consumed alongside tiger nuts (*Cyperus esculentus*). Using hairless mice, an extract from this plant was also found to be useful in treating AD [44].

- ***Rosmarinus officinalis***

Common name: Rosemary

Family: Labiatae

In many regions of the world, rosemary is a common houseplant. It is used to flavour food, drinks, cosmetics, and other products. Caffeic acid and its by-products, such as rosmarinic acid, are the key components of rosemary. These substances have antioxidant properties. Long-term clinical symptoms including photo-aging and photo-cancers are caused by chronic UV exposure. It has been demonstrated that *R. officinalis* extract is helpful in lowering UV-induced cutaneous photodamage.[45] Atomic force microscopy was used in a different study to detect the prevention of bacterial growth of rosemary essential oil in case of *P. acnes*. AFM noted prominent modification in the size and morphology of *P. acnes* in reaction to essential oil therapy. The bacterium that causes acne, *P. acnes*, has also been shown to be resistant to rosemary oil [46]. When rosemary leaf extract was applied to mouse skin, it prevented benzo(a)pyrene from binding covalently to epidermal DNA and prevented B(a)P and DMBA from causing tumours to grow [47].

- ***Sarco asoca***

Common name: Ashoka

Family: Caesalpinaceae

The mixture of roots in form of paste works well to cure skin issues like freckles, rashes, and ulcers. It helps to ease the itching brought on by redness on skin, itching, psoriasis, inflammation of dermis, and visarpa by putting the squeezed flower to the epidermis. For the treatment of pruritis, scabies, and tinea pedis, it is a favoured plant [48].

- ***Thyme vulgaris***

Common name: Thyme

Family: Lamiaceae

It might help with cellulitis manifestation, which include skin reddening, soreness, tenderness, edoema, fever, and chills. Cellulitis is a bacterial infection that can produce these symptoms. Additionally, it might be beneficial for bacterial and fungal infections [49].

- ***Avena sativa L.***

Common name: Oat

Family: Poaceae

Numerous clinical studies investigating the impact of oats on skin infection have been conducted, and the results of all of them have demonstrated a considerable reduction in epidermis erythema, dryness, flakiness, tickling, and redness following oat extract application. By blocking the release of arachidonic acid from phospholipids and its following conversion into prostaglandin and leukotrienes, a blend of oat extract indicates

prevention of inflammation outside the body on skin [50]. Apart from this, it prevented the declaration of the enzymes cyclooxygenase (COX-2) and phospholipase A2 (PLA2).

- ***Hyperici herba***

Common name: St. John's wort

Family: Hypericaceae

The reduction of mice's ear oedema caused by croton oil demonstrated the anti-inflammatory action of *Hyperici herba* extracts and pure components in vivo; the lipophilic extract was the most effective compound. The lymphocytic response in the skin and the expansion of local T cells were all inhibited by *Hyperici herba* extract that also included hyperforin and by an ointment made from a 1: 9 alcoholic extract of this herb. In individuals with slight to diminish allergic eczema, the cream systematize to 1.5% hyperforin phytomarker concentration better the situation of epidermis and decrease in epidermis colonisation by *S. aureus* bacteria clearly better than placebo [51]. For the prevention and curing of small wounds, burns, and skin boils, *hypericin herba* liquid extract is applied topically [52].

- ***Salviae folium***

Common name: Sage leaf

Family: Lamiaceae

Activities like prevention from inflammation, control of spread of bacteria and astringent effects are all present in sage leaf. Inside and outside the skin studies have

demonstrated the prevention of inflammation by ursolic and rosmarinic acids. In vivo, croton oil-induced mouse ear oedema was interrupted by sage leaf extracts in a dose-dependent manner. Traditional herbal medicine made from sage leaf is used to cure bacterial epidermis infections and minor skin inflammations. Oleanolic acid also has anti-inflammatory properties, but these were less pronounced. Sage oil shown bactericidal and fungicidal effects in vitro as seen in microbial studies. [53]

- ***Curcuma Longa***

Common name: Turmeric

Family: Zingiberaceae

Curcumin, the active ingredient, is thought to have a diversity of living outcomes, including prevention of inflammation, protection of cells from damage by free radicals, anti-tumor, anti-bacterial, and antiviral ones that have application in clinical treatment. People typically use it as eczema therapy. The primary component of turmeric, curcumin, appears to have anti-inflammatory and antibacterial characteristics, which may help cure skin irritation caused by eczema [54].

