



# A Review on Formulation and Evaluation of Herbal Sunscreen

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## Abstract:

Today's fast-paced lifestyle has a negative impact on our health due to pollution and harsh synthetic chemicals; therefore, nature has provided us with its timeless, noteworthy herbal elements. UV radiation is the main cause of sunburn and is also linked to dangerous skin cancer. A topical substance called sunscreen helps protect skin from UV rays by reflecting or absorbing part of the sun's UV rays. It may help avoid sunburn and lessen the negative effects of the sun, like skin cancer and early aging. The current study presents the formulations and evaluation of topical photo-protectives that include various photo-protective polyphenols as well as antioxidant, anti-malignant, antifungal, antiaging, moisturizing, and wound healing properties. The current study produces a natural photoprotective formulation that is stable and has Possessing anti-inflammatory, anti-proliferative, anti-malignant, antifungal, antiaging, antioxidant, and other photo-protective polyphenol properties. A durable natural photoprotective formulation with antioxidant qualities, a high SPF, and more essential homogeneous UVA/UVB protection is produced by the current research effort.

**Keywords:** fast-paced lifestyle, pollution, synthetic chemicals, herbal elements, UV radiation, sunburn, skin cancer, sunscreen, photoprotectives, polyphenols, antioxidant, anti-malignant, antifungal, antiaging, moisturizing, wound healing, formulation, evaluation, stable, anti-inflammatory, anti-proliferative, SPF, UVA, UVB protection

## Introduction:

Sunscreen has photo-protective qualities, it seems sense that UV protection is quite popular. Sunscreen preparation is used topically with the intention of increasing the level of Sun Protection Factor (SPF) and healing, preventing, or resisting the damaging effects of sunburn, suntan, sun cancer, and premature skin aging. Sunscreens are an organic defence mechanism that protects the skin, the body's outermost layer, from harmful UV rays .Its capacity to absorb, reflect, or disperse a portion of the UV radiation that the sun emits onto skin that has been exposed to excessive UV radiation UVA and UVB radiation can cause skin melanoma, sunburn, photoaging, pigmentation, and other uncomfortable or dangerous effects. Because flavonoids, phenolic compounds, or herbal oils have the ability to absorb UV radiation in the UV-A region, they are significant components of UV protection and have demonstrated anti-oxidant, wound healing, antifungal, premature aging, moisturizing, anti-inflammatory, and antiproliferative actions. Many sunscreen formulations are on the market that are intended to shield skin from sunburn and skin cancer. However, a survey of the market revealed that some of the synthetic sunscreen agents have unfavourable effects, including hormone changes, cell mutation, and eczema (an allergic reaction). Aside from their effectiveness in absorbing UV rays, many

formulations offer multifunctional sun protection; nevertheless, the majority of these formulations are expensive and contain combined synthetic compounds that are hazardous or even cancerous. Sunscreen use is frequently associated with protection from the sun; however, this is an overly simplistic approach. Rather, protection should involve a combination of strategies, including wearing protective clothes, using sunscreen, and avoiding excessive sun exposure. UV radiation from the sun has a major impact on the skin, leading to immunosuppression, precancerous and cancerous lesions, sunburns, and aging.

### Review of Literature:

**1. Arun Rasheed et al. (2022)**- Prepared sunscreen lotions made from extracts of bioactive materials including Aloe vera (Liliaceae), Curcuma longa L. (Zingiberaceae), and Alpinia galanga Willd (Siamese ginger), which have a broad spectrum of anti-UV radiation efficiency with a lower concentration of chemical UV filters. The sunscreen lotions' SPF for normal skin (SPF 55 and SPF 20) and non-mutagenic, non-irritating properties were demonstrated by the results.

**2. Lim HW et al. (2019)**- Narla and Lim's review focuses on FDA regulation, environmental impact, and health implications of sunscreen use. It examines regulatory policies governing sunscreen ingredients, labelling, and claims, emphasizing the need for robust oversight to ensure product safety and efficacy.

