

HARMFUL EFFECTS OF UV RADIATION AND NATURAL TREATMENT

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Abstract

As the skin is the largest organ of the human body, the importance of maintaining homeostasis and protecting the skin from ultraviolet radiation is essential. Neglecting it can result in wrinkles, hair loss, blisters, rashes, life-threatening cancers, and disorders in immune regulation. UV radiation enormously influences the skin; causing maturing, sun related burns, precancerous and destructive injuries, and immunosuppression. UV radiation immunosuppressive affects the antigen-introducing cells inside the epidermis and adds to the probability of skin disease. There are three sorts of UV radiation: UVC, UVB, and UVA. The ozone layer ingests 100 percent of UVC, 90% of UVB, and an insignificant measure of UVA. Hence, the consumption of the ozone layer expands UV transmission. Aloe vera is a strong, enduring, tropical, dry season safe, delicious plant having a place with the Liliaceae family which, generally has been utilized for an assortment of therapeutic purposes. Cucumber extract has strong moisturizing abilities as well as mild astringent effects. It also helps remove dead skin cells and tightens skin.

Keywords: Homeostasis, Ultraviolet, Immunosuppressive, Aloe vera, Cucumber.

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INTRODUCTION

As the skin is the largest organ of the human body, the importance of maintaining homeostasis and protecting the skin from ultraviolet radiation is essential. Neglecting it can result in wrinkles, hair loss, blisters, rashes, life-threatening cancers, and disorders in immune regulation.

There are three types of UV radiation: UVA, UVB, and UVC. UVC is not as much of a concern because its rays are

blocked by the ozone layer and therefore do not reach the earth's surface. Photoprotection from both UVA and UVB radiation is more of a concern for patients. Continuous and prolonged exposure to (UV) rays over numerous years is the main source of skin malignant growth i.e., skin cancer and many other skin related diseases. The expanded rate of skin disease throughout the most recent ten years is emphatically connected with the

developing appreciation for outside exercises & recreational sun exposure. Increased exposure to sunlight is also the leading cause of detrimental effects on the skin, eye, and immune system.

There is understanding between the scientific and medical orders that exposure to daylight is a principle motivation to harm the skin. An electromagnetic radiation in daylight called Ultraviolet (UV). The UV rays having wavelength below 320nm are responsible for the most of the therapeutic as well as toxic effects that are attributing to sunlight. Therefore protection from these rays is an issue of concern and sunscreen having SPF are used for these purpose.

UV light is manually partitioned into three territories: UVA (320-400 nm), UVB (290-320 nm), what's more UVC (200-290 nm). Sunscreens are the most well-known product that utilized for skin insurance against sunlight based UVB radiation which causes burn from the sun, photoaging, skin disease like Cancer, formation of telangiectasia, and pigmentation irregularities. Both UVA and UVB can cause sunburn, photo ageing, erythema and inflammation. Generally, UVC does not have harmful effects on the skin.

Reason behind using sunscreen is to make the skin healthier and radiation free, our purpose is to make the sunscreen more natural and herbal so that the product remains chemical free and have less adverse and side effects as well as be more effective compare to another chemical based sunscreen.

UV radiation enormously influences the skin, causing maturing, sun related burns, precancerous and destructive injuries, and immunosuppression. UV radiation immunosuppressive affects the antigen-introducing cells inside the epidermis and adds to the probability of skin disease. There are three sorts of UV radiation: UVC, UVB, and UVA. The ozone layer ingests 100 percent of UVC, 90% of UVB,

and an insignificant measure of UVA. Hence, the consumption of the ozone layer expands UV transmission. UVA is related with maturing and pigmentation. It enters profound into the skin layer and delivers free extreme oxygen species, by implication harming DNA. UVA builds the quantity of fiery cells in the dermis and diminishes the quantity of antigen-introducing cells. UVB causes sun related burn and DNA strand breaks. It causes pyrimidine dimer changes, which are related with nonmelanoma skin diseases.

