



FORMULATION AND EVALUATION OF HERBAL SUNSCREEN CREAM

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ABSTRACT:

Sunscreen is a chemical substance that aids in UV radiation protection. UV B radiation is what causes blisters, while UV A may do greater harm to the skin. The optimal sunscreen ought to block both wavebands. The purpose of this study was to create a topical herbal sunscreen formulation using a combination of medicinal herbs along with certain fixed oils. The development of melanoma, carcinoma of squamous cells, and acts of keratosis is decreased by regular use of sunscreen. Chemicals in sunscreen may be either organic or inorganic. Sunblock lotion is another name for sunscreen. The product that shields skin from UV rays of the sun by reflecting or absorbing them. Sunscreen products have become more popular due to the rise in skin cancer cases and the photodamaging effects of UV radiation. These products have been proved to be beneficial for symptom reduction. Sunscreen ingredients should be entirely secure, chemically inert, non-irritating, non-toxic, photostabile, and capable of to shield the skin from sun harm.

Objective:

1. UV Protection: Natural chemicals found in herbal products such as red raspberry seed oil, licorice extract, and BUTTERFLY PEA FLOWE can aid in shielding the skin from UV rays. In order to lower the chance of solar damage, these substances can either absorb UV radiation or function as physical barriers.
2. Antioxidant Properties: Vitamins C and E, flavonoids, polyphenols, and other antioxidant-rich substances are abundant in many plant extracts. By assisting in the neutralization of free radicals produced by UV exposure, these antioxidants help shield the skin from oxidative stress and early aging.
3. Skin Soothing and Healing: Herbal components with calming and healing qualities include calendula, chamomile, and aloe vera. By adding these components to sunscreen formulas, you can soothe sensitive skin and encourage a quicker healing process after a sunburn.
4. Miniaturization: Herbal oils, such as shear butter, coconut oil, and jojoba oil, are great all-natural moisturizers that help keep skin hydrated and prevent dryness. These oils can be added to sunscreen formulas to help maintain the skin's hydration and nourishment.
5. Non-Comedogenic Formulation: It's critical to create non-comedogenic goods that don't clog pores in order to guarantee that herbal sunscreens work for all skin types. Botanical extracts and light herbal oils can hydrate without piling up pimples.

Results:

A broad spectrum of absorbance is necessary for a sunscreen product to be effective in preventing sunburn and other skin damage. Spread ability and viscosity are the main factors that influence the acceptability of a cosmetic product during handling and storage. There was no redness, inflammation, or irritation with the prepared cream. After the formulation was stored for a lengthy period, the cream's color did not alter. Using tap water to wipe it off made removing the lotion simple.

Conclusion:

The goal of the study was to create a herbal sunscreen lotion by extracting the blossom from the butterfly pea and testing its effectiveness in avoiding sunburn.

Keywords: - sunburn, Asian pigeowings, herbal sunscreen, SPF (sun protection factor)

INTRODUCTION: -

Herbal sunblock is another name for herbal sunscreen. A lotion, spray, or other topical treatment called herbal suntan lotion helps shield the skin from UV rays from the sun, preventing sunburn and other skin damage. Sunscreen is divided into two categories. Sunblock

1) Physical sunscreen

Those that reflect the sunlight.

2) Chemical sunscreen

Those that absorb the UV light

Sunscreen agents should only be applied externally. The application of sunscreen as a UV protection agent and photoprotectant. The ability of sunscreen formulations to prevent UV-induced sunburn and their chemopreventive action determine which sunscreen applications, when applied topically, shield the treated region from sunburn. UV radiation from the sun causes a number of skin conditions, including sunburn, pigmentation, early aging, and photocarcinogenesis. The primary mechanism of UV radiation-induced skin damage is the production of Reactive Oxygen Species (ROS), which interact with proteins and lipids to modify them. UVA radiation is also partially responsible for this damage. For sunscreen to be effective in preventing photoaging and skin cancer, it should contain antioxidant agents in addition to sunblock agents. Owing to their potential as antioxidants, plants are a popular choice for sunscreen formulations that aim to prevent sun-induced skin damage. A topical substance called sunscreen shields the skin from the sun's damaging rays.

