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A Review on: Formulation and Evaluation of Herbal Sunscreen

Ms. Shweta kharat[1], Ms. Ketakee More[2], Ms. Arti M.Gadade[3], Mr. Nitin M. Gawai[4], Ms. Tanuja Satpute[5]
B. Pharmacy Department, Mahadev Kanchan College of Pharmaceutical Education and Research, Uruli Kanchan, Pune, Maharastra, India

Abstract-Herbal sunscreens are commonly utilized by nearly everyone to protect against the damaging effects of UV radiation from the sun. This research focuses on creating and assessing herbal sunscreen creams that demonstrate effectiveness against UV radiation. The goal is to formulate and evaluate a herbal sunscreen using a blend of natural plant extracts recognized for their sun-blocking properties.
The initiative will add to the expanding research on herbal sunscreens, concentrating on their efficacy, safety, and ecological impact. The study intends to encourage the creation of more secure and environmentally conscious sunscreen options. Key physicochemical characteristics, such as viscosity and water resistance, are examined to guarantee product stability and convenience for users. The study also investigates the potential for broad-spectrum against both UVA and UVB rays, aiming to offer comprehensive sun protection.
Keywords- Ultraviolet Radiation, Antioxidant, Sun Protection Factor(SPF),Environmental Impact, UVA And UVB, Sunburn

I. INTRODUCTION

In comparison to synthetic cosmetics, people are becoming more interested in herbal cosmetics these days. Creams with an SPF of are applied to the skin to prevent sunburn. Maximum protection from the sun's intense UV rays is indicated by a higher SPF number. Additionally, research has shown that herbal sunscreen creams are safer and cause less adverse effects than those made with chemicals. Herbal sunscreen, also referred to as herbal sunblock, is a topical product such as a lotion or spray. This product helps shield the skin from the sun's ultraviolet (UV) radiation while minimizing sunburn and other skin damage. Sunscreens can be Divided into two types-Physical sunscreen-which reflects sunlight ,Chemical sunscreen- which absorbs UV light. Sunscreen agents are intended for external application only, serving as protective agents against UV exposure. The formulation of sunscreen, when applied to the skin, safeguards the area from sunburn. Its effectiveness is determined by its capability to protect against UV-induced sunburn as well as its chemo preventive properties. Excessive exposure to solar ultraviolet radiation leads to various skin issues, including sunburn, skin pigmentation.

A. Classification of sunscreen

Sunscreens are divided into two categories based on their method of application: systemic and topical. Topical sunscreens are further divided into two types based on their action mechanism -Organic sunscreen, Inorganic sunscreen
Organic Sunscreen: Organic sunscreens work by being absorbed into the skin and converting UV radiation into heat. They are lightweight and ideal for everyday use, allowing for the easy incorporation of skincare ingredients. The active components in organic sunscreens are carbon-based chemicals, which do not include minerals.
In organic sunscreen: These particles function as a physical barrier against ultraviolet and UV light, as they scatter and reflect UV rays away from the skin.

B. Mechanism of Photoprotection

Sunscreens function by preventing and reducing the harmful impacts of ultraviolet rays from the sun. Studies have shown that applying sunscreen can enhance the skin's ability to tolerate UV exposure. They operate through two primary mechanisms: scattering and reflecting UV energy away from the skin's surface. Mineral-based, or inorganic, sunscreens utilize this method by creating a barrier that prevents sun rays from penetrating the skin. Organic sunscreens, on the other hand, absorb UV energy and convert it into heat, thus diminishing its harmful effects and limiting how deeply it can reach the skin.