Major Diseases Caused By Excess Sun Exposer/UV Radiation:

Premature aging and Skin damage:

UV-related skin issues include actinic keratoses and untimely maturing of the skin. Actinic keratoses are skin developments that happen on body regions presented to the sun. The face, hands, lower arms, and the "V" of the neck are particularly vulnerable to this sort of sore. Despite the fact that premalignant, actinic keratoses are a risk factor for squamous cell carcinoma. Search for raised, rosy, unpleasant finished developments and look for brief clinical consideration on the off chance that you find them.

Chronic exposer to the sun additionally causes untimely maturing, which over the long haul can cause the skin to turn out to be thick, crumpled, and rough. Since it happens continuously, frequently showing itself numerous years after most of an individual's sun openness, untimely maturing is regularly viewed as an unavoidable, ordinary piece of becoming older. Be that as it may, up to 90 percent of the noticeable skin changes normally credited to maturing are brought about by the sun. With legitimate security from UV radiation, generally untimely maturing of the skin can be kept away from.

Other skin damage includes:

Suntan/Sunburn:

Suntan or sunburn notify that skin has been damaged or harmed by ultraviolet (UV) rays.

Melanin is the shade that gives skin its tone. Individuals with fair complexion have less melanin than individuals with brown complexion. At the point when skin is harmed by UV beams, the body makes more melanin to attempt to safeguard against additional harm.

Tanning –

Following sun exposure, tanning occurs in a biphasic pattern. Immediate pigmentdarkening (IPD) occurs in minutes, succeeded in days by delayed pigment darkening(DPD). Immediate pigment darkening represents photo-oxidation of preformed melanin, and is due predominantly to UVA.

Sunburn-

A burn from the sun is brought about by over-the-top exposure to the sun's ultraviolet (UV) beams or by exposure to artificial sources of UV beams like tanning beds. The greatest risk factors for burn from the sun includes the span and intensity of exposure. An increase in the quantity of sun related burns experienced straightforwardly connects to a high risk of skin disease

Immune- Suppression:

Researchers have observed that overexposure to UV radiation might smother appropriate working of the body's immune system and the skin's normal guards. For instance, the skin regularly mounts a safeguard against unfamiliar invaders like cancer disease and infections. However, overexposure to UV radiation can debilitate the resistant framework, diminishing the skin's capacity to safeguard against these intruders.

Ultraviolet radiation (UV), specifically the UVB range, smothers the invulnerable framework in more than one way. UVB restrains antigen show, prompts the arrival of immunosuppressive cytokines and causes apoptosis of leukocytes.

Cataract and other Eye damage:

Long periods of exposure to UV beams leads the protein in the focal point of the eye to cluster and thicken, keeping light from going through it. This obfuscating

and thickening of the focal point is known as a cataract, and it is the main source of vision loss.

Cataracts are a type of eye harm in which a deficiency of transparency in the focal point of the eye mists vision. Whenever left untreated, cataracts can prompt visual deficiency.

Research has shown that UV radiation increase the probability of specific cataracts. Although treatable with present day eye a medical surgery procedure, cataracts reduce the vision of millions of people and cost billions in clinical care consideration every year.

Different sorts of eye damage include pterygium (tissue development that can impede vision), skin disease around the eyes, and degeneration of the macula (the piece of the retina where visual insight is generally intense).

These issues can be reduced with legitimate eye protection. Search for shades, glasses or contact focal points assuming you wear them, that offer 99 to 100% UV protection.

Skin Cancer:

Every year, more new instances of skin cancer are analyzed, than new cases of breasts, prostate, lung, and colon diseased cancer combined. One out of five people will foster skin malignant growth in the course of their life. One person dies dust from skin malignant growth(cancer) consistently. Unprotected exposure to UV radiation is the most preventable risk factor for skin cancer.

The main cause of skin cancer is overexposure to sunlight, especially when it results in sunburn and blistering.

Ultraviolet (UV) rays from the sun damage DNA in your skin, causing abnormal cells to form.

These abnormal cells rapidly divide in a disorganized manner, forming a mass of cancer cells.

The major two types of skin cancer caused by UV Radiations are as follows:

Melanoma: Melanoma, the most genuine

type of skin cancer, is presently perhaps the most widely recognized tumors among the adolescents and youthful grown-up ages 15 to 15 to 29. While melanoma represents around three percent of skin malignant growth cases, it causes in excess of 75% of skin cancer death.

