“Formulation and Evaluation of Herbal Sunscreen Cream”

Miss. Waghmode Monika Vasant
Prof. Khade. P.
Dr. HINGANE L.D.
ADITYA PHARMACY COLLEGE, BEED 431122

Abstract

Sunscreen is a chemical compound that help protect you from UV rays sunburn is caused by ultraviolet B radiation but ultraviolet A may be more damaging to the skin. Sunscreen should ideally block both wavebands.

The aim of this study was to develop herbal topical sunscreen formulation based on some fixed oils, in combination with some medical plants. Regular use of sunscreen reduces the development of actinic keratosis, squamous cell carcinoma and melanoma. Sunscreen may be organic or inorganic chemicals. Sunscreen is also known as sunblock lotion. The product that absorb or reflect the sun’s ultraviolet radiation and protect the skin. The increasing incidence of skin cancers and photo damaging effects caused by ultraviolet radiation has increased the use of sunsreening agents, which have shown beneficial effects in reducing the symptoms.

Sunscreening agents should be safe chemically inert, non irritating non toxic, photo stable an able to provide complete protection to the skin against damage from solar radiation.

Keyword:
herbal Snscreen, SPF(sun protection factor), skin burn, Asian pigeonwings.
Introduction:

Herbal sunscreen also known herbal sunblock. Herbal suntan lotion is a lotion, spray or other topical product that helps protect the skin from the sun's UV radiation and which reduce sunburn and other skin damage. Sunscreen can be classified into two types sunscreen:

1) Physical sunscreen

Those that reflect the sunlight.

2) Chemical sunscreen

Those that absorb the UV light.

Sunscreen agents are for external use only. The use of sunscreen as photo protecting agents for UV protection. The sunscreen formulation is which when applied topically protect the treated area from sunburn. Sunscreen depends on ability to protect against UV induced sunburn and their chemopreventive activity. Excessive solar ultraviolet radiation are responsible for various skin damages such as sunburn, skin pigmentation, premature aging and photo carcinogenesis. The main mechanism of skin damage by UV radiations is formation of Reactive Oxygen Species (ROS) that interact with proteins, lipids and subsequently alter them. UVB and to a lesser extent UVA are responsible for inducing skin damages.

Sunscreen should contain antioxidant agent in addition to sunblock agent to be effective in prevention of photoaging and skin cancer. Plants due to their antioxidant potential are known as attractive option to be used in Sunscreen formulation for prevention of skin damage due to solar radiation. Sunscreen is topical product that protects the skin against harmful effects of the sun.
Classification of sunscreen and the mechanism of photoprotection

Sunscreen are classified as either topical or systemic based on the route of administration. Topical sunscreen are divided into two classes on their mechanism of protection:

**Organic sunscreen**

Organic sunscreen works by absorbing into skin and converting UV rays into heat. It is thin and ideal for everyday use, allowing for skincare ingredients to be added easily. Organic sunscreen actives chemical carbon based compound. It contains non-mineral active ingredient.

**Inorganic sunscreen**

These are particles that scatter and reflect UV rays back to the environment. They act as a physical barrier to indent ultraviolet and UV light. They are considered broad spectrum as they cover the entire ultraviolet spectrum. The Inorganic sunscreen are also referred to as sunblock.

**Mechanism of photoprotection**

Sunscreen act by preventing and minimizing the damaging effects of the ultraviolet sun rays following exposure to the sunscreen have been demonstrated to increase the tolerance of the skin to UV exposure. They work on two mechanisms:

Scattering and reflection of UV energy from the skin surface mineral based on inorganic sunscreen works on this mechanism. They provide a coating that blocks sun rays from penetrating through the skin.

Absorption of the UV energy by converting it to heat energy, thus reducing its harmful effects and reduce the depth which can penetrate the skin. Organic sunscreen works on this mechanism.
Main role of ingredients used in formulation

Aloe vera

Aloe vera is a good active ingredient to reach in Sunscreen arsenal. It has been proven to both treat and prevent burns on your skin. The leaves of aloe vera and A. Barbadensis are the source of aloe vera gel. Aloe vera gel is used in cosmetics lotion for its moisturizing and revitalization action. It blocks UVA and UVB rays and maintain skin natural moisture balance. It stop the sunburn and stimulate immune system intervention. Aloe vera gel can be used to help with the healing process of sunburn. It help relieve pain and redness by reducing inflammation. The gel also stimulate the production of collagen which help the healing process.

