

JOURNAL OF BIOTECHNOLOGY AND FOOD ENGINEERING

Volume: 2 Issue: 1
January-March, 2024
ISSN: 2959-0116



DOI:

<https://doi.org/10.5281/zenodo.10934946>

Research Article



 **KMF Publishers**
www.kmf-publishers.com/jbfe/

OPEN  ACCESS

Formulation and Development of Sunscreen Stick by Calendula Oil

Mandan Savita, Patil Jeevan, Patil Neha

Department of Cosmetic Technology, R. C. Patel Institute of Pharmaceutical Education and Research, Shirpur, Dhule (MH), India

ABSTRACT

There are a lot of different types of sunscreen products (Cream, lotion, Spray, Gels, Sticks, Powders, Oils) that are available in the market. Sunscreen products that contain strong active ingredients. Those ingredients can cause sun exposure and properties to absorb, reflect, and scatter UV radiation. According to their wavelength, ultraviolet light can be classified as UVA, UVB, or UVC. It is determined that UVA stands for aging and UVB for burning. One definition of sunscreen is its capacity to shield skin from scorching UV rays. Per the guidelines set forth by the USFDA and COLIPA, the SPF of a sunscreen product is determined by dividing the minimal erythema dose (MED) of skin protected by sunscreen by the MED of exposed skin and carried out on live human subjects in vivo. The sticks were prepared by using different types of waxes and oils. Main active is calendula oil the oil obtained from calendula flower with the help of Clevenger's apparatus. You can use calendula oil to shield your skin from UV rays. The SPF of calendula oil in formulation is 14-16. Calendula oil can be maintaining the natural pigment of our skin. Oil also used to reduce inflammation, healing wounds, and calming and softening the skin. The stick is helpful for directly applying sunscreen to a narrow area of the body, like the forehead, lips, or nose. The stick is Water-repellent substances because they contain oils and waxes, but they are costly to make.

ARTICLE HISTORY

Received 6 January 2024

Revised 20 February 2024

Accepted 25 March 2024

KEYWORDS

Minimal erythema dose (MED),
Clevenger's apparatus

CONTACT Mandan Savita Email: a.mandan@rediffmail.com

INTRODUCTION

Sunscreens are products that are applied to the skin to shield it from the damaging effects of ultraviolet (UV) radiation from the sun. There are numerous brands of sunscreen with different ingredients available. The active components function by scattering, reflecting, or absorbing part or all of the sun's rays. The majority of sunscreen products are made up of different ingredients. Products containing sunscreen are available for purchase as sticks, lotions, creams, gels, oils, sprays, and lip balms and, be purchased without a doctor's prescription. (3) Based on their wavelengths, the following three categories of ultraviolet light exist: UVA, UVB, and UVC. The ozone layer covers the earth and blocks UVC, which has the shortest wavelength. The major health effects that increase with ozone layer depletion are the main source of concern. (6) UVC light exposure would have. The next shortest wavelength, UVB light, is known as tanning light because it is light in this range that encourages skin formation Although UVB light only reaches the skin's outermost layer, it can exacerbate the effects of UVA light and encourage the growth of squamous and basal cell carcinomas. The melanin pigment that tans the skin. Longwave radiation from the sun called ultraviolet A penetrates the skin more deeply than UVB and results in skin leathering and wrinkles. (5) UVA radiation harms connective tissue, with Melanoma-causing light, the most severe cutaneous cancer. The goal of the current investigation was to examine the sunscreen properties of an herbal formulation. Studies on the sun protection factor (SPF) of calendula flowers' essential oil have not been found hortense L. (Asteraceae). The study looks into the in vitro SPF using Calendula's ultraviolet

spectrophotometry method. floral oil in a cream-based formula. Clevenger's apparatus was used to isolate calendula oil, GC-MS was used to identify compositions, and homogenization was used to prepare the oil's cream before it was assessed for physical characteristics. (7) A UV-visible spectrophotometer was used in an in vitro method to assess the sun protection factor of the cream. Calendula oil's SPF in the cream formulation demonstrated good activity ($SPF = 14.84 + 0.16$). The results of this study indicated that calendula oil cream could be applied topically to shield the skin from ultraviolet light as a sunscreen lotion and to preserve the skin's inherent pigmentation. (1)

