



FORMULATION AND EVALUATION OF HERBAL SUNSCREEN

1)Eknath Kautikrao More, 2)Anand Gajanan Mapari, 3)Dattatray Dnyaneshwar Pande, 4)Sunny Pralhad Mapari, 5)Dnyaneshwari Ram Patil , 6)Harshal Ananta Magar,7) Dr. Kailash R. Biyani, 8)Prof. Suraj D.Sagrule.

(1-6) Ug Student, Anuradha College of Pharmacy Chikhli Buldana

(7):- Principal of Anuradha College of Pharmacy Chikhli Buldana, (8):- Associate Professor , Anuradha college of pharmacy chikhli.

Eknath Kautikrao More, At-Sakegaon Buldana, 443201, India (moree9915@gmail.com)

Anand Gajanan Mapari, At-Golegaon BK, shegaon, 444203, India (anandmapari25@gmail. Com)

ABSTRACT :

Sunscreen is a crucial component of skincare, protecting the skin from the harmful effects of ultraviolet (UV) radiation. Traditional chemical sunscreens have raised concerns about their safety and environmental impact. In response to these concerns, there has been a growing interest in formulating herbal sunscreen. Herbal sunscreen also known as 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 reduces sunburn. Herbal sunscreens leverage the natural properties of plant-based ingredients to provide UV protection. The use of herbs and botanicals for sun protection has been practiced for centuries in various cultures. Herbal sunscreens aim to offer a more sustainable and eco-friendly alternative to conventional sunscreens. The formulation of herbal sunscreens is rooted in the principles of natural and holistic skincare. These formulations often utilize a blend of herbs, oils, and other natural ingredients. Herbs like aloe vera, green tea, and lavender are commonly incorporated into herbal sunscreen recipes. The synergy of multiple herbs can enhance the overall UV protection and skin benefits. Sunscreen should contain an antioxidant agent in addition to a sunblock agent to be effective in prevention of photo aging and skin cancer

Keywords :- Herbal, sunscreen, SPF, Skincare, UV-protection, Herbal-sunblock.

1. Main text (Introduction)

Cosmetics Purpose of Cosmetics is cleansing, beautifying or altering appearance and enhancing the beauty. Exposure of skin to sunlight and other atmospheric conditions causes production of Reactive Oxygen Species (ROS). ROS react with DNA, Protein and Fatty acids causing oxidative damage and impairment of antioxidant system. The herbs or herbal extracts act on these areas and produce healing, softening, rejuvenating and sunscreen effect. The solar spectrum at the earth's surface (sea-level): 290 to 3000 nm. The spectrum implicated in human skin reactions involves wavelengths up to 1800 nm. Ultra-violet radiation is subdivided into three bands: UVA (320-400 nm), UVB (290-320 nm) and UVC (200-290 nm). Ultraviolet irradiation is involved in the pathogenesis of skin cancers, photosensitive diseases, photoallergic or phototoxic drug reactions and may affect biomolecules of the skin. Sunscreen is a crucial component of skincare, protecting the skin from the harmful effects of ultraviolet (UV) radiation. Traditional chemical sunscreens have raised concerns about their safety and environmental impact. In response to these concerns, there has been a growing interest in formulating herbal sunscreens. Herbal sunscreen also known as 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 reduces sunburn. Herbal sunscreens leverage the natural properties of plant-based ingredients to provide UV protection. The use of herbs and botanicals for sun protection has been practiced for centuries in various cultures. Herbal sunscreens aim to offer a more sustainable and eco-friendly alternative to conventional sunscreens. The formulation of herbal sunscreens is rooted in the principles of natural and holistic skincare. These formulations often utilize a blend of herbs, oils, and other natural ingredients. Herbs like aloe vera, green tea, and lavender are commonly incorporated into herbal sunscreen recipes. The synergy of multiple herbs can enhance the overall UV protection and skin benefits. Sunscreen should contain an antioxidant agent in addition to a sunblock agent to be effective in prevention of photo aging and skin cancer

2 Herbal sunscreen is a type of sunscreen formulated using natural plant-based ingredients, herbs, and botanical extracts to provide protection against the harmful effects of ultraviolet (UV) radiation from the sun. These natural ingredients are used to create a product that offers sun protection while avoiding or minimizing the use of synthetic chemicals found in traditional sunscreens. Herbal sunscreens are often considered a more holistic and eco-friendly approach to sun protection, as they harness the natural properties of herbs and botanicals to shield the skin from UV damage.

