International Journal of Pharmaceutical and Medicinal Research

Journal homepage: **www.ijpmr.org**

Review Article

Herbal Cream Formulations with Ultraviolet Protection: A Comprehensive Review

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ARTICLE INFO:

Article history:
Received: 19 October, 2025
Received in revised form: 18 December , 2025
Accepted: 5 February, 2026

Keywords:
Herbal cream, Sunscreen, UV radiation, Aloe vera, Turmeric, Neem,

ABSTRACT

Herbal creams are the topical formulations prepared using natural plant-based ingredients. They are also widely used for moisturising, protecting, and healing the skin. Recently, herbal sunscreen creams have gained attention as natural alternatives to chemical sunscreens for protection against harmful ultraviolet (UV) radiation. This review discusses the formulation, preparation, evaluation, and benefits of herbal creams, including those designed for UV protection. These formulations can be evaluated by using various evaluation parameters like pH, viscosity, irritancy, spread ability, microbial growth, thermal stability, homogeneity, acid value, saponification value, accelerated stability studies, patch test, smear test, after feel, washability, physical properties, dye test, after feel, in vitro diffusion study, etc.

Introduction

Creams are semisolid emulsions that are applied topically to the skin. They are designed to deliver active substances for medicinal or cosmetic uses. Because they contain bioactive substances obtained from natural sources that are safer and more biocompatible than synthetic agents, herbal lotions are becoming more and more popular[1]. These formulas offer efficient skincare remedies by fusing contemporary pharmaceutical methods with the conventional application of medicinal herbs. The majority of the ingredients in traditional creams were synthetic and artificial, and while they were effective, they frequently irritated sensitive skin and caused allergies and long-term negative effects. These synthetic components frequently upset the skin's natural equilibrium and reduced its barrier of defence. Concerns regarding safety were raised by these formulations over time, which prompted customers to switch to kinder, plant-based substitutes that are more skin-friendly and effective [2].

In recent years, there has been a significant surge in customer demand for herbal beauty products. A variety of advantageous qualities, including antibacterial, emollient, antiseptic, anti-inflammatory, and antioxidant activities, should be present in plant parts used to make cosmetics. Compared to synthetic chemicals, these natural components are usually gentler, kinder to the skin, and have less adverse effects. Additionally, herbal ingredients thoroughly nourish the skin and enhance its general texture and look. Additionally, customers' interest in herbal beauty products has increased due to growing awareness of sustainability and chemical-free skincare.

Aloe vera (Aloe barbadense Miller) and turmeric (Curcuma longa) are two commonly used medicinal plants with potent therapeutic and cosmetic properties. Curcumin, which is found in turmeric, has strong anti-inflammatory, antioxidant, antibacterial, and wound-healing properties. Aloe vera gel has calming, hydrating, anti-inflammatory, and skin-healing properties since it is high in polysaccharides, vitamins, and minerals. Both plants are frequently utilised in herbal remedies to treat burns, acne, skin infections, inflammation, and general skin health. They are widely used in pharmaceuticals, cosmetics, and traditional healing systems because of their inherent safety profile and wide range of medicinal usefulness [3].

History of Herbal Creams:

Herbal creams draw deep from their ancient roots, most of which originated from the earliest medicinal practices that employed the use of plants for therapeutic advantages in many diseases. The history of using herbs in topical preparations is considered to be thousands of years old, and evidence of this practice has been obtained in ancient civilisations such as Egypt, China, India, Greece, and Rome. Among the very first to make topical ointments or creams containing herbal extracts were the Egyptians. If merged herbs like aloe vera with different plant oils to prepare salves, which help to heal skin wounds, infection and burns. Cleopatra, too, was known for her skincare routines, which included herbal components. Varied herbs were combined in India, particularly in the Ayurvedic system-one of the oldest and most compact systems of natural healing-which traces its history for more than 5,000 years. In this setting, Ayurvedic practitioners produced herbal lotions that included Mint, Tulsi, neem, turmeric, and sandalwood. These preparations were applied for wound healing, soothing skin inflammation, and treating various diseases. Cosmetics are products generally used to beautify and purify the skin[4].

HERBAL CREAMS

Herbal creams are emulsions that contain oil and water. They may include contents such as neem, papaya, aloe vera, Tulsi, and turmeric. Herbal creams can include different tinctures, extracts, and essential oils. Herbal creams also have vitamins and minerals, which are natural nutrients and are free of synthetic supplements that may be toxic [5].

Types of Creams Based on Emulsion

Creams are mainly of two types based on their emulsion nature:

- **Oil-in-Water (O/W) Creams:** These are non-greasy and easily washable, ideal for cosmetic use such as moisturising and fairness creams.
- **Water-in-Oil (W/O) Creams:** These have a higher moisturising effect and are oily. Like cold creams, they are typically utilised for defensive and therapeutic purposes [6].

Ideal Properties of a Cream

- Smooth and uniform texture.
- Good consistency and spread ability [7].
- Pleasant odour and appearance.
- PH compatible with skin (5.5–6.5).
- Stability without phase separation.
- Non-toxic and non-irritant to skin.