The genus *Calendula* in the daisy family Asteraceae comprises about 15–20 species of annual and perennial herbaceous plants that are commonly Named after marigolds. *Calendula officinalis* is a fragrant, short-lived perennial herb that reaches a height of 80 cm (31 in) with lax or erect stems that are sparsely branched. The leaves are hairy on both sides, oblong-lanceolate, and measure 5–17 cm (2–7 in) in length. The margins are either entire or sporadically waved or slender teeth. The yellow inflorescences have a thick capitulum, or lower head, with a diameter of 4–7 cm, encircled by two rows of hairy bracts; in the wild, the ray florets are arranged in a single ring around the central disc florets. (8) The disc florets are tubular, hermaphrodite, and typically have a deeper orange-yellow colour than the tridentate, female florets outermost ray florets. When the right circumstances are met, the flowers may bloom throughout the entire year. The fruit, an achene with a thorny curve, weighs, on average, 10.1 mg ($n = 50$). The use of calendulas as food plants by certain Lepidoptera species' larvae

comprising a big yellow cabbage moth, Hebrew that is setaceous and underwing personality. (7)

MECHANISM OF SUNSCREEN

UV radiation has a significant negative impact on the skin, leading to sunburns, aging, precancerous and cancerous lesions, and immune suppression. Skin cancer risk is increased by UV radiation's immunosuppressive effects on the antigen-presenting cells in the epidermis. (4) There are 3 types of UV radiation: UVC, UVB, and UVA. The ozone layer absorbs 100% of UVC, 90% of UVB, and a minimal amount of UVA. Because of this, UV transmission rises when the ozone layer is reduced. UVA is linked to aging as well as pigmentation. Deeply penetrating the skin layer, it releases oxygen species that are free radicals, which indirectly damages DNA. UVA causes a decrease in antigen-presenting cells and an increase in inflammatory cells in the dermis. UVB radiation breaks DNA strands and causes sunburn. (6) It results in pyrimidine dimer mutations, which are linked to skin conditions other than melanoma tumors. Both primary and secondary protective factors are involved in photoprotection. Sunscreens are the main component; these consist of tangible obstacles that mirror and light scattering and chemical barriers that take in light. Among the secondary factors are DNA repair enzymes, osmolytes, and antioxidants that prevent skin damage by interfering with the photochemical cascade that is caused by UV light from the sun. (9)

MATERIAL & METHODOLOGY

Active profile

Calendula

Biological Source: *Calendula officinalis*

Family: Asteraceae

Kingdom: Plantae

Chemical constituent

The carotenoids flavaxanthin and triterpenoid esters are found in *Calendula officinalis* petals and pollen. the source of antioxidants, auroxanthin the hue of yellow-orange. Other carotenoids, primarily lutein (80%), zeaxanthin (5%), and beta-carotene, are present in the leaves and stems. Additionally, widely used are plant extracts. by makeup, most likely because of the existence of substances like resins, saponins, and essential oils. *Calendula officinalis* flowers (9) contain oleanane type, flavanol glycosides, and triterpene oligoglycosides. saponins, triterpene glycosides, and glucoside sesquiterpene. Flowers of calendula are abundant in lutein-containing 29.8 mg per 100 grams. (5)

EXPERIMENTAL WORK

Extraction process of active ingredients

The botanical garden provided fresh calendula flowers, whose petals were cut off and thoroughly cleaned under water that was flowing. Following the complete removal of excess water, the petals were carefully packed into a Clevenger's distillation flask. apparatus with an adequate volume of water and a few pieces of porcelain chippings to avoid jolting during the extraction procedure for eight hours, the extraction was carried out. (4) Calendula oil was taken from a

graduated receiver and cleaned to get rid of any traces of water using anhydrous sodium sulphate. It was discovered that the oil yield that was obtained was 1.25%. (10)