Sun Protection Factor Efficacy of Sunscreen: The ability of sunscreen to protect the skin against UV-induced burning, with the level of performance. It is characterized by the Sun Protection Factor (SPF). It is a numerical rating system to indicate the degree of protection provided by a sun care product like sunscreen. Sun Protection Factor is defined as: The minimal erythema dose (MED): "The lowest time interval or dosage of UV light radiation sufficient to produce a minimal, perceptible erythema on unprotected skin. [7][8] The in-vitro methods for assessing the photoprotection: 1. Transpore Tape:

Methods that involve measurement of absorption or transmission of UV radiation through sunscreen product films in quartz plates or biomembrane. 2. Spectrophotometer Measurement: Spectrophotometric analysis of dilute solution of sunscreen.

Nomenclature or types of herbal sunscreen :

There are several types of herbal sunscreens, each with its own formulation and characteristics. The types of herbal sunscreens can vary based on their ingredients, texture, and application methods. Here are some common types of herbal sunscreens:

- Cream-Based Herbal Sunscreen ,
- Gel Based Herbal Sunscreen,
- Spray Herbal Sunscreen,
- Powder Herbal Sunscreen,
- Lip Balm Herbal Sunscreen,

Structure

Simple mathematical equation which substitutes the in-vitro methods is:-

$$SPF = CF \times \sum EE(\text{wavelength}) \times I(\text{wavelength}) \times \text{abs}(\lambda) (\text{wavelength})$$

Where,

CF – Correction factor

EE – Erythrogenic effect of radiation with wavelength

Abs – Spectrophotometric absorbance values at wavelength

Values of $EE \times I$ are constant

1.1. Tables

Table 1: Normalized Product function used in the calculation of SPF

Wavelength (λ nm)	$EE \times I$ (Normalized)
290	0.0150
295	0.0817
300	0.2874
305	0.3278
310	0.1864
315	0.0839
320	0.0180
Total	1

Materials and Methods

Materials : Almond oil, Vitamin E capsule, Rose water, White beeswax, Liquid paraffin, Borax, Methyl paraben, Water.

Methods :

- 1) Research and Ingredient Selection: Select appropriate herbs, botanicals, and natural oils for the formulation.
- 2) Formulation Development: Develop the sunscreen formulation using appropriate active ingredients and excipients. Determine the SPF level and the blend of herbal ingredients for optimal sun protection.
- 3) Safety Testing: Conduct safety tests, to ensure the product is safe for skin application.
- 4) Efficacy Testing: Perform in vitro and in vivo testing to determine the product's effectiveness
- 5) Product Testing: Test the product for stability and resistance to factors like heat, moisture, and light.

Table 2 : Formula For Herbal Sunscreen Formulation :

Sr.no	Ingredients	Quantity Taken	Role
1	Almond Oil	10ml	Skin-soothing properties
2	White Beeswax	25gm	Moisturizer
3	Liquid paraffin	35ml	Reduce dryness from skin
4	Borax	10gm	Cleaner
5	Vitamin E	4 capsules	Moisturizer
6	Methyl Paraben	0.1gm	Anti-microbeal
7	Water	25ml	Reduce loss of moisture from dry skin

8	Rose Water	7ml	Perfumary agent, anti-bacteriale
---	------------	-----	----------------------------------

Evaluation Test

Tabel 3 :

Sr.no	Parameters	Observation
1	Appearance	Soft cream
2	Color	White
3	PH	7.5
4	Texture	Smooth
5	Viscosity	3060-3684

Sun Protection Factor (SPF):

Procedure :

- 1 gm quantity of formulated cream was weighed, transferred to 100 ml volumetric flask and diluted to volume with ethanol. File naming and delivery
- Further, it was kept for ultra-sonication for 5 minutes and filtered through cotton filter, discarded the initial 10 ml
- Afterwards 5 ml aliquot was transferred to 25 ml volumetric flask and the volume was adjusted with ethanol.
- The absorption spectra of samples in solution were obtained in the range of 290-450 nm using 1 cm quartz cell and ethanol as blank
- The absorption data obtained in the range of 290-320 nm every 5 mm interval and 3 determinations were made at each point