Classification of sunscreen and the mechanism of photo protection

Depending on how it is applied, sunscreen can be categorized as systemic or topical. Topical sunscreen is split into two groups according to how it works. natural sunscreen Natural Sunscreen

Organic sunscreen

The way that organic sunscreen functions is by penetrating the skin and turning UV radiation into heat. Because of its thinness and suitability for daily use, skincare components can be added with ease. Chemically, an organic sunscreen contains carbon-based compounds. Its active ingredient is a single mineral.

Inorganic sunscreen

Sunscreen without ingredients These particles serve as a physical barrier to harmful ultraviolet and UV light, scattering and reflecting UV rays back to the surrounding environment. Since they cover the whole UV spectrum, they are regarded as broad spectrum. Another name for inorganic sunscreen is sunblock.

Mechanism of photo protection

It has been shown that using sunscreen increases the skin's resistance to UV exposure by preventing and reducing the harmful effects of ultraviolet solar radiation. They employ two methods. Inorganic sunscreens function on this process by reflecting and scattering UV radiation off the skin's surface, creating a layer that prevents sun rays from passing through the skin. Organic sunscreen operates on this mechanism by absorbing UV light and converting it to heat energy, which lessens the detrimental effects and reduces the depth at which the skin can be penetrated. Sunscreen without ingredients

Plant Profile

ALOE VERA

Botanical name for aloe Vera is Aloe Barba dense miller.

Appearance:

Succulent plants like aloe vera usually reach heights of 24-39 inches (60-100 cm). Its green, fleshy, thick leaves can reach lengths of 12 to 19 inches (30 to 50 cm). The leaves contain a gel-like material inside of them and spiky, serrated edges. Yellow tubular flowers on a stem resembling spikes bloom on the shrub.

Constituent and nutritional value:

More than 75 active ingredients, including vitamins, minerals, enzymes, polysaccharides, and amino acids, are found in aloe vera. A transparent gel that is high in water, polysaccharides, and glycoproteins can be found inside the leaves. A yellow sap with laxative qualities called aloin is found on the leaf's outer rind. In addition, aloe vera is a good source of calcium, magnesium, zinc, and chromium, as well as vitamins A, C, and E.

Uses

utilized in many different products, including as nutritional supplements, herbal medicines, cosmetics, and skin care items. Skin irritations, small wounds, and sunburns are among the primary conditions it is used to treat.

Aloe Vera may potentially have antioxidant and anti-inflammatory qualities, according to certain research.

BUTTERFLY PEA FLOWER

Native to Southeast Asia, the butterfly pea blossom is scientifically known as *Clitoris ternate*. It is a herbaceous perennial plant in the Fabaceae family. The plant is distinguished by its vivid blue blossoms, which have been historically utilized for a variety of purposes, such as culinary and medicinal uses.

***Pharmacology properties:***

The butterfly pea blossom is well-known for having a high concentration of bioactive substances such as tannins, alkaloids, and flavonoids. These substances support the pharmacological characteristics of the plant, which include antibacterial, neuroprotective, anti-inflammatory, and antioxidant activities. These qualities have led to studies on the flower's potential advantages in treating a range of medical ailments.

1. **Antioxidant Activity:** The antioxidant properties of butterfly pea flower help in combating oxidative stress and reducing cellular damage caused by free radicals. This makes it beneficial for
2. Overall health and well-being.
3. **Anti-Inflammatory Effects:** Studies have shown that butterfly pea flower possesses anti-inflammatory properties that may help in reducing inflammation in the body. This could be
4. Beneficial in managing inflammatory conditions.
5. **Antimicrobial Properties:** The antimicrobial activity of butterfly pea flower makes it effective against certain bacteria and fungi. This property can be utilized in treating infections and
6. Promoting overall immune health.
7. **Neuroprotective Benefits:** Some research suggests that the bioactive compounds present in butterfly pea flower may have neuroprotective effects, potentially aiding in cognitive function and brain health.

