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Mini Review

A Review on Herbal Sunscreen

Lata Potey*, Vaishnavi Helonde, Milind Buradkar Anjali Durbude, and Saleemuddin Farooqui

Pharmaceutical Chemistry, Shree Sainath College of Pharmacy, India

***Corresponding author**

Lata Potey, Shree Sainath College of Pharmacy, Dawalameti, Nagpur, Maharashtra, India, Tel no: 9822711804

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Abstract

Herbal cosmetics are now become more interesting by people as compared to synthetic cosmetic products. Herbal sunscreen is available in various forms which can be topically available. The objective of this study is to collect current data regarding herbal sunscreens development, to review guidelines for its development and to overview use of herbal extracts and natural molecules in herbal sunscreen. Sunscreen products protect the skin from the sun's ultraviolet (UV) radiation which helps in the reduction of sunburn and other skin problems. Its function is based on its capability to absorb, reflect or scatter the sun's rays. The Sun protection factor (SPF) of a sunscreen is calculated by comparing the amount of time demanded to produce sunburn on sunscreen guarded skin to the amount of time demanded to cause sunburn on unguarded skin. Sun protecting agents are involved in various classes of compounds bearing enormous biological activities like antioxidant, anti-inflammatory, and antimutagenic effect etc. Studies in the research have shown that natural products (herbs) plays the essential role in sun protection by their photoprotective activity such as curcumin, garlic compounds caffeic and ferulic acid, apigenin, genistein, resveratrol, nordihydroguaiaretic acid, carnosic acid, silymarin, tea polyphenols, Capparis spinosa extract. So, this review concluded that the natural sunscreen is safe and easy to use by creating barrier between skin and ultraviolet radiation.

INTRODUCTION

Herbal Sunscreen (also known as herbal sunblock, herbal sun tan cream) is a cream, spray or other topical product that helps cover the skin from the sun's ultraviolet (UV) radiation, and which reduces sunburn and other skin damage, with the thing of lowering the threat of skin cancer with the help of herbs. In the United States, the term suntan cream generally means the reverse of sunscreen, and rather refers to cream designed to moisturize and maximize UV exposure and tanning rather than block it [1]. Sun protection is a fundamental to look after skin and eyes from the damaging effect of the sun because exposure to ultraviolet radiation contributes to ageing skin and is the main cause of skin cancer. Some people may need to take particular care because of photosensitivity. You should also be careful to protect your skin if you are at high altitude in any season, particularly when in the snow because it reflects extra ultraviolet radiation onto your skin [2].There are some ideal characteristics of herbal based sunscreen, it can absorb light preferentially over the range of 280-320 nm, it can tolerate heat, light and sweat, not readily absorb into the skin, not create any toxic reactions to the skin [3]. This review article sought to explain the classification of sunscreen products, biological activities with mechanism of actions, and scientific basis of use of sunscreen etc.

Types of Sunscreen products

There are several different types of sunscreen product that can be set up on the global demand (oils, sticks, gels, creams, lotions). They must each have sunscreens that give sufficient protection against dangerous UV rays [4].

Chemical and physical sunscreen is two basic types.

A chemical sunscreen blocks the UV rays while, the physical sunscreen reflects the dangerous rays away from the skin.

Physical Sun block's: Zinc oxide and titanium dioxide are two types of physical sun block's that are mainly used.

Both include UVA and UVB broad- spectrum defense. They're gentle enough for day-to-day use because they rarely produce skin irritation, especially for people with sensitive skin and for children.

Chemical Sun block's: The majority of chemical sun blocks are thus composed of multiple chemicals, each blocking a different UV light area mainly in UVB region, chemicals used in sun block's cream are active. Which are able to block the UVA rays. Sunblock's formulation, which blends both chemical and physical active components, is the perfect sunblock formulation [5].

Biological activities

The most important natural activities in the field of sun protection can be briefed in six main classes.

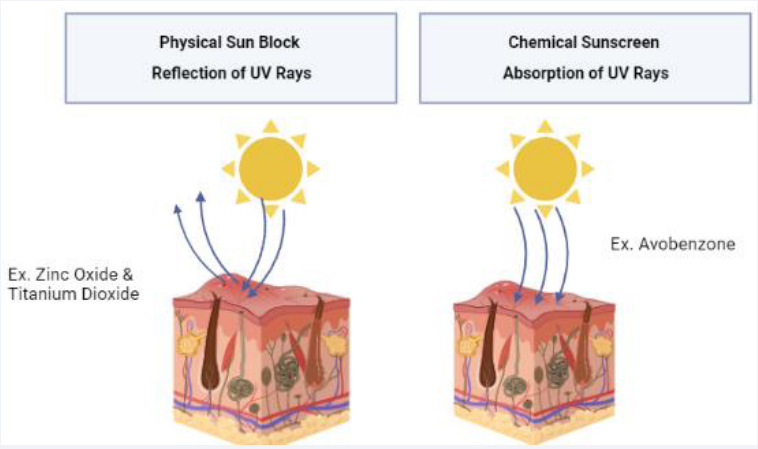

Figure 1 Physical Sun Block Vs Chemical Sunscreen (Created in Biorender Software).