UV exposure and burns from the sun, especially during adolescence, are hazard factors for the illness. Not all melanomas are solely sun-related-other potential impacts incorporate hereditary elements and immune system inadequacies.

Nonmelanoma Skin Cancers:

Non-melanoma skin cancer is less dangerous than melanomas. In any case, they can spread whenever left untreated, causing deformation and more genuine medical conditions. There are two essential kinds of non-melanoma skin cancer: basal cell and squamous cell carcinomas. In the event that got and treated early, these two malignant growths are seldom lethal.

Basal cell carcinomas: These are the most well-known kind of skin disease growths. They generally show up as little, plump knobs or knobs on the head and neck however can happen on other skin regions. Basal cell carcinoma develops gradually, and it seldom spreads to different pieces of the body. It can, however, infiltrate deep down in the bones and cause impressive harm.

Squamous cell carcinomas: These are cancers that might show up as knobs or as red, textured patches. This disease can form into enormous masses, and dissimilar to basal cell carcinoma, it can spread to different pieces of the body.

Treatment or Cure for the UV Radiation Induced Diseases:

Some of the basic treatments and prevention are as follows:

Clothing and avoidance-Clothing varies in its ability to block transmission of UVR. Tightknit, dry, darkfabrics are more effective than are loose knit, wet, white garments.

Sunscreens: Physical sunscreens- such as

zinc oxide

Chemical sunscreens- includes SPF (Sun Protection factor), UV Protection factor

Tan accelerators/Tanning agents- These may contain one or more melanin precursors that proceeds to increase the amount of melanin.

Sunburn Therapy

Photoaging Treatment

Education regarding Photoprotection

Natural Agents Used in Treatment for UV Radiation Influenced Diseases:

Studies have shown that there are various natural substances or agents that can relieve or cure sun causing harmful effects and that too without causing any type of major side effects.

These agents are often used in various formulation of natural sunscreen or sunblock preparations.

Aloe Vera Gel:

Aloe vera is a strong, enduring, tropical, dry season safe, delicious plant having a place with the Liliaceae family which, generally has been utilized for an assortment of therapeutic purposes. It plays a tremendous customary part in native arrangement of medication like Ayurveda, siddha, unani and homeopathy.

Clinical assessments have uncovered that the pharmacological dynamic fixings are packed in both the gel and skin of the Aloe vera leaves.

Benefits of Aloe Vera Gel:

Aloe Vera gels are mostly and widely use gel in cosmetics due to its properties i.e.,

- 1.moisturizes the skin
- 2.anti-ageing,
- 3.anti-inflammatory,
- 4.reducing infections like; eczema, psoriasis, Acne and other skin infections.
- 5.cooling effect,
- 6.prevent Sunburn and many more.

Usage of Aloe Vera Gel for Sun Protection: It also blocks the ultraviolet (UV) rays and maintain skin's moisture

balance, the bradykinase enzyme in Aloe Vera stops sunburn, Aloe Vera alone does not provide sufficient amount of sun protection by itself.

Rather the herbal formulation that contains Aloe Vera and Sun Protecting factor (SPF 10-30) will be very much effective in sunscreen Cream.



Figure- Aloe Vera

Aloe Vera matches almost the same pH to the human skin- so with this quality of Aloe Vera gel allows to get absorb and penetrate to human skin quickly and deeply, and this is the reason that it is such an excellent carrier for sunscreen. Using Aloe Vera on skin has many anti-ageing benefits like it is completely full of Vitamin-C, E and beta-carotene which helps in preventing Drying of skin and increase collagen production which helps in decreasing the fine lines and wrinkles.

Aloe vera gel concludes active components :

It contains 75 possibly dynamic constituents: nutrients, catalysts, minerals, sugars, lignin, saponins, salicylic acids and amino acids. Nutrients: It contains nutrients A (beta-carotene), C and E, which are cell reinforcements.

It likewise contains vitamin B12, folic corrosive, and choline.

Cucumber (Cucumissativus) : Cucumber extract has strong moisturizing abilities as well as mild astringent effects. It also helps remove dead skin cells and tightens

skin. Cucumbers soothe skin irritations, prevent water retention and are rich in water, fiber and beneficial minerals. Cucumber also contains ascorbic acid (vitamin C) and caffeic acid, both of which soothe skin irritations. These two acid compounds prevent water retention, which is why cucumbers applied topically are helpful for swollen eyes, burns and dermatitis.



