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Review Article

IMPORTANCE OF HERBAL COSMOCEUTICALS IN MANAGEMENT OF SUNBURN

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ABSTRACT

The use of Herbal cosmoceuticals increases day by day. They are used in the number of skin problems. But Now the days it was seen that their acceptance increased in sunburn treatment. Sunburned skin is one of the major risk factors for melanoma and non-melanoma skin cancers. Therefore, Protection against exposure to UV rays is an important matter of concern. When UV radiations absorbed by the skin surface they produce harmful compounds called free radicals or reactive oxygen species (ROS), which can lead to cause skin cancer or premature ageing of the skin. To reduce the generation and damage of reactive oxygen species, researchers recommend the use of sunscreen to protect the skin from harmful UVR. Many herbal sunscreen formulations are available in the market and adopted by hypersensitive people. Some of them are Portulacaoleracea, Solanumlycopersicum, Aloe vera, Malusdomestica and Peumusboldus Molina. In this article, we discuss some easily available herbs and other measures for effective treatment. Some preventive methods are also discussed in this article.

Keywords: Ultraviolet rays, herbal cosmoceuticals, sunburn, skin types and antioxidant activity.

INTRODUCTION

A sunburn is a condition occurs due to overexposure of living tissue, such as skin to ultraviolet radiation from the sun. The manifestation caused by sunburn are red to reddish skin that is hot to touch, excess exposure can be life-threatening and may lead to skin cancer[1]. Inflammation due to sunburn some time considered an endpoint in many photo biologic studies. Suntan is a condition which occurs when the skin is exposed to a moderate amount of UV radiation. The solar ultraviolet (UV) radiation reaching the earth's surface is increasing because of the depletion of the ozone layer[2]. Chronic solar UV radiation induces several biological responses including the development of erythema, edema, sunburn cell, hyperplastic response, photoaging, and skin cancer. The UV radiation is considered to be a major factor causing skin cancer and other skin and eye diseases[3]. Ultraviolet radiation consists of UVA (320-400 nm), UVB (280-320 nm) and UVC (200-280 nm). Overdose of UVA may cause acceleration of skin ageing, and promote photo dermatosis and phototoxic reactions. Overdose of UVB leads to acute and chronic reactions, which may lead to skin damage, reddening or sunburn, increase risks of melanoma, eye damage, and even DNA damage case of high dosage[4]. Most UVC cannot reach the earth's surface[5]. The short duration of sun exposure is important for vitamin D production [6] and protects against certain internal cancers[7]. Now the day's various herbal cosmoceuticals are utilized for the treatment of sunburn and suntan.

Symptoms of Sunburn

The major symptom of sunburn is shown as initial redness (erythema), followed by varying degrees of pain. The severity of symptoms is proportional to both the duration and intensity of exposure. Other symptoms include edema, itching, peeling skin, rash, nausea, fever, chills, and syncope. Also, the person feels a warm sensation at the affected area due to the heat radiated from the sunburn.

Skin types

As we all know there are four basic types of skin (Table no.1). The type of skin depends upon genetic factors but some external and internal factors also play an important role.

TARGETS OF HERBS TO PREVENT SKIN AGING

Extrinsic skin ageing is a process which depends on the sun exposure and pigmentation of the skin. With the exposure to UV radiation, epidermis becomes acanthotic with a reduction in the collagen and gradual disintegration of elastic fibres. The phenomena occurring at a molecular level for photo-ageing include cell signalling, mitochondrial damage, protein oxidation and shortening of telomeres etc.

Table 1: Skin types and features

Skin type	Features
Normal	No visible pores Smooth texture Soft skin Even tone No greasy patches
Dry	Tight skin Low level of sebum Dehydrated skin
Oily	Dark color skin Pimples Shiny and thick skin
Combination	T-zone oily