1. Filtering activity against UVB/ UVA radiation,

2. Antioxidant and reactive oxygen species scavenging activity,

3. Antimutagenic activity,

4. Anticancer properties,

5. Booster effect,

Antioxidant and reactive oxygen species scavenging activity: Antioxidant effect represents one of the crucial mechanisms of photo protective activity of herbal extracts. ROS (reactive oxygen species) are considered as oxidant agents and are responsible for the development of skin diseases like skin aging, lipid peroxidation, and cancer. These species include hydroxyl revolutionaries, peroxyl revolutionaries, superoxide anion, and, substantially their active precursor's ozone, hydrogen peroxide, and singlet oxygen [6]. ROS reply negatively with DNA, proteins, and unsaturated fatty acids that in turn induce carcinogenic processes and inflammatory response from cells. Phenolic/ polyphenolic composites and flavonoids generally represent the main source of natural antioxidant compounds, and several types of examination feature the utility of including natural antioxidant extracts in topical products. Antioxidant composites from herbs offer new possibilities and strategies for an effective prevention and treatment of UV- mediated damages and disorders, which are substantially due to the generation of reactive oxygen species suppressing exempt responses. The benefits of natural antioxidants in topical products are currently generally accepted in light of the information available. There are several effective in vitro tests for antioxidant activity. Each of them is grounded on different mechanisms and, therefore, evaluates different kinds of oxidative protection. In order to gain a sufficient evaluation on in vitro antioxidant, it's therefore necessary to perform different types of tests to assess the studied composites on different kinds of oxidative species [7]. Some of them are:

- Diphenyl-2-picrylhydrazyl (DPPH) assay,
- Luminol photo chemiluminescence (PCL) assay,
- 2,20- Azino- bis-3-ethyl-benzothiazoline-6-sulfonic (ABTS) acid assay,
- Oxygen radical absorption capacity (ORAC).

Antimutagenic activity and anticancer properties: UV radiation is a highly energetic ionizing radiation which can damage the DNA of cells which may turn to lead a cancer. Cancer can be caused by immunosuppression, oxidative stress, direct DNA damage, inflammatory response, and p53 tumor suppressor gene mutations. On the other hand, it should be taken into account that immunosuppression might be the desired effect in subject affected by autoimmune disorders [8].

Studies have shown that more people are diagnosed with skin cancer each year in US than all the other cancers combined. One in every five Americans ends up with skin cancer before they reach the age of 70. 1 Around 8 billion dollars spent to treat skin cancer every year. One statistic says that between 1994 and 2014 the people who got treated for skin cancer have increased to shocking 77%. Around 90% non-melanoma skin cancers are reason of UV radiation. The sad part is every hour a person dies because of skin cancer that's caused because of exposure to sun's UV radiation [9].

Several methods are available for a predictive in vitro antimutagenic or anticancer activity evaluation and it's relatively tough to identify a list of preferred tests. Still, a good practice should include at least one of the validated methods in the screening of a new substance or admixture [10].

Use of sunscreen has been shown to reduce the incidence of both melanoma and nonmelanoma skin cancer [11].

Both the Canadian Dermatology Association and the American

Academy of Dermatology recommend the use of sunscreen for the prevention of skin cancer [12].

Effectiveness of sunscreen in preventing photo aging and skin cancer: Evidences from experimental studies, a large randomized controlled trial (RCT) and smaller nonrandomized experimental studies support the effectiveness of sunscreen in preventing the signs of photo aging, including wrinkles, telangiectasia and pigmentary differences convinced by ultraviolet radiation [13].

Experimental studies from the 1980s and 1990s showed that sunscreen protect against cell damage compatible with carcinogenesis in animal models [14].

In organ transplant recipients, a population at high threat of morbidity and death from skin cancer, a prospective single centre study of 120 matched cases showed that the use of sun protection factor (SPF) 50 sunscreen overs 24 months reduced the development of actinic keratoses, squamous cell lymphomas and, to a less extent, basal cell lymphomas [15].

Anti-inflammatory activity: UV- radiation induces the inflammatory response. UVB- convinced cyclooxygenase- 2 (COX- 2) expressions leads to an increase in the production of prostaglandin (PG) metabolites. COX- 2expression in the skin has been linked to the pathophysiology of inflammation and cancer. Exposure to UV radiation is also known to increase the expression of pro-inflammatory cytokines like tumor necrosis factor, interleukin (IL) - 1, and interleukin IL- 6. These anti-inflammatory properties including varied herbal substances and drugs can be estimated by a number of systems [16].

Booster effect

There are already known compounds that can boost the SPF of UV filters but the mechanisms that are responsible for booster effects are varied and frequently changeable; some are linked to the nature of the UV filters that the formulator wants to enhance. It is, in fact, tough to uniquely define the general characteristics of a component with booster effect [17].

Three main strategies available to achieve "booster effect" are

- Interaction with the UV filters at the physical- chemical level to enhance effectiveness(optimize the effectiveness of the UV absorber admixture),
- Apply a correct formulation strategy,
- Enhance the film- forming properties (use of emollients and film- forming agents).

One of the reasons of the growing significance of the booster effect is the consolidated marketing trend of placing on the request sunscreen products with advanced SPF values; as a consequence of this, the formulator has to find all the possible tricks to use the smallest possible measure of UV filters in the product. Considering the evaluation of herbal materials as "booster constituents," this activity is, in some cases, identifiable by the in vitro tests as described below. Ingredients that enhance UV purifier distribution and enhance spreadability are also precious [18].

- According to EU regulation. Addition VI reports the list of UV filters allowed in beautifying Products there are too many compounds but most common are;

  - Titanium dioxide
  - Zinc oxide
  - Di- methicodiethylbenzalmalonate
  - Benzoic acid derivations
  - And their nano compounds

CONCLUSION

Skin cancer may be developed by the exposure to ultraviolet radiations which are very common across world. This review has given various biological effects of sunscreen products to reduce the risk of developing both melanoma and nonmelanoma skin cancer. Research on the safety and efficacy of established sunscreens and novel agents is ongoing.

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