Figure- Cucumber Extract

Usage of Cucumber Fruit's Flesh for Sun Protection

1. Prevents signs of aging
2. Includes vitamins like B5, C, and E
3. Prevents sunburn
4. Instant cooling effect
5. Lightens scars and soothes the skin
6. Hydration of the skin
7. Antioxidant property

Neem (Azadirachta indica): For more than ten decades, the neem tree has been utilized for its restorative medical properties. Neem oil contains numerous constituents like Oleic Acid, Palmitic Acid, Stearic Acid, Linoleic Acid, Vitamin C, and Carotenoids.



Figure- Neem Extract/Oil

Carotenoids can help:

Fix skin harm and indications of maturing brought about by UV radiation, chemicals, or skin inflammation.

Decrease hyperpigmentation brought about by UV radiation, chemicals, or skin inflammation.

A phytochemical investigation discovered that neem leaves contain SPF, demonstrating that neem concentrates could offer security against burn from the sun while additionally assisting with safeguarding the skin.

Neem is now a common ingredient in many natural sunscreens that use safe and natural ingredients to guard against sun damage.

Benefits of Neem Oil:

Anti-aging effect.

Rich in Vitamin C, Stearic Acid, Oleic Acid.

Antibacterial Properties

Treat Wrinkles, Skin Redness, and Water loss.

Fight skin infection.

Evening Primrose Oil:

Evening primrose oil has many important properties that are beneficial to the health of the human skin, the main properties of the evening primrose oil are moisturize, dryness, irritation, roughness and wrinkles, Evening primrose oil is made up of many numbers of different beneficial constituent, which include Omega-6, Omega -9, Stearic acid and also the main ingredient in the evening primrose oil are essential Fatty acids which majorly help in the skin barrier and reduce moisture loss from the skin, this essential fatty acid are those fats that the human body cannot produced on its own, so for this reason the evening primrose oil is taken as an supplement in the sunscreen.

Benefit of Evening Primrose Oil:

Linoleic acid which are found in evening primrose oil is an (Omega-6) have anti-inflammatory properties, promote moisture holding in the skin, also helps to soothe and stop acne and also helps in softening of skin

Oleic acid which are found in evening primrose oil is an (Omega-9) helps to maintain the softness and elasticity of the skin and also have the anti-oxidant properties.

Stearic acid is mainly known for the softening of the skin and also have cleansing properties that help in cancel or eliminate dirt, sweat from the skin.



Figure- Evening Primrose Oil

Soybean Oil:

Soybean (Glycine Max) are nutritious and cost-effective addition to sunscreen, soybean oil mainly contain vitamin-E that acts as a natural sunscreen that mainly helps in absorb Ultra Violet (UVB) rays and helps to reduced skin photo damages. The soybean oil have the antioxidant properties which is rich in essential fatty acids i.e protein, iron, and calcium, It also helps in treat irritation and burns caused sun. Soybean oil is rich in vitamin E, a nutrient that help in promote skin health. Applying the soybean oil topically helps to protect against inflammation and helps the skin to be moisturize. Soybean oil are cost effective moisturizer in compared to other oils.



Figure- Soybean Oil

Benefits of Soybean Oil in Sunscreen:

Natural SPF10

Antioxidants Properties

Vitamin E

Reduce Premature Aging (wrinkles and fine lines)

Moisturizer

Jojoba Oil:

Jojoba is an oil that is mainly produced by the seeds of the *Simmondsia chinensis* plant, which is a shrub. It is mainly found in two forms i.e “jojoba oil” and “jojoba wax” Jojoba oil is a famous ingredient in a few natural sunscreen products. Sun damage can dehydrate human skin which can cause flaking. Jojoba oil restores Vitamin E, adds moisture, and adds healing properties to the skin and protect from sunburns.