**3. Fears TR et al. (2016)**- Fears' research focuses on the methodological challenges in studying sun exposure and skin cancer risk. It identifies pitfalls and challenges in the connection between solar radiation and skin cancer incidence, highlighting the need for rigorous study design and data analysis techniques.

**4. Halliday GM, Damian DL et al. (2014)**- In a high-risk population, the impact of consistent sunscreen use on melanoma risk is examined in this study. The results reinforce the significance of sun protection techniques in the prevention of skin cancer by indicating that regular use of sunscreen is linked to a lower incidence of melanoma.

**5. Strutton GM et al. (2011)**- This landmark trial provides compelling evidence supporting the effectiveness of sunscreen in reducing melanoma risk. It found a significant reduction in melanoma risk among participants who consistently used sunscreen compared to those who did not, highlighting the importance of sustained sun protection habits.

**6. Dore JF et al. (2007)**- This study disproves widespread beliefs about sunscreen users' sun behavior by showing that they typically spend more time in the sun, which may increase their chance of developing skin cancer and overall UV exposure. It emphasizes how crucial it is to support all-encompassing sun protection techniques in addition to using sunscreen.

**7. Wulf HC et al. (2005)**- Thieden et al.'s research focuses on sunscreen application thickness and its impact on sun protection. They found that applying sunscreen at a higher thickness significantly improves sun protection efficacy, highlighting the importance of proper sunscreen application techniques for optimal protection against UV radiation.

**8. Autier P, Doré JF (1998)**: The study by Autier and Doré assesses the connection between melanoma risk and sunscreen use. They did not discover any proof that sunscreen prevented melanoma, indicating that more research is necessary to fully understand sunscreen's role in preventing skin cancer.

### AIM AND OBJECTIVE-

#### Aim:-

Formulation and Evaluation of Herbal Sunscreen.

#### Objectives-

The main objectives of the formulation are:

- Collection of all the required ingredients and herbal plant.
- Preparation of the herbal extracts.
- Extract out the active ingredient from herbal plant.

- Evaluation of the formulation.
- To create a sunscreen formula with herbal components.
- To create different formulas
- To carry out characterizing physiochemically.
- To attain the highest level of formulation stability.
- To maximize the benefits of UV protection

## Material and Method:

### Ingredients:-

1. **Zinc Oxide:** A mineral sunscreen ingredient that offers broad – spectrum protection against both UVA and UVB rays.



Figure 1: Zinc Oxide

2. **Aloe Vera Gel:** Aloe vera is well-known for its calming and hydrating qualities gel serves as a base for the sunscreen and helps to hydrate the skin.



Figure 2: Aloe vera Gel

3. **Carrot Oil:** Rich in antioxidants and vitamins, carrot oil can help protect the skin from environmental damage and promote skin health.



Figure 3: Carrot Oil

4. **Almond Oil:** A natural emollient, almond oil helps to moisturize and soften the skin while providing some sun protection.



Figure 4: Almond Oil

5. **Desi Ghee:** A traditional skincare ingredient, ghee is moisturizing and nourishing, making it beneficial for dry or sensitive skin.



Figure 5: Desi Ghee

6. **Rosemary Oil:** Rosemary oil is known for its antioxidant properties and may provide additional skin protection against environmental stressors.



Figure 6: Rosemary Oil

#### METHODOLOGY:-

| S. no. | Ingredients   | Quantity |
|--------|---------------|----------|
| 1.     | Zinc oxide    | 2 tbsp   |
| 2.     | Aloe vera oil | 1 tbsp   |
| 3.     | Carrot oil    | 1 tbsp   |
| 4.     | Almond oil    | 2 tbsp   |
| 5.     | Desi ghee     | 1 tbsp   |
| 6.     | Rosemary oil  | 6 drops  |