Ideal properties of sunscreen

- Must absorb a broad range of UV rays, causing sunburn [8].
- Must be stable in the presence of sunlight.
- Should be able to provide complete protection for the skin.
- Should be safe, effective, chemically inert, and at low concentration.
- Should not cause irritation, sensitisation and toxicity.
- Activity against UVB and UVA radiation.
- Anti-oxidant and reactive oxygen species scavenging property.
- Anti-mutagenic property.
- Anticancer property.
- Booster effect.

Components Used in Herbal Cream Formulation

Table No.1: Components used in herbal formulation

Component Type	Examples	Function / Role
Aqueous Phase	Distilled water, Rose water	Acts as the base; it provides hydration and helps to dissolve water-soluble ingredients.
Oil Phase	Coconut oil, Almond oil, Olive oil, Beeswax	They give skin smoothness, nutrition and emollient qualities.
Emulsifying Agents	Borax, Cetostearyl alcohol, Emulsifying wax	Helps mix oil and water phases to form a stable cream.
Thickening Agents	Stearic acid, Cetyl alcohol	Provides thickness, texture, and stability to the cream.
Preservatives	Neem extract, Propolis	Prevents microbial growth and increases shelf life.
Perfume/Colour	Essential oils, Natural colourants	Adds fragrance and aesthetic appeal.
Active Herbal Ingredients	Aloe vera, Turmeric, Neem, Tulsi, Sandalwood, Cucumber	Provide therapeutic, soothing, and skin-protective effects.

Examples of Herbal Creams

- Aloe vera cream, Aloe vera gel, coconut oil, beeswax moisturiser and anti-inflammatory.
- Turmeric cream, Turmeric extract, sandalwood oil, Antiseptic and fairness[9].
- Neem-Tulsi cream Neem and Tulsi extract Anti-acne and antibacterial.
- Sandalwood cream, Sandalwood oil, rose water. Cooling and soothing.
- Cucumber cream Cucumber extract, glycerine, Skin hydration and freshness[10].

Aloe vera

Aloe vera is a medicinal plant that is frequently used in traditional medicine, healthcare products, and cosmetics. It has a reputation for being calming, therapeutic, and cooling. The plant's leaves are filled with a clear gel that is high in antioxidants, vitamins, minerals, and enzymes[11]

Botanical name: Aloe barbadensis Miller,
Family: Liliaceae / Asphodelaceae,
Common name: Aloe, Ghritkumari
Chemical constituents
Aloe vera contains
Vitamins A, C, E, and B12, Minerals: magnesium, zinc, and calcium
Enzymes: lipases and amylase18 or more amino acid[12]

Fig no. 1:Picture of Aloevera

Fig no.2: Aloevera gel

Medicinal Properties

Aloe vera has potent anti-inflammatory qualities that help lessen skin redness and swelling. Additionally, it efficiently hydrates and softens the skin to preserve its suppleness. Its inherent antifungal and antibacterial properties aid in infection prevention and skin protection. Aloe vera speeds up the healing of burns, wounds, and other minor ailments. Its antioxidant components also shield the skin from dangerous free radicals, preserving skin health and averting oxidative damage[13].

Products for the skin and makeup include gels and moisturisers that keep the skin moisturised. Products for controlling acne help lessen excess oil and pimples. Redness and swelling are lessened by anti-inflammatory lotions. Wrinkles and fine lines can be reduced with anti-ageing lotions. After-sun gels and sunscreens shield the skin from UV radiation and calm it after sun exposure [14].

TURMERIC

Curcuma longa rhizomes are used to make the yellow-coloured spices known as turmeric. Ayurveda, Unani, Siddha, and contemporary herbal remedies all make extensive uses of it.

Curcumin, its primary active ingredient, has potent therapeutic effects [15].

BOTANICAL INFORMATION

Botanical name: Curcuma longa

Family: Zingiberaceae

Common names: Turmeric, Haldi (Hindi), Haridra (Sanskrit)

CHEMICAL CONSTITUENTS

Curcuminoids: Curcumin, Demethoxycurcumin, Bisdemethoxycurcumin

Volatile oils: Turmerone, Atlanone, Zingiberene,

Proteins, minerals, carbohydrates

Colour, antioxidant, and anti-inflammatory properties are all attributed to curcumin[14].

Fig. no (3) Turmeric

Fig.no (4) Turmeric product

Medicinal Properties

- Anti-inflammatory agents help reduce swelling and pain. Antiseptic properties prevent infection. Antibacterial and antifungal effects are beneficial for injuries. Antioxidants protect cells from damage. Healing wound activity supports fast recovery[15,16].
- It helps treat wounds and cuts, reduces joint pain and arthritis, improves digestion, and supports immunity. It is also used for skin infections. In cosmetics, it is used in anti-inflammatory creams, face packs and masks, anti–dark spot treatments, and skin brightening creams[17].