Chemical Constituent:

1. **Flavonoids:** Butterfly pea flowers contain flavonoids such as quercetin, kaempferol, and myricetin, which also contribute to their antioxidant activity and potential health effects.
2. **Alkaloids:** Some alkaloids have been identified in butterfly pea flowers, although their specific types and concentrations can vary. Alkaloids are often biologically active compounds with diverse effects.
3. **Triterpenoids:** These compounds are found in various plant species and may have medicinal properties, although their specific role in butterfly pea flowers is not as extensively studied.
4. **Sterols:** Butterfly pea flowers contain sterols, which are important components of cell membranes and may have various physiological effects.
5. **Tannins:** Tannins are polyphenolic compounds found in many plant species. Beside their UV absorbing properties, the significant antioxidant and radical scavenging characteristics of tannins make them interesting cosmetics components with possible skin preserving and ant wrinkle activity.

Uses for sunscreen formulation:

- **Natural UV Protection:** Butterfly pea flower extract contains antioxidants that help protect the

Skin from harmful UV rays. It can potentially act as a natural sunscreen ingredient, offering Protection against both UVA and UVB rays.

- **Anti-inflammatory Properties:** The plant has anti-inflammatory properties that can help soothe Sun-exposed skin and reduce redness or irritation caused by sun exposure.
- **Skin Hydration:** Butterfly pea flower extract is known for its hydrating properties, which can help Maintain skin moisture levels when incorporated into sunscreen formulations.
- **Antioxidant Activity:** The plant is rich in antioxidants like flavonoids, which can neutralize free Radicals generated by UV exposure and prevent oxidative damage to the skin.
- **Skin Brightening:** Butterfly pea flower extract is also believed to have skin-brightening effects, This can help even out skin tone and reduce the appearance of sun-induced hyperpigmentation.

3. *COCONUT OIL:*

Coconut oil prevents premature skin aging and maintains the skin's smoothness and softness. Use coconut oil on your skin to exfoliate and hydrate. Coconut oil moisturizes dry skin, even in those who have eczema or other skin conditions. Its antimicrobial, antifungal, and antiviral qualities aid in wound healing by preventing skin damage from free radicals. Because coconut oil contains anti-inflammatory qualities that lessen skin redness, it can help with issues affecting both dry and oily skin types.



Chemical Composition

The meat or kernel of mature coconuts that are taken from the coconut palm (*Cocos nucifera*) is where coconut oil is produced. It is a fatty oil. The medium-chain triglycerides (MCTs) in the oil, including lauric acid, caprylic acid, and capric acid, have been linked to a number of health advantages.

Pharmacodynamics

The MCT content of coconut oil is the main factor influencing its pharmacodynamic properties. In contrast to long-chain triglycerides, which are frequently present in other dietary fats, these fatty acids are digested differently. MCTs are quickly absorbed and sent straight to the liver, where they can either be metabolized into ketones or used as an energy source. Studies have demonstrated the neuroprotective properties of ketones, suggesting their potential utility in the treatment of epilepsy and Alzheimer's disease.

Pharmacokinetics

Following consumption, the gastrointestinal tract hydrolyzes coconut oil to release its constituent MCTs. The portal vein is then used to absorb and deliver these fatty acids to the liver. MCTs are rapidly oxidized and metabolized in the liver, which increases thermogenesis and energy expenditure. This process results in the production of ketone bodies, which can pass across the blood-brain barrier and provide brain cells with an alternate energy source.

ROASE WATER:

Rose water has vitamin B, which is frequently found in sun products and sunscreen. It contributes to increasing SPF's efficacy. Rose water is a useful tool for reducing skin discoloration. 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. Gulabjal is a moisturizing and nourishing substance that shields skin from damaging environmental aggressors. Its antioxidant levels combat free radicals and maintain the skin's radiance. Rose petals are steeped in water to create flavored rose water. Because of its attractive scent and possible health advantages, it is frequently used in cooking, cosmetics, and aromatherapy.

Botanical Information:

Scientific Name: Rosa damascene

Family: Rosacea

Genus: Rosa

Species: R. damascene

**Cultivation:**

- Rose water is typically produced through steam distillation of rose petals.
- The Rosa damascene plant is native to the Middle East but is cultivated in various regions worldwide for its aromatic flowers.

Uses:

- Skincare: It is a common ingredient in skincare products due to its hydrating and soothing properties. It can help tone the skin and reduce redness.
- Aromatherapy: The fragrance of rose water is believed to have calming effects and is often used. In aromatherapy for relaxation.