Tabel 4 :SPF Determination Of Formulation Of Herbal Sunscreen

Wavelength (nm)	EE × I	Absorbance	EE × I × Abs
290	0.0150	0.388	0.00582
295	0.0817	0.473	0.0386441
300	0.2874	0.231	0.0663894
305	0.3278	0.734	0.2406052
310	0.1864	0.504	0.0939456
315	0.0839	0.302	0.253378
320	0.0180	0.165	0.00297
SPF Total	1		0.70172
			SPF = 7.0172

Summary Of Various Evaluation Parameter In Herbal Sunscreen :-

Parameters	Observation
Appearance	Cream Like
Emulsify Type	W/O
Test For Irritancy	No Irritation
Phase Separation	No Phase Separation
Homogeneity	Uniform
PH	7.59
SPF	7.0172

Result :

Herbal sunscreen has wide application for preventing skin like as sun burns skin harms and skin related disease. PH, viscosity, homogeneity, appearance, stability are the factor affect the formulation and handling of product. Herbal-sunscreen helps to reduce redness inflammation and irritation. There is no changes occurs in long time storage of formulation of herbal-sunscreen.

The formulation has between 7-9. The herbal-sunscreen appearance like smooth white and the consistency. It provide sun-protection to skin from harm radiation. The SPF values of herbal sunscreen achieve by carrying out UV-spectrophotometry technique

REFERENCES :

1. Cengiz E, Wissing SA, Muller RH and Yazan Y. Int J CosmetSci 2006; 28: 371-378.
2. Wissing SA and Muller RH. The development of an improved carrier system for Sunscreen formulations based on crystalline lipid nano particles. Proceedings of the 13th International Symposium on Microencapsulation 2001; 5-7 September: 238-239.

3. Nesseem D. *Int J CosmetSci* 2011; 33:70–79.
4. Singh Shivani and Garg Garima. Sunscreen: An introductory review. *Journal of Pharmacy Research*, 210; 3 (8)
5. COLIPA, European Cosmetic: Sun Protection Factor Test Method Toiletry and Perfumery Association; 1994; 94: 289.
6. Medical Definitions. Definition of Sun Protection Factor. [Cited on 2011 Mar 29] Available from URL: <http://medical.yourdictionary.com/sun-protection-factor>
7. Aburjai T, Natsheh FM. Plants used in cosmetics. *Phytotherapy Res* 2003; 17: 987-1000
8. Bendova H, Akrman J, Krejci A, Kubac L, Jirova D, Kejlova K, et al. In vitro approaches to evaluation of Sun Protection Factor. *Toxicol in vitro* 2007; 21:1268-75.
9. Fourneron J.D., Faraud F, Fauneron A. Sur la mesure in vitro de la protection solaire de crèmes cosmétiques. *C R AcadSci II* 1999; 2:421-7.
10. Gordon V. C. Evaluation du facteur de protection solaire. *ParfumCosmetArom* 1993; 112:62-5.
11. Mansur JS, Breder MNR, Mansur MCA, Azulay RD. Determinacao Do Fator De Protecao Solar PorEspectrofotometria. *A Bras Dermatol Rio De Janeiro* 1986; 61:121-4.
12. Pissavini M, Ferrero L, Alaro V, Heinrich U, Tronnier H, Kockott D, et al. Determination of the in vitro Sun Protection Factor. *Cosmet Toiletries Oak Park* 2003;118:63-72
13. Walters C, Keeney A, Wigal C.T., Johnstom CR, Cornelius RD. The spectro photometric analysis and modeling of sunscreens. *J ChemEduc* 1997; 74:99-102.
14. Sayre RM, Agin PP, LeVee GJ, Marlowe E. Comparison of in vivo and in vitro testing of sun screening formulas. *PhotochemPhotobiol* 1979; 29:559-66.
15. Santos EP, Freitas ZM, Souza KR, Garcia S, Vergnanini A. in vitro and in vivo determinations of Sun Protection Factors of sunscreen lotions with octylmethoxycinnamate. *Int J CosmetSci* 1999; 21:1-5. 19
16. Urbach F. The historical aspects of sunscreen. *J. Photochem. Photobiol. B* (2001) 64:99- 104.
17. Griffiths, C.E.M.; Maddin, S.; Weidow, O.; Marks, R.; Donald A.E.; KahlonG. Treatment of photoaged skin with a cream containing 0.05 isotretinoin and sunscreens. *J. Dermatol. Treat*; 2005, 16, 79-86.
18. Svobova, A.; Psotova, J