UV radiation triggers the formation of Reactive Oxygen Species (ROS) which decreases the activity of enzyme tyrosine phosphatase. This particular enzyme suppresses the cell surface receptor binding proteins, such as epidermal growth factor (EGF), interleukin (IL)-1, keratinocytes growth factor and tumour necrosis factor (TNF)-α. Further, UV radiation also induces nuclear factor (NF) κB and via neutrophil recruitment and release of matrix metalloproteinase which further increases the matrix degradation.UV radiation affect on electron transport chain of mitochondria produces ROS that can damage mitochondrial DNA. This process leads to lower the production of ATP from mitochondria. ROS also affects proteins of the epidermis and alter their normal functions. Damage of proteins due to ROS may result in loss of structural proteins and increased susceptibility to degradation. Telomeres are the tandem repeat of short sequence (TTAGGG). This sequence exists in the loop. UV irradiation causes shortening of telomeres by changing in the loop configuration leading to the interaction with Werner protein, which triggers the tumor suppressor protein p53 expression and other proteins to induce apoptosis. Natural aging is also known as intrinsic aging involving similar mechanisms as that of extrinsic aging. Usually, hormonal changes and ROS play notable roles in

chronological aging. Lower secretion of androgens and estrogens causes wrinkling, dryness, epidermal atrophy, and decrease in elasticity of collagen. Therefore, development of herbal products should be aimed at targeting maximum of these alterations associated with skin aging.

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Prevention of Skin ageing due to UV

The extreme exposure to sun rays and pigmentation of skin leads to skin ageing. The UV exposure of skin leads to a reduction in collagen, gradual disintegration of elastic fibers and also triggers the formation of reactive oxygen species (ROS). The ROS production causes a decrease in the activity of tyrosine phosphate. This enzyme subdues the cell receptor-binding protein, like tumor necrosis factor, epidermal growth factor, keratinocytes and interleukin. The UV radiation also affects the mitochondrial electron transport chain which produces ROS. The ROS cause alternation in epidermis functions, loss of structural proteins which increases the susceptibility to degradation. The shortening of telomeres by UV radiations triggers the tumor suppressor. Therefore, herbal cosmoceuticals are developed to prevent extrinsic skin ageing.

Benefits of Herbal Cosmoceuticals in Photoprotection

Many people suffering from skin hypersensitivity don't want to use chemical sunscreens due to concern about skin exposure to unfamiliar chemicals. Although a variety of hypoallergenic sunscreen products are available for customers with sensitive skin, still options are limited sunscreen agents. Now, researchers have claimed that sunscreen having herbal components are more suitable for hyperallergic skin patients because they are less irritant and easily adjustable to skin. Topical cosmetic formulations are often most prescribed by family physicians and dermatologists for sunburn. Patients feel more comfortable while using topical therapies as compare to other treatments because they have milder side effects, easier to use, generally less expensive and are more readily available[8]. Herbal cosmetics must have one or more active sunscreening agent with antioxidant properties to achieve good photoprotection effect.

Some Important Herbal Photoprotective Agents

Important constituents of photo protecting agents are incorporated in a cream base at different concentrations and widely used as herbal sunscreen cosmetics (Table no.2). Some Plants with photoprotective properties are discussed below:

Herbal Photoprotective Agents
Aloe vera
Allium sativum
Allium sativum
Allium sativum
Allium sativum
Allium sativum
Allium cepa
Ctrus lemon
Corcussativus
Coriandrumsativum
Calendula officinalis

Table 2: Herbal Photoprotective Agents [14]

Portulacaoleracea

*Portulacaoleracea*also known as *red root* is an annual succlent annual and belongs to family *Portulacaceae*, which may reach 40 cm (16 in) in height. The stems are smooth, red colour and grow along the ground, whereas the leaves are arranged in alternate or opposite position around the stem [10]. Sanja*et al* has proved that, the antioxidant activity of the methanolic extract of *Portulacaoleracea* using methods such as DPPH free radical-scavenging, reducing power estimation by FeCl3, nitric oxide free radical scavenging, superoxide scavenging activity[11].

Solanumlycopersicum

Fruit of *Solanumlycopersicum* is widely using in the treatment of sunburn (Fig.no.1). The constituent Lycopene is responsible for the activity[12].

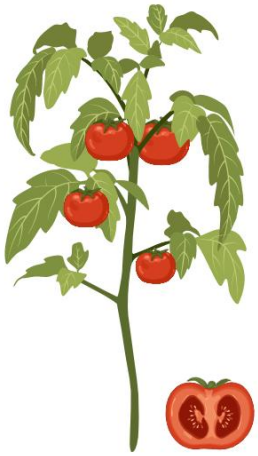

Fig.1: Solanumlycopersicum.