Butterfly pea flower:

Packed with antioxidant

Butterfly pea flower contain many antioxidant such as flavonoids authocyanin and polyphenols. Your skin need antioxidant to improve general health and elasticity. Antioxidant help to minimize fine line and improve your skin and appearance.
Soothes minor skin irritation

Butterfly pea flower it helped calm itching and general irritation. The butterfly pea flower used for use in rejuvenating the skin.

Reduce redness

Because of butterfly pea flowers ability to soothe irritated skin, it also minimize redness caused by acne, dryness, and general irritation. These nourishing properties are further enhanced when combined with other nutrients that benefit skin health.

Improve moisture retention

This helps increase skin turnover to naturally restore itself. Moisture retention helps stop dryness and promote lipid balance.

Improve the skin barrier

Because butterfly pea flower contain plant based antioxidants and antioxidants vitamin such as vitamins, it help improve skin barrier
Suitable for all skin type

Butterfly pea flower is a hidden skin ncare rockstar. It is gentle enough for use on all skin types, no matter what time of year it is.

Coconut oil:

Coconut oil keeps the skin soft and smooth while preventing premature ageing of the skin. Coconut oil for skin use as a moisturizer, remove dead skin cells. Coconut oil moisturizing dry skin including in people with condition such as eczema. Promoting wound healing it have antibacterial, antifungal and antiviral properties which prevents free radicals from causing damage to the skin. Coconut oil has anti-inflammatory properties which reduce redness on skin this can be helpful for both dry and oily skin conditions by reducing inflammation of the skin.

Rose water

Rose water contain vitamin B. which often used in Sunscreen and sun product. It helps to bolster the effectiveness of SPF. Rose water can be used to lighten the skin pigmentation. Rose water can remove oils and dirt from your skin by unclogging your pores. It helps maintain pH level of your skin. It is hydrating and nourishing agent for skin and protect skin against harmful environmental aggressors. Gulabjal has antioxidant levels that tackle free radicals and keep skin healthy and glowing.
**Vitamin E Capsule**

Vitamin E it provides extra protection against acute UVB damage and protect against cell mutation caused by sun and pollution exposure. Vitamin E it help cleanse your skin and removing the impurities from and help improve skin elasticity. Vitamin E combination with lemon juice it help to whiten the skin. It is most commonly known for its benefits of skin health and appearance. It has antioxidant and anti-inflammatory properties.
Formulation of sunscreen cream

Formulation of butterfly pea flower extract:

To make an extract of butterfly pea flower for herbal sunscreen, steep about a dozen fresh or dried flower leaves in a cup of boiling water. After about 15 minutes, strain the liquid and discard the leaves. The deep blue water is then ready to be used in Sunscreen cream.

Butterfly pea flower contains:

| Soluble minerals               | 8.94mg |
| Ash                             | 0.9mg  |
| Crude protein                  | 41.27mg|
| Soluble carbohydrates          | 29.18mg|

Formulation of sunscreen cream was prepared by following procedure -

I have to take butterfly pea flower extract. Then I have take aloe vera gel because it has proven to both treat and prevent burns on skin. Then added rose water in mixture rose water provide cooling effect. Then gradually add coconut oil and vitamin E. All the ingredients were mixed vigorously using spatula for about 20-30 min and placed.

List of ingredients used in formulation

| Aloe vera.              | 5 gm |
| Rose water.             | 2ml  |
| Butterfly pea flower Extract. | 4gm |
| vitamin E.              | 2gm  |
| coconut oil.            | 2ml  |
Final Product

Evaluation of sunscreen cream for sunscreening activity

Effectiveness of sunscreen:
The effectiveness of sunscreen is usually expressed by sunscreen protection factor (SPF), which is the ratio of UV energy required to produce a minimal erythemal dose in protected skin to unprotected skin. A simple, rapid and reliable in vitro method of calculating the SPF is to screen the absorbance of the product between 290-320 nm at every 5 nm intervals. SPF can be calculated by applying the following formula known as Mansur equation.