CONCLUSION

Using herbs to treat different skin conditions holds a lot of potential. Indians treat skin diseases with a variety of plant-based treatments and traditional medicine, which is used by more than 80% of the population. Since they are significantly less expensive

than biomedicine, they could be of important assistance to India's community as a whole and to impoverished people precisely. A number of conditions of skin, from allergic rashes to severe skin cancer, can be treated additionally safely and economically with herbs because they contain many active components. Cutting down of forests, degradation of habitat, non-agricultural, and other man-made activities could pose a serious ultimatum to these kind of species because majority of the plant that are efficient at treating skin problems are typically restricted to forests. Depends on in vitro and in vivo clinical and pharmacological tests, the majority of herbal treatments now on the market are used to cure inflammatory skin diseases. However, some of them are only utilised because they have prolonged been used conventionally in inhabitants medicine.

REFERENCES

- [1] Wolf R, Oumeish OY, Parish LC, Intertriginous eruption, Clin Dermatol. 2011, Mar-Apr, 29(2), 173-9.
- [2] Kalra MG, Higgins KE, Kinney BS, Intertrigo and secondary skin infections, Am Fam Physician. 2014, Apr 01, 89(7), 569-73.
- [3] Yosipovitch G, Tur E, Cohen O, Rusecki Y, Skin surface pH in intertriginous areas in NIDDM

- patients, Possible correlation to candidal intertrigo, Diabetes Care, 1993 Apr, 16(4), 560-3.
- [4] Metin A, Dilek N, Bilgili SG, Recurrent candidal intertrigo: challenges and solutions, Clin Cosmet Investig Dermatol. 2018, 11, 175-185.
- [5] Tüzün Y, Wolf R, Engin B, Keçici AS, Kutlubay Z, (July–August 2015). "Bacterial infections of the folds (intertriginous areas)", Clinics in Dermatol. 2015, Jul-Aug, 33 (4), 420–8.
- [6] Mistiaen P, Poot E, Hickox S, Jochems C, Wagner C, Preventing and treating intertrigo in the large skin folds of adults: a literature overview, Dermatol Nurs. 2004, 16, 43-6.
- [7] Dohvoma C, Hutchison I, Calvert M, Labiamental intertrigo. An indication for orthognathic surgery, Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1995, 79, 551-3.
- [8] Chiriac A, Murgu A, Coroş MF, Naznean A, Podoleanu C, Stolnicu S. Intertrigo Caused by *Streptococcus pyogenes*, J Pediatr. 2017 May, 184, 230-231
- [9] Laube S, Farrell AM, Bacterial skin infections in the elderly: diagnosis and treatment, Drugs Aging 2002, 19, 331-42
- [10] Honig PJ, Frieden IJ, Kim HJ, Yan AC, Streptococcal intertrigo: an underrecognized condition in children, Pediatrics 2003,112, 1, 1427-9.
- [11] Calikoglu E, Soravia-Dunand VA, Perriard J, Saurat JH, Borradori L, Acute genitocrural intertrigo: a sign of primary human immunodeficiency virus type 1 infection, Dermatol. 2001, 203, 171-3.
- [12] Guitart J, Woodley DT, Intertrigo: a practical approach, Compr. Ther. 1994, 20, 402-9.
- [13] Aste N, Atzori L, Zucca M, Pau M, Biggio P, Gram-negative bacterial toe web infection: a survey of 123 cases from the district of Cagliari, Italy, J Am Acad Dermatol. 2001,45, 537-41.
- [14] Janniger CK, Schwartz RA, Seborrheic dermatitis, Am Fam Physician 1995, 52, 149-55, 159-60.
- [15] Wolf R, Elman M, Brenner S, Drug-induced “intertrigo.”, Int J Dermatol. 1993, 32, 516-6.
- [16] Sibbald RG, Kelley J, Kennedy-Evans K-L, Labrecque C, Waters N, A practical approach