**Procedure:**

- 1. Preparation:** Ensure that all equipment and surfaces are clean and sterilized to prevent contamination.
- 2. Measuring Ingredients:** Measure out the desired quantities of each ingredient based on the desired SPF level and consistency of the sunscreen. The ratio of zinc oxide to the other ingredients will determine the level of sun protection offered by the sunscreen.
- 3. Mixing the Ingredients:** In a clean mixing bowl, combine the zinc oxide with the aloe vera gel, carrot oil, almond oil, ghee, and rosemary oil. Use a whisk or spoon to thoroughly blend the ingredients until they form a smooth and homogeneous mixture.
- 4. Adjusting Consistency and SPF:** Depending on the desired consistency and SPF level of the sunscreen, you may need to adjust the ratio of ingredients. Adding more zinc oxide will increase the SPF of the sunscreen, while adjusting the other ingredients can change the texture and feel of the product.
- 5. Testing:** Before using the sunscreen on your skin, perform a patch test to check for any allergic reactions or sensitivities to the ingredients. Apply a small amount of the sunscreen to a small area of skin and wait for 24 hours to observe any adverse reactions.
- 6. Storing the Sunscreen:** Transfer the sunscreen mixture to a clean, airtight container for storage. Store the sunscreen in a cool, dry place away from direct sunlight to maintain its effectiveness.

**Evaluation Parameters:**

- 1. Physical properties:** The cream is subjected to physical properties like Colour, Odour, Appearance and Texture
- 2. Viscosity:** The thickness or viscosity of a substance, affecting its spreadability and texture.
- 3. Solubility:** It refers to how well a substance dissolves in a solvent. It indicates the extent to which particles of the substance can disperse and mix uniformly within the solvent. Solubility is crucial in determining the effectiveness and compatibility of substances in various formulations, including sunscreen.
- 4. pH determination:** It measures the acidity or alkalinity of a solution on a logarithmic scale from 0 to 14, with 7 being neutral. Lower values denote acidity, higher values alkalinity. pH influences chemical reactions and skin compatibility in sunscreen formulations.
- 5. Viscosity:** It is the measure of a fluid's resistance to flow. It indicates how easily a substance flows and is crucial in determining the texture, spreadability, and application of sunscreen formulations.
- 6. Spreadability:** It refers to the ease with which a substance can be uniformly spread over a surface. In sunscreen, it denotes how effectively the product can be applied to the skin for even coverage.
- 7. Film formation:** It describes the ability of a substance to create a cohesive and continuous layer on a surface. In sunscreen, it refers to how well the product forms a protective film on the skin upon application.
- 8. Drying time:** It is the duration it takes for a substance to evaporate or solidify after application. In sunscreen, it indicates how quickly the product dries on the skin, affecting comfort and usability.

9. **Transparency:** It refers to the clarity or translucency of a substance, indicating the degree to which light passes through. In sunscreen, it describes how clear or opaque the product appears on the skin.
10. **Physical stability:** It denotes the ability of a formulation to maintain its physical properties over time, resisting changes such as separation, settling, or degradation. In sunscreen, it ensures the product's efficacy and usability throughout its shelf life.

### Conclusion:

In conclusion, sunscreen cream plays a crucial role in protecting the skin from the harmful effects of UV radiation. Through its SPF rating and formulation, sunscreen effectively reduces the risk of sunburn, premature aging, and skin cancer when applied correctly and consistently. Research underscores the importance of choosing a sunscreen with broad-spectrum protection against both UVA and UVB rays, as well as considering factors like water resistance and individual skin type. While sunscreen offers significant benefits, its efficacy can vary depending on application technique and environmental factors. Moreover, discussions surrounding sunscreen highlight the need for complementary sun protection techniques including looking for shade and donning protective gear. Despite occasional concerns about ingredient safety and environmental impact, sunscreen remains a critical tool in promoting skin health and preventing sun-related damage. Ultimately, the widespread adoption of sunscreen as part of a comprehensive sun protection strategy is essential for maintaining healthy skin and reducing the incidence of sun-induced skin conditions.

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