Evaluation of Herbal Creams

The herbal cream was rated as follows. Physical Examination The developed herbal creams were further assessed using the following physical standards. The formulation's colour, Odor, consistency, and condition are examples of physical parameters[18].

a) **Colour:** The colour of the cream was observed by visual Examination: the result was given in table.

b) **Odour:** The odour of cream was found to be Traits[19].

c) **pH measurement:** The pH meter was calibrated with standard buffer solution. Around 0.5g of cream was weighed and dissolved in 50ml distilled water, whose pH was measured using the digital pH meter[20].

d) **Viscosity:** The viscosity of the formulation was measured using a Brookfield or Ostwald viscometer at 100 RPM, utilizing spindle no. 7, and at temperature 25°C. The viscosity measurements were conducted in triplicate and the average of the three values was recorded.

e) **Spredability:** The designed cream's spreadability was assessed by sandwiching a sample between two slides and applying a specific weight for a predetermined amount of time until a uniform thickness was reached. Spredability is determined by how long it took to correctly split the two slides apart. Better Spredability is indicated by the shorter time needed to successfully separate the two slides.

f) **Stability:** The stability of the prepared herbal cream under various storage circumstances was assessed. The cream retained its consistent consistency and did not exhibit any phase separation or discoloration during the testing period. Good physical stability was indicated by the colour and physical appearance being the same. There were no unpleasant Odors or indications of microbial development. These results imply that the formulation is stable and appropriate for long-term storage.

g) **Skin irritation test**: Mark an area (1 sq.cm) on the left-hand dorsal surface. The cream was applied to the Specified area and time was noted. Irritancy, erythema, oedema, was checked if any for regular intervals up to 24 hrs. and reported[20]

5. Common Herbal Ingredients for UV Protection

- **Aloe vera:** Aloin, aloesin Soothes skin, protects from UV damage.
- **Turmeric:** Curcumin Natural UV absorber and antioxidant.
- **Green tea:** Catechism Reduces oxidative stress caused by UV rays.
- **Sandalwood:** Santalol cooling and shielding from radiation.
- **Cucumber:** Ascorbic acid, silica Moisturising and protective.
- **Neem:** Azadirachtin, Anti-inflammatory and photoprotective

Table no.2: Example of Herbal Sunscreen Cream Formulation

Ingredients	Quantity
Aloe vera gel	10%
Turmeric extract	2%
Green tea extract	1%
Coconut oil	5%
Beeswax	10%
Rose water	q.s

Evaluation Parameters

- **Sun Protection Factor (SPF):** SPF measures the sunscreen's ability to protect skin from UVB rays. It is determined by in vitro or in vivo methods using spectrophotometry (the Mansur equation). Herbal extracts like aloe vera, turmeric, and green tea have natural SPF activity
- **Physical Parameters:** The preparation should be evaluated for appearance, colour, and homogeneity
- **pH Measurement**: pH determines product skin compatibility and chemical stability
  Ideal range for herbal creams: 5.0–7.0.
  Measured using a digital pH meter at intervals (0, 7, 15, 30, 60 days).
- **Stability:** Stability testing ensures that the herbal sunscreen maintains its physical appearance, viscosity, SPF, and pH under various storage conditions (temperature, humidity, light)

- **Viscosity:** The formulation's viscosity was measured at 100 RPM using a Brookfield or Ostwald viscometer with spindle
- **Spread ability:** Indicates how easily the cream spreads on the skin surface. Higher spread ability ensures uniform protection and better cosmetic acceptability.
- **Skin irritation test:** Patch test or Draize test performed on volunteers or animals to check for redness, itching, or irritation caused by herbal ingredients

FUTURE SCOPE

Standardization of herbal Ingredients

Because of variations in soil, temperature, plant species, and extraction techniques, the quality of herbal extracts varies. To guarantee constant quality, future research should concentrate on creating standardised extraction methods and finding stable phytochemical markers

Advanced formulation techniques

Herbal creams based on nanotechnology, such as liposomes, Nano emulsions, and herbal nanoparticles, can greatly increase skin penetration, stability, and SPF. The application of nano-herbal sunscreen compositions may be investigated in future research.

Clinical Evaluation and safety studies

Long-term safety studies are lacking for the majority of herbal creams. Clinical trials to assess efficacy, irritation potential, photostability, and allergic reactions in wider populations should be part of future studies.

Combination formulation:

To increase protection and promote skin health, multi-herbal synergistic formulations including antioxidants, anti-inflammatory herbs, and natural UV filters could be developed.

Stability Enhancement:

Future research can concentrate on natural preservatives, encapsulating methods, and antioxidant stabilizers to increase storage stability without the use of artificial chemicals because herbal creams have a short shelf life.

Conclusion

Herbal creams, including sunscreen formulations, are safe and effective alternatives to chemical-based skincare products. They combine moisturising, healing, and UV protective properties. The incorporation of herbs like Aloe vera, Turmeric, Neem, and green tea enhance photo protection and skin nourishment. Herbal creams have the potential to be quite important in the contemporary dermatological and cosmetics sectors with more research and standardization.

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Source of support: Nil, Conflict of interest: None Declared