- to the prevention and management of intertrigo, or moisture-associated skin damage, due to perspiration: expert consensus on best practice, *Wound Care Canada*, 2013, 11(2), 36-43.
- [17] Voegeli D, Intertrigo: causes, prevention and management, *British Journal of Nursing*. 2020, Jun 25, 29(12), 16-22.
- [18] Hoeger PH, Stark S, Jost G, Efficacy and safety of two different antifungal pastes in infants with diaper dermatitis: a randomized, controlled study, *J Eur Acad Dermatol Venereol*. 2010 Sep, 24(9), 1094-8.
- [19] Chakraborty A, Brantner A, Mukainaka T, Nobukuni Y, Kuchide M, Konoshima T, *et al.*, Cancer chemopreventive activity of *Achyranthes aspera* leaves on Epstein-Barr virus activation and two-stage mouse skin carcinogenesis, *Cancer Lett*. 2002, 177, 1-5.
- [20] Shams-Ghahfarokhi M, Shokoohamiri MR, Amirrajab N, Moghadasi B, Ghajari A, Zeini F, *et al.* In vitro antifungal activities of *Allium cepa*, *Allium sativum* and ketoconazole against some pathogenic yeasts and dermatophytes, *Fitoterapia*. 2006, 77, 321-3.
- [21] Das I, Saha T, Effect of garlic on lipid peroxidation and antioxidation enzymes in DMBA-induced skin carcinoma, *Nutrition*. 2009, 25, 459-71.
- [22] Kim J, Lee Is, Park S, Choue R, Effects of *Scutellariae radix* and *Aloe vera* gel extracts on immunoglobulin E and cytokine levels in atopic dermatitis NC/Nga mice, *J Ethnopharmacol*. 2010, 132, 529-32.
- [23] Kaufman T, Kalderon N, Ullmann Y, Berger J, *Aloe vera* gel hindered wound healing of experimental second-degree burns: A quantitative controlled study, *J Burn Care Rehabil*. 1988, 9, 156-9.
- [24] Miller MB, Koltai PJ, Treatment of experimental frostbite with pentoxifylline and *aloe vera* cream, *Arch Otolaryngol Head Neck Surg*. 1995, 121, 678-80.
- [25] Olsen DL, Raub W, Jr, Bradley C, Johnson M, Macias JL, Love V, *et al.*, The effect of *aloe*

- vera gel/mild soap versus mild soap alone in preventing skin reactions in patients undergoing radiation therapy, *Oncol Nurs Forum*. 2001, 28, 543–7.
- [26] Joshi AR, Joshi K, Ethnomedicinal plants used against skin diseases in some villages of Kali Gandaki Bagmati and Tadi Likhu watersheds of Nepal, *Ethnobotanical Leaflet*. 2007, 11, 235–46.
- [27] Arora N, Bansal MP, Koul A, *Azadirachta indica* exerts chemopreventive action against murine skin cancer: Studies on histopathological, ultrastructural changes and modulation of NF-kappaB, AP-1, and STAT1, *Oncol Res*. 2011, 19, 179–91.
- [28] Rasheed A, Shama SN, Joy JM, Reddy BS, Roja C, Formulation and evaluation of herbal anti-acne moisturizer, *Pak J Pharm Sci*. 2012, 25, 867–70.
- [29] Fonseca YM, Catini CD, Vicentini FT, Nomizo A, Gerlach RF, Fonseca MJ, Protective effect of *Calendula officinalis* extract against UVB-induced oxidative stress in skin: Evaluation of reduced glutathione levels and matrix metalloproteinase secretion, *J Ethnopharmacol*. 2010, 127, 596–601.
- [30] Fuchs SM, Schliemann-Willers S, Fischer TW, Elsner P, Protective effects of different marigold (*Calendula officinalis* L.) and rosemary cream preparations against sodium-lauryl-sulfate-induced irritant contact dermatitis, *Skin Pharmacol Physiol*. 2005, 18, 195–200.
- [31] Olsen DL, Raub W, Jr Bradley C, Johnson M, Macias JL, Love V, et al., The effect of *aloe vera* gel/mild soap versus mild soap alone in preventing skin reactions in patients undergoing radiation therapy, *Oncol Nurs Forum*. 2001, 28, 543–7.
- [32] Renu S, Treatment of skin diseases through medicinal plants in different regions of the world, *Int J Compr Pharm*. 2010, 4, 1–4.
- [33] Cassano N, Ferrari A, Fai D, Pettinato M, Pellè S, Del Brocco L, et al., Oral supplementation with a nutraceutical containing Echinacea, methionine and antioxidant/immunostimulating compounds in patients with cutaneous viral warts, *G Ital*