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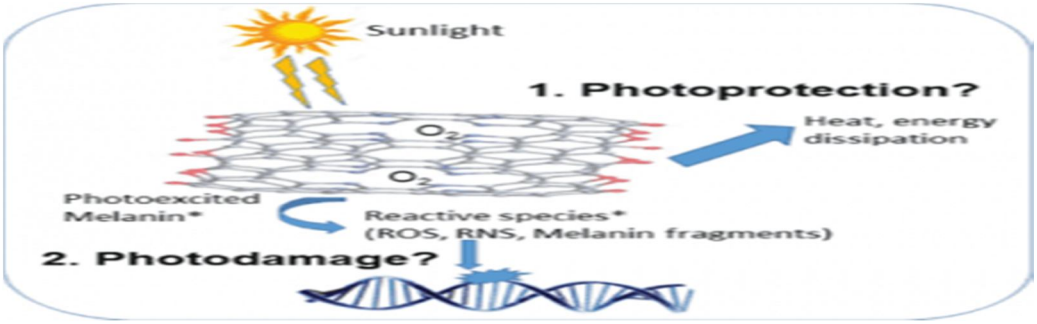

Fig1-Mechanism of Photoprotection

II. MATERIAL AND METHOD

A. Coconut Oil

Biological source:-Coconut oil is derived from Cocos Nucifera
Family:- Arecaceae
This multipurpose component, which comes from the fruit of the coconut palm, has a number of advantageous skincare qualities.Co conut oil is frequently used in the creation of herbal sunscreen due to its inherent SPF qualities and hydrating capabilities.It has med iumchain fatty acids that can help keep the skin smooth and hydrated while shielding it from UV raysFurthermore, coconut oil has a lot of antioxidants that can counteract free radicals and lessen oxidative stress brought on by exposue to the sun.Because of its smoo thing qualities, it can be used on sensitive skin, increasing the overall efficacy and skin-
nourishing advantages of herbal sunscreen formulas.By shielding the skin from free radical damage, its antibacterial, antifungal, and antiviral properties promote wound healing.

Fig.2 coconut oil

B. Aloe Vera Gel

Botanical Name:-Aloe Barbadaceae
Family:-Liliaceae
Is vital in herbal sunscreens for its calming, moisturizing, and restorative attributes. It delivers a cooling sensation, alleviating sunburn and swelling. Abundant in antioxidants and vitamins A, C, and E, it aids in shielding and repairing skin from UV harm. Aloevera gel additionally creates a protective layer, retaining moisture and boosting the efficiency of other sun-blocking components. Its lightweight, non-oily consistency makes it perfect for simple application and absorption in natural sunscreen products. Aloevera gel can be utilized to assist with the recovery process of sunburn; it alleviates discomfort and redness by diminishing inflammation, and the gel also promotes collagen production, which supports the healing process.

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Fig.3 Aloe vera gel

C. *Butterfly Pea Flower*

Antioxidants abound in the butterfly pea plant's blossoms, which are abundant in flavonoids, polyphenols, and authocyanins.Your s kin's general health andsuppleness depend on antioxidants.Antioxidants minimize fine wrinkles on your skin, improving its appeara nce and textureAntioxidants help to improve the appearance of your skin and reduce fine lines.

Cut down on the rednessThe capacity of butterfly pea flowers to calm sensitive skin also reduces redness from acne, dryness, and ov erall irritation. Together with other nutrients that support healthy skin, these nourishing qualities are further increased.

Improve moisture retention:

This promotes skin turnover so that it can heal itself naturally. Retaining moisture prevents dryness and encourages lipid balance Soothes minor skin irritation The butterfly pea flower used for use in rejuvenating the skin .Improve the skin barrier The presence of plant-based antioxidants and antioxidant vitamins in butterfly pea flowers helps to improve the skin barrier.

Suitable for all skin type.

Butterfly pea flower is a hidden skincare rockstar. It is gentle enough for use on all skin types.

Fig.4 Butterfly Pea Flower:

D. Rose water

Scientific Name:-Rosa damascene

Family:- Rosacea

Vitamin B found in rose water is frequently found in sunscreen and other sun. protection products.The efficacy of SPF is enhanced by it.Skin pigmentation can be lightened by using rose water.Rose water unclogs your pores, allowing you to remove debris and oils from your skin.It aids in preserving the pH balance of your skin It is a skin nourishing and moisturizing ingredient that shields the skin from damaging environmental factors.Because of its high antioxidant content, gulabjal helps fight free radicals and maintain health y, radiant skin.Herbal sunscreens use rose water because of its calming and moisturizing properties.For sensitive skin types, it is perf ect since lowers irritation and helps balance the PH of the skin.