Figure- Jojoba Oil

Benefits of Jojoba oil in Sunscreen:

It treats Acne

Reduce Fine lines and Wrinkles

Soothe Sunburns

Antioxidant Properties

Vitamin E

Retains Moisture

Natural Cleanser

Antibacterial Properties

Anti-aging Properties

Red Raspberry Seed Oil:

The incorporation of raspberry seeds oil in cosmetics and pharmaceutical products based on its anti-inflammatory activities notably for the prevention of gingivitis, rash, eczema, and other skin lesions has been patented. Raspberry seed oil extracts

have many pharmacological effects included antimicrobial, antioxidant, anti-inflammatory activity and many other effect. The red raspberry seed oil contain properties that are beneficial to the human skin and body. The red raspberry seed oil is packed with essential fatty acids and vitamin. Its believed to offer protection from sun, which have an natural SPF of 28-50 for UVB and UVC rays, and SPF of 8 for UVA rays.

Benefits of Red Raspberry Seeds Oil:

It absorb UVB and UVC rays, and also an limited protection from UVA rays.

Contains Antioxidant and vitamin A & E

Anti-aging

Reduce Acne.

Skin-Inflammation

Moisturizing

Boost skin Hydration Level.



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Figure- Red Raspberry Seed Oil

Wheatgerm Oil:

Wheat germ oil is mostly used in many natural and herbal formulations as it is very highly nourishing and moisturizing for aging and dry skin, Vitamin and fatty acids present in wheat germ oil helps in repairing scarred, cracked skin. Wheat germ oil is an perfect source of antioxidants which very much helps in improving blood circulation and repairing skin that are usually damaged by the UV rays. The wheat germ oil are popularly known for its Humectant property. That seals the moisture from the skin which

helps in removing excess oil production that latter on leads to pimples and acne.

Benefits of Wheat Germ Oil:

Natural SPF 20

Vitamin E



Figure- Wheat Grem Oil

Coconut Oil:

Coconut is an mostly used ingredient in the cosmetic products, and have proven that coconut oil can effectively block almost around 20 percent of the harmful sunrays that can damage the skin. As per some study the coconut oil have a natural SPF of 30 or may have higher SPF. The study says that that the use of coconut oil in the sunscreen with other ingredients can protect human skin diseases as well fetal skin cancers like melanoma. Coconut along with other ingredient can mainly protect the skin from the UVA and UVB rays.

Benefits of Coconut Oil:

Reduce Inflammation.
Lightens Dark patches.
Hydration for skin
Antibacterial
Antifungal
Moisturizer
Antioxidant
Prevents Acne



Figure- Coconut Oil

Almond Oil:

Almond oil mainly promote heart health, also stabilize blood sugar level and stops free radical damage and helps human to maintain a healthy weight. With this properties, almond oil has an SPF of around 5. Almond contain lot of vitamin which is very useful and helpful for skin protection and healing from the harmful UV rays. The benefits don't end with skin. It contain anti-inflammation and immunity-boosting properties, this properties are very much useful for the summer and colder seasons. Almond oil are rich in Vitamin D, Vitamin C, and various minerals that help soothe the skin from protecting the skin from UV rays, irritation, and also restore skin's moisture barrier.



Figure- Almond Oil

Benefits of Almond Oil:

Reduce Skin Irritation.
Antioxidants
Hydrates Skin.
Contain Natural SPF 5.
Rich in Vitamin E, Vitamin C
Antibacterial
Moisturizer

CONCLUSION:

Since long time back, the use of the chemicals in sunscreens as a sun protecting and photo-protective agent or properties in the formulation is a common practice, getting varies of harmful effects to the skin, now days they are becoming less popular. The use of natural sunscreen has been getting a great attention of

research due to their safety and effective action on the human skin. The additives properties exerted by the phytoconstituent of plant make them the most useful and suitable ingredient of the sunscreen formulation. The plant actives are now used more over the chemical sunscreens due to the broad spectrum of the UVA, UVB, UVC rays, absorption, which may even cause skin Cancer. Use of suncreening agent is beneficial in minimizing the occurrence of skin cancer in people with fair skin. However the same effect on Asian skin is debatable, as this type considered to be resistant to skin cancer. Sunscreen use is advisable in young adults to prevent and minimize other photodamaging effects. Affordability and proper application techniques and the challenges that must be addressed in order to achieve regular sunscreen usage.

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