



Sunscreen: UV radiation and their effect on Skin

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ABSTRACT : Skin is a delicate organ of body, thus by considering the facts related to this attempt are made to develop cream having sun-protective as well as fairness activity with improved user compliances and avoidance of undesirable effect.Sunlight despite of source of life and energy creating major health challenges like sunburn , pigmentation, wrinkles, dermatitis, urticaria, ageing, immune suppression and number of skin cancers too. The topical application of sunscreens (and avoidance of extreme exposure to sun rays) is worldwide recognized as the best strategy to avoid sun burn and edema.The article discusses UV radiation and their effect on skin.

KEYWORDS: Sunscreen, Solar radiation, UV rays, SPF, Sun-protective.

INTRODUCTION :

In India, cosmetic is defined as any article intended to be rubbed, poured, sprinkled, sprayed on, or applied to the human body or any part for cleaning, beautifying, promoting attractiveness or altering the appearance^[1].Now-a-days one cosmetic category sunscreen have gain wide popularity due to additional health benefits apart from beautification^[2,3]. Sunscreen also known as sun cream or sun block, is a topical product that absorbs or reflects some of the sun's ultraviolet radiation and thus help to protect against sunburn, especially for fair-skinned individuals^[4,5]. Diligent used of sunscreen can also slow or temporarily prevent the development of wrinkles or sagging skin^[5,6].

Depending on mode of action, sunscreen can be classified into :

1. Physical sunscreen – Those that reflects the sunlight.
2. Chemical sunscreen – Those that absorb the UV light.

The chemical and physical sunscreen agent act by either absorbing and scattering the solar UVR, respectively. To protect skin well against UVR, both types should be included into the sunscreen product^[7,8].

ULTRA-VIOLET RADIATIONS AND HUMAN SKIN :^[9,10]

Ultraviolet (UV) radiation is defined as that portion of the electromagnetic radiation lies between X-rays and visible light which is from 200 to 400 nm. This ultraviolet radiation comprises 3 categories depending on wavelength as follows:

- **UV-A Radiation:** This radiation ranges between 320 to 400 nm. UV-A is most responsible radiation for immediate tanning or darkening of the skin due to excess production of melanin in the epidermis, premature photo ageing, suppression of immunologic functions, and even necrosis of endothelial cells and damage of dermal blood vessels.
- **UV-B Radiation:** This radiation ranges between 280 to 320 nm. UV-B radiations are known as burning rays as they are 1000 times more capable of causing sunburn than UV-A. UV-B rays act mainly on the epidermal basal cell layer of the skin but more genotoxic than UV-A radiations. Ultraviolet B (UVB) rays vary with time and season are major cause of sunburn. Sunburned skin is a leading risk factor for melanoma and non-melanoma skin cancer.
- **UV-C Radiation:** This radiation ranges between 200 to 280 nm. UV-C radiations are filtered by stratospheric ozone layers so less effective and hazardous.