Fig.5 Rose Water

E. Vitamin E capsule

Vitamin E offers further defense against acute UVB damage and against cell mutations caused by pollution and sun exposure.By re moving pollutants, vitamin E helps to cleanse the skin and increase its elasticity.The skin gets lighter when vitamin E and lemon juic e are combined.it is best known for enhancing skin health and attractiveness. It possesses antioxidant and anti-inflammatory properties. Using vitamin E in herbal sunscreen.

Fig.6 Vitamin E Capsule

III. FORMULATION OF HERBAL SUNSCREEN CREAM

Step 1: Preparation: Assemble all required supplies and ingredients.
Make sure your work area is sanitized and clean.Sterilize the jars or containers used to store the sunscreen by giving them a thorou gh rinse with rubbing alcohol after washing them in hot, soapy water.

Step 2: Formulation of butterfly pea flower extract: In a cup of boiling water, soak a dozen fresh or dried butterfly pea flower leaves to create an extract for herbal sunscreen.Strain the liquid and throw away the leaves after 15 minutes or At that point, the dee p blue water is prepared for use in sunscreen cream.

Step 3: Using butterfly pea flower extract, a sunscreen cream formulation was created using the steps below.then use aloe vera gel, which has been shown to both prevent and heal skin burns.After that, rose water was added to the concoction, which had a cooling effect then add vitamin E and coconut oil gradually. Using a spatula, all the ingredients were thoroughly combined for 20 to 30 minutes before being put in place.

A. Formulation Table

Table.1 .Formulation table

Sr .No	Ingredient	Quantity
1.	Butterfly Pea Flower	4gm
2.	Alovera Gel	5gm
3.	Coconut Oil	2ml
4.	Rose Water	2ml
5.	Vitamin E	2gm

Fig. 7 Final Product

B. Evaluation of sunscreen cream for sunscreening activity

Effectiveness of Sunscreen:-

Sunscreen protection factor (SPF), which is the ratio of UV energy needed to create a minimal erthemal dose in protected skin to un protected skin, is typically used to express how effective a sunscreen is.A straightforward, quick, and accurate in vitro technique for determining the spf is to test the product's absorbance between 290 and 320 nm at 5-nm intervals.

F×€EF(wavelength)×I(wavelength)×Abs(wavelength) is the spectrophotometric formula for SPF.

where EE stands for erythmogenic effect of light with wavelength

CF for correction factor (10), and Abs for spectrophotometric absorbance values at wavelength. The EE×I constants' value.

PH of the cream:-

A standard buffer solution was used to calibrate the pH meter.The pH of the cream was determined after 0.5 of it was weighed and dissolved in 50.0 milliliters of pure water.

Homogeneity:- Both touch and visual appearance were used to test the formulations for homogeneity.

Appearance:- The cream's color, pearl sheen, and roughness were evaluated and assessed.

Removal:- Using tap water to wash the area where the cream was applied, the cream's ease of removal was assessed.

Irritancy test:

After applying the cream to the designated region, the time was recorded.After feel: The amount of residue, emolliency, and slipperi ness were assessed following the application of a predetermined quantity of cream.

C. Observation Table

Table.2 Observation Table

Sr. No	Parameters	Observation
1	Colour	Light Blue
2	Odour	Characteristics
3	Spreadability	Good and uniform
4	PH	6.5
5	Test of Irritancy	No Irritation Reaction

D. Application Of Herbal Sunscreen

1) Pharmaceutical Industry: The project outcomes can contribute to the development of natural and safer alternatives to chemical sunscreens, catering to the growing demand for organic and environmentally-friendly skincare products.

2) Cosmetics Industry: Herbal sunscreen formulations can be marketed as natural and eco-friendly alternatives in the cosmetics industry, appealing to consumers seeking clean beauty products.

3) Public Health Awareness: Awareness: Educate the public about the benefits of herbal sunscreens and promote sun-safe practices to prevent skin damage and reduce the risk of skin.

4) Academic Research: Contribute to academic research by publishing findings in scientific journals and presenting at conferences, advancing knowledge in the fields of herbal medicine and skincare.