• SPF spectrophotometric = CF × EE(wavelength) × I(wavelength) × Abs(wavelength)

Where CF = correction factor (10), EE = erythmogenic effect of radiation with wavelength, Abs = spectrophotometric absorbance values at wavelength.

The value of EE × I constants.

• PH of the cream:
The pH meter was calibrated using standard buffer solution. About 0.5 of the cream was weighed and dissolved in 50.0 ml of distilled water and its pH was measured.
• Homogeneity:

The formulations were tested for the homogeneity by visual appearance and by touch.

Appearance:

The appearance of cream was judged by its colour, pearlscence and roughness and graded.

• Removal:

The ease of removal of the cream applied was examined by washing the applied part with tap water.

• Irritancy test:

The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24hrs and reported.

• After feel:

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.

• Type of smear:

After application of cream, the type or film or smear formed on the skin were checked.
### Types of skin and SPF

<table>
<thead>
<tr>
<th>Types.</th>
<th>Description</th>
<th>SPF.</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Always burn easily. And never tans</td>
<td>More than 8.</td>
<td>Sensitive</td>
</tr>
<tr>
<td>2</td>
<td>Always burn and tan. Minimally</td>
<td>6-7.</td>
<td>Sensitive</td>
</tr>
<tr>
<td>3</td>
<td>Burn moderately and. Tan gradually</td>
<td>4-5</td>
<td>Normal</td>
</tr>
<tr>
<td>4</td>
<td>Burn minimal and. Always tan well</td>
<td>2-3</td>
<td>Normal</td>
</tr>
<tr>
<td>5</td>
<td>Barely burn and tan. Profusely</td>
<td>2</td>
<td>Insensitive</td>
</tr>
<tr>
<td>6</td>
<td>Never burn and. Become deeply Pigmented</td>
<td>None</td>
<td>Insensitive</td>
</tr>
</tbody>
</table>

### Observations

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Parameters</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>Light Blue</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>Characteristics</td>
</tr>
<tr>
<td>3</td>
<td>Spreadability</td>
<td>Good and uniform</td>
</tr>
<tr>
<td>4</td>
<td>PH</td>
<td>6.5</td>
</tr>
<tr>
<td>5</td>
<td>Test for Irritancy</td>
<td>No. irritation reaction</td>
</tr>
</tbody>
</table>
Benefits of sunscreen

• Reduce risk of skin cancer
• Protect against sunburn
• Avoid inflammation and redness
• Avoid blotchy skin and hyperpigmentation
• Stop DNA damage
• Prevent the early onset of wrinkles and fine lines
• Lower skin cancer risk
• Shields from harmful UV rays
• Maintain the brightness of your natural complexion
• Maintain the look and texture of your skin
• Delays premature signs of aging
• Reflects UVA and UVB rays
• Works immediately when applied on the skin.

Advantages

• Easily available
• No side effects
• No special equipment needed for preparation
• They are inexpensive
• Ingredients are easily available
• Renewable resources
• Be non toxic and non irritant
• Be neutral
• Be stable to heat
• Easy to manufacture

**Disadvantages**

• They are difficult to hide taste and odour
• Manufacturing process are time consuming and complicated
• Herbal drug have slow effects as compare to allopathic dosage form it also requires long term therapy.

**Result**

To be effective in preventing sunburn and other skin damage, a sunscreen product should have a wide range of absorbance. During the storage and handling of cosmetic formulation spreadability and viscosity are the prime parameter which affects the formulation acceptability. The formulated cream exhibited no redness, inflammation and irritation. When formulation were kept for long time, it found that no change in colour of cream. The cream was easily removed by washing with tap water.

**Conclusion**

The study attempted to develop herbal sunscreen cream using extract of butterfly pea flower and examined their efficacy for preventing sun burn.
Reference