Aloe vera

The Aloe vera leaves(*A. barbadensis*) belongs to family *Liliaceace* is the source of *Aloe vera* gel (Fig.no.2). Aloe vera gel is obtained from them. The anthraquinones containing sap of *Aloe vera* is not included in the gel. For its moisturizing and revitalizing properties, the gel is used in cosmetic and toiletry products.[13,14]. The *Aloe vera* leaf helps in the cellular repairing and also in digestion, assimilation of foods, minerals, vitamins and other important nutrients to add some zest to the skin[15].

Malusdomestica

It is commonly known as Apple (Fig.no.3.). The Trees are cultivated worldwide and are the most widely grown species in the genus Malus. Quercetin, Epicatechin are two constituent of fruit, use for its antioxidant activity[16].

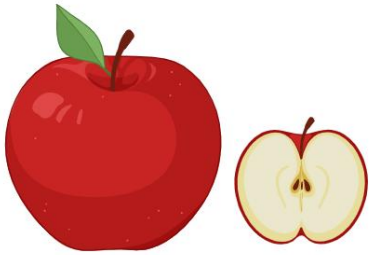

Fig. 2:Malusdomestica

Terminaliachebula

Also known as *Harde*. It belongs to the family *Combertaceae*. Widely used as a cardiotonic, laxative and in many other health supplements Gallic acid, ellagic acid and ascorbic acid are some important constituents of *Terminaliachebula* are known to possess free radical scavenging properties.

Peumusboldus Molina

Peumusboldus tree belonging to the family *Monimiaceaeis*now widely recognized as a herbal remedy by several Pharmacopoeias. Leaves of *Peumusboldus* are rich in several aporphine-like alkaloids, among them, boldine, which is the most abundant one [17]. During the early 1990s, research claimed boldine as one of the most potent natural antioxidants found in this plant.

Calendula officinalis

It is also known as marigold, belongs to the family *Asteraceae*. It prevents UV-B mediated changes in skin and shows antioxidant activity.

Coffea Arabica

Also known as coffee, belongs to family *Rubiacese*. Seeds are popularly known as coffee beans. The *Coffea Arabica* protect skin from wrinkles and photo-damaging.

The basic for sun protection

There are some basic approaches for protection some of them are discussed here:

- Use sunglasses to protect eyes
- Limit or avoid exposure during peak hours of afternoon
- Use head to protect neck, face and eye
- Use sunscreen
- Avoid dehydration

Major methods for sunburn treatment or prevention

Ibuprofen and Aspirin are popular pain reliever which reduces the inflammation around the sunburn, as well as pain. An anti-inflammatory paste can be used as well. Aloe vera, cortisone cream, etc. can be applied topically on the skin to get some relief from the irritation and the sunburn (Fig.no.3).

Cooling relief

Have a cool water bath or a very gentle shower. Avoid using soap, bath oils, or other detergents during bath or shower. These products will irritate your skin and possibly make the effects of the sunburn feel even worse.

Fig. 3: Methods for sunburn treatment or prevention.

Keeping hydrated

Drink lots of water. Sunburn is often dehydrating, therefore it is important to counterbalance this by drinking a great deal of water. Aim for eight glasses containing eight ounces/236ml of water daily.

Protecting sunburned skin

Protect your skin from sunburn if you're going outside. Ideally,use shade or wear clothing over affected areas if you're going back out into the sunshine. If you can't avoid exposing your skin, cover the burn with a thin layer of Aloe vera and put some SPF-45 sunscreen on it to protect the skin from further damage.

Topical applications for relief

Aloe vera should be used on the burned skin. Different gels and lotions can be obtained from the market that contains aloe vera or it can be peeled off from the plant. The aloe should be applied gentlyon the skin with the help of the pads of fingers.

Conclusion

Sunburn mainly occurs due to very hazardous UV radiations. Sunscreen lotions, topical steroids and NSAID's are used for the treatment of sunburn. The pain and stress of the victim can be relieved by using products that provide cooling relief. Various chemical and herbal remedies are available for the treatment. Herbal cosmeceuticals area unit natural merchandise whose ingredients have properties to rejuvenate and defend the skin against the environmental pollution, chemicals, fluctuations in atmospheric temperature, Ultraviolet A& B radiations, wrinkling, hyperpigmentation (excessive tanning) and inflammations. This review focuses on scientific account on the use of herbs in cosmetics.

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