Formulation

Table 1: formulation table of sunscreen stick

Sr. No	Ingredients	Qty. for 100%
1	Mineral oil	8%
2	Castor oil	15%
3	Bees wax	20%
4	Lanolin	5%
5	Cetyl alcohol	2%
6	Isopropyl myristate	2%
7	Ozokerite wax	15%
8	Carnuba wax	7%
9	Propylene glycol	8%
10	Colour	1-2%
11	Perfume	1-2%
12	Butylated hydroxytoluene	1-2%
13	Calendula oil	15%

Procedure

- Every piece of equipment needs to be thoroughly cleaned and washed.
- All the components except perfume and colour were taken in a one beaker.
- Then this phase Bring the temperature up to 70–75°C.
- The heating material was constantly stirring.
- It is important to accurately record the temperature of the heated material When the mixture reaches that temperature, turn off the heat. The "Calendula oil" is 45°C. incorporated into the item and blend well.

- Then added colour and perfume to the product. Prepared product filled in a suitable container, labelled the container and submitted the preparation. (2)

Use of product

Sticks are easy for under the eyes and the backs of the hands. It's important to take precautions when using stick sunscreens to ensure the best protection for you and your family. Sticks are effective when used on small, targeted areas (like the nose, tops of your ears, and shoulders). (9)

RESULT AND CONCLUSION

Result

Table 2: Evaluation parameters with their results

Sr No.	Evaluation parameters	Inference
1	Colour	Pale yellow
2	Surface Tension	No defects
3	pH	9.5-10.5
4	Melting point	55oC
5	Breaking point	37 gm
6	Thixotropy character	7.2 cm
7	Force application	Good
8	Skin irritation test	No

CONCLUSION

The study to attempted to exact out calendula oil from the ‘Calendula officinalis’ its application in the sun screening agent. The calendula oil was extracted/isolated. The prepared sunscreen stick was evaluated using various parameter and was found to be satisfied for application on the skin to make it health and protect from sun-light without ant side effects.

REFERENCES

1. Sayre RM, Agin PP, Levee GJ, Marlowe E. Comparison of in vivo and in vitro testing of sunscreens formulas. *Photochem Photobiol* 1979; 29:559-66.
2. Indian Pharmacopoeia. Vol. 2. Government of India: Controller of Publications; Government of India, Ministry of Health and Family Welfare; 1996. p. A70-4.
3. K. Niharika et al. Formulation and evaluation of cinnamon oil sticks, roll-ons for analgesic, anti-inflammatory and antiarthritis effect. *Int. Res. J. Pharm.* 2018;9(7):136-139
4. Mishra AK, Mishra A, Chattopadhyay P. *Calendula officinalis*: An important herb with valuable therapeutic dimensions-An overview. *J Glob Pharm Technol* 2010; 2:14-23.
5. Indian Pharmacopoeia. 1(A)(pp50,93). Controller of publication. Delhi government of India. Ministry of Health and Family welfare.
6. Braga PC, Dal SM, Culici M, Spallino A, Falchi M, Bertelli A, et al. Antioxidant activity of *Calendula officinalis* extract: Inhibitory effects on chemiluminescence of human neutrophil bursts and electron paramagnetic resonance spectroscopy. *Pharmacology* 2009; 83:348- 55.
7. Rautela Sunil, Tailor Chandra Shekhar, Badola Ashutosh. Formulation and Evaluation of a Herbal Lipstick: A New Approach. *International Journal of Pharmaceutical Erudition* 2013; 3(1): 26-30.
8. COLIPA, CTFA-SA, JCIA. International Sun Protection Factor (SPF) test method (COLIPA-The European Cosmetic Toiletry and Perfumery Association; CTFA-SA- Cosmetic, Toiletry and Fragrance Association of South Africa; JCIA Association), 2003. 1 Japan Cosmetic Industry
9. Mittal B.M. and Saha R.N. *Handbook of Cosmetics*. A Vallabh Prakashan. 2003; 1st ed:132-56.
10. Paye, M., Barel, A., Maibach, H, (2008). *Handbook of Cosmetic Science and Technology Special Indian Edition*. (pp. 611-612). New York London.