Health Benefits:

- Rose water is rich in antioxidants and may have anti-inflammatory properties.
- It is sometimes used as a natural remedy for various skin conditions like acne and eczema.
- Ingesting rose water in moderation may also offer digestive benefits

VIT-E CAPSULE:

Extra protection against acute UVB damage and against cell mutation brought on by exposure to the sun and pollutants is provided by vitamin E. Vitamin E helps to increase skin suppleness and cleanse the skin by eliminating pollutants. Lemon juice and vitamin E together can help whiten skin. It is most well-known for improving the appearance and condition of skin. It contains anti-inflammatory and antioxidant qualities.

**Material and Method:****Material used in formulation:**

Aloe Vera	5mg
Rose water	2ml
Butterfly pea flower extract	4ml
Coconut oil	2ml
Vit-E	2cap

Method for formulation

Butterfly pea flower extract formulation: Steep around a dozen fresh or dried flower leaves in a cup of boiling water to prepare an extract of butterfly pea flowers for herbal sunscreen. Strain the liquid and throw away the leaves after about fifteen minutes. Then, the rich blue water is prepared for use in sunscreen formulation.

Butterfly pea flower contain
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 the extract from butterfly pea flowers. Then, since aloe vera gel has been shown to both treat and prevent skin burns, I started taking it. After that, rose water was added to the mixture; this has a cooling effect. Next, add vitamin E and coconut oil gradually. Using a spatula, all the ingredients were thoroughly combined for 20 to 30 minutes before being placed.



Evaluation Parameter:

Effectiveness of sunscreen:

Sunscreen protection factor (SPF) is a common metric used to express sunscreen effectiveness. To determine the SPF in vitro, a quick, easy, and accurate way is to screen the product's absorbance between 290 and 320 nm at intervals of 5 nm. The Mansur equation, which is as follows, can be used to compute SPF.

• **SPF spectrophotometric** = $CF \times EE(\text{wavelength}) \times I(\text{wavelength}) \times \text{Abs}(\text{wavelength})$

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

The value of $EE \times I$ constants.

• PH of the cream:

Standard buffer solution was used to calibrate the PH meter. The pH of the cream was determined after 0.5 of it was weighed, dissolved, and added to 50.0 milliliters of distilled water.

• Homogeneity:

The uniformity of the formulations was assessed by both tactile and visual inspection. Look: The color, pearlescence, and roughness of the cream were used to score its appearance.

• Removal:

By using tap water to wash the area where the cream was applied, the cream's ease of removal was evaluated.

• Irritancy test:

After applying the cream to the designated area, the time was recorded. For up to 24 hours, irritability, erythema, and edamame were monitored and reported at regular intervals.

• After feel:

After applying a predetermined amount of cream, the degree of emollience, slipperiness, and residue were assessed.

• Type of smear:

Following cream application, the kind of film or smear that developed on the skin was examined.

Observation Table:

Srno	Parameter	Observation
1.	Color	Light green yellow
2.	Odor	Characteristics
3.	Taste for Irritancy	no
4.	Spread ability	Good & uniform
5.	PH	6.5

Summary and Conclusion :

The goal of the study was to create a herbal sunscreen lotion by extracting the blossom from the butterfly pea and testing its effectiveness in avoiding sunburn. The goal of the current study was to develop a stable, SPF-appropriate herbal sunscreen. The SPF ratings of the coconut oil-based sunscreens (F5 and F6) were found to be high—33.43 and 33.50, respectively—and to be stable, with good antioxidant activity. It has also been demonstrated that these natural sunscreens are not carcinogenic. It may be said that the current research will hopefully result in better ways to treat sunburns brought on by exposure to UV light. The study also shows that the most effective, reliable, and repeatable method for assessing the efficacy of herbal sunscreens is UV Spectroscopy. Therefore, the results of this study can aid in the establishment of uniform standards for herbal sunscreens by producers, scientific associations, and regulatory bodies.

A broad spectrum of absorbance is necessary for a sunscreen product to be effective in preventing sunburn and other skin damage. Spread ability and viscosity are the main factors that influence the acceptability of a cosmetic product during handling and storage. There was no redness, inflammation, or irritation with the prepared cream. After the formulation was stored for a lengthy period, the cream's color did not alter. Using tap water to wash the lotion off was a simple process.

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