- Dermatol Venereol. 2011, 146, 191–5.
- [34] Sharma M, Schoop R, Suter A, Hudson JB, The potential use of *Echinacea* in acne: Control of *Propioni bacterium* acnes growth & inflammation, Phytot her. Res. 2011, 25, 517–21.
- [35] Tantray MA, Tariq KA, Mir MM, Bhat MA, Shawl AS, Ethnomedicinal survey of shopian, Kashmir (J and K), India, Asian J Tradit Med. 2009, 4, 1–6.
- [36] Chanda S, Baravalia Y, Screening of some plant extracts against some skin diseases caused by oxidative stress and microorganisms, Afr J Biotechnol. 2010, 9, 3210–7.
- [37] Kingston C, Jeeva S, Jeeva GM, Kiruba S, Mishra BP, Kannan D, Indigenous knowledge of using medicinal plants in treating skin diseases in Kanyakumri district, Southern India, Indian J Tradit Knowl. 2009, 8, 196–200.
- [38] Yucel I, Guzin G, Topical henna for capecitabine induced hand-foot syndrome, Invest New Drugs. 2008, 26, 189–92.
- [39] Aertgeerts P, Albring M, Klaschka F, Nasemann T, Patzelt-Wenzler R, Rauhut K, et al., Comparative testing of Kamillosan cream and steroidal (0.25% hydrocortisone, 0.75% fluocortin butyl ester) and non-steroidal (5% bufexamac) dermatologic agents in maintenance therapy of eczematous diseases, Z Hautkr. 1985, 60, 270–7.
- [40] Patzelt-Wenzler R, Ponce-Pöschl E, Proof of efficacy of Kamillosan(R)cream in atopic eczema, Eur J Med Res. 2000, 5, 171–5.
- [41] Maiche AG, Gröhn P, Mäki-Hokkonen H, Effect of chamomile cream and almond ointment on acute radiation skin reaction, Acta Oncol. 1991, 30, 395–6.
- [42] Leung AY, Foster's Encyclopedia of Common Natural Ingredients used in Foods, Drugs and Cosmetics, John Wiley, Wiley-Interscience 2 nd ed. 1996
- [43] Quisumbing E, Quezon City, Phillipines, Medicinal Plants of the Phillipines, Katha Publishing Company, JMC Press, 1978,
- [44] Lim YY, Kim HM, Park WS, Kim JH, Shin HJ, Kim MN, et

- al., Anti-inflammatory and anti-pruritic effects of *Portulaca oleracea* L. extract using *in vitro* and *in vivo* inflammation model: LPS-treated raw264.7 cells, keratinocytes, NC/Nga mice and hairless SKH-1 mice, Korean J Asthma Allergy Clin Immunol. 2011, 31, 199–206.
- [45] Martin R, Pierrard C, Lejeune F, Hilaire P, Breton L, Bernerd F, Photoprotective effect of a water-soluble extract of *Rosmarinus officinalis* L. against UV-induced matrix metalloproteinase-1 in human dermal fibroblasts and reconstructed skin, Eur J Dermatol. 2008, 18, 128–35.
- [46] Fu Y, Zu Y, Chen L, Efferth T, Liang H, Liu Z, et al., Investigation of antibacterial activity of rosemary essential oil against *Propionibacterium acnes* with atomic force microscopy, Planta Med. 2007, 73, 1275–80.
- [47] Huang MT, Ho CT, Wang ZY, Ferraro T, Lou YR, Stauber K, et al., Inhibition of skin tumorigenesis by rosemary and its constituents carnosol and ursolic acid, Cancer Res. 1994, 54, 701–8.
- [48] Cibin TR, Devi DG, Abraham A, Chemoprevention of two-stage skin cancer *in vivo* by *Saraca asoca*, Integr Cancer Ther. 2012, 11, 279–86.
- [49] Renu S. Treatment of skin diseases through medicinal plants in different regions of the world, Int J Compr Pharm. 2010, 4, 1–4.
- [50] Blumenthal M, Goldberg A, Brinckann J, *Oat straw*. Newton: American Botanical Council, 2000, Herbal medicine. Expanded Commission E Monographs, 281–2.
- [51] Schulz V, Hänsel R, Blumenthal M, Tyler VE, Rational phytotherapy, Berlin Heidelberg: Springer-Verlag, 2004, 335–47.
- [52] WHO, *Herba hyperici*. Geneva: World Health Organization, 2002, Monographs on selected medicinal plants, 149–71.
- [53] European Scientific Cooperative on Phytotherapy. *Salviae officinalis folium*, 2nd ed, New York: Thieme, 2003, ESCOP Monographs, 452–5.
- [54] Benzie IFF, Wachtel-Galor S, Boca Raton (FL) (2011) CRC

Press/Taylor & Francis, Philip
D, Shenefelt, Herbal Medicine:
Biomolecular and Clinical
Aspects, 2nd edition.