IV. CONCLUSION

The study looked at the effectiveness of a herbal sunscreen lotion made from butterfly pea flower extract in avoiding sunburn.A bro ad range of absorption is necessary for sunscreen products to effectively prevent sunburn and other skin damage.The main factors in fluencing the acceptability of cosmetic formulations during handling and storage are viscosity and spreadability.When the formulati on was stored for a long period, it was discovered that the cream's color did not change and that it showed no signs of redness, infla mmation, or irritation. Washing with tap water made removing the lotion simple.

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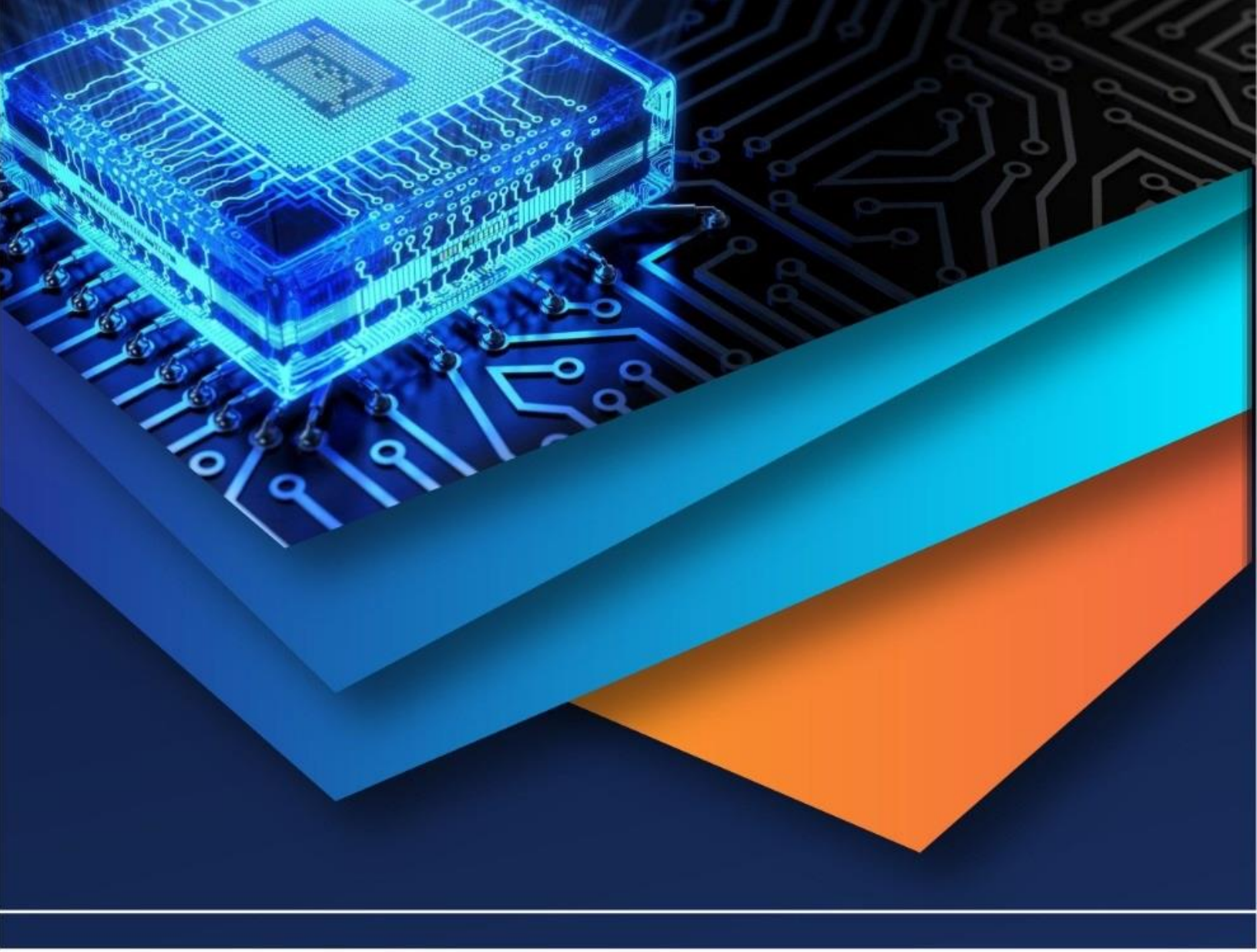

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