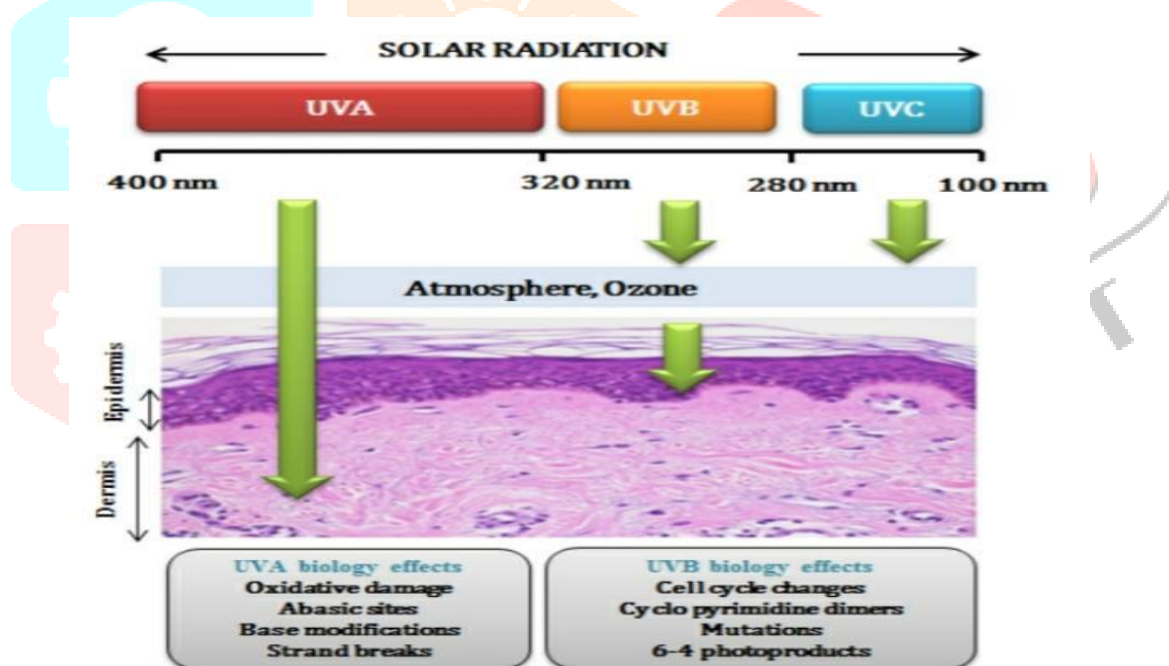


Figure 1 – UV radiation and their biological effect on skin

POSITIVE EFFECT OF UVR :

Exposure to UVR is not always considered bad. In fact, UV from the sun is needed by our bodies to produce vitamin D. Vitamin D helps to strengthen bones, muscles and body's immune system. It may also lower the risk of getting some kinds of cancers such as colon cancer. UV is used in the treatment of skin condition such as psoriasis. This is the condition where the skin sheds its cells too quickly and develops itchy, scaly patches. Exposure to UV shows the growth of the skin cells and relieves the symptoms^[11]. A meta-analysis of randomized

trials found that bright light and dawn stimulation therapies reduce the severity of depression in patient with seasonal affective disorder^[12].

NEGATIVE EFFECT OF UVR :

UV-induced skin damage is one of the most common concerns in the world. Certainly, UVA is a risk of skin ageing, dryness, dermatological photosensitivity and skin cancer. It damages DNA through the generation of reactive oxygen species (ROS), which causes oxidative DNA base modifications and DNA strand breaks^[13,14,15]. On other side, UVB can directly damage DNA through the formation of pyrimidine dimer and then cause apoptosis or DNA replication errors, leading to mutation and cancer^[16]. UVC is the shortest and most energetic wavelength, it is most dangerous type of UV ray because it cause various adverse effects such as mutagenic and carcinogenic^[16]. UV is an environmental human carcinogen. There is very strong evidence that each of the three main types of skin cancer (basal cell carcinoma, squamous cell carcinoma and melanoma) is caused by sun exposure.

Basal cell carcinoma (BCC) is the most common skin cancer and occurs most frequently on the face and head. The incidence of BCC has steadily increased and the lifetime risk of developing BCC is 30 percent^[17]. BCC arises from the basal layer of epidermis and its appendages.

Melanoma is the most serious form of skin cancer. It is most commonly found on areas exposed to UVR, such as the back of the legs in women and backs of men^[18]. Tanning beds have been found to particularly increase a patient's risk of melanoma. Appropriate UVR protection decrease the risk of developing a melanoma or having a secondary melanoma.

SUNSCREEN VEHICLES :^[19]

The vehicle used for sunscreen protection is important to consider because it can affect the strength of UV absorbance.

Oil-in-water and water-in-oil are the most commonly used sunscreens. They are easy to apply and the oil provides the UV absorption. The only drawback is that the lotions may be thick or leave a greasy feel.

Gels are water based therefore they are a good option for people who have oily skin. Gel-based sunscreen are less greasy than oil based but they are more easily removed by perspiration or water.

Cosmetic, such as foundation makeup, helps to provide an everyday protection. The SPF in cosmetic ranges from 4 to 30, foundation makeup also provides some UVA protection.

CONCLUSION : There are some positive effect of UVR but the negative effects can potentially be life threatening. Encouraging photo protectors such as sunscreen is currently the best strategy. It is important to educate the patient towards the effect of UVR on human skin and accordingly how to pick an appropriate sunscreen because this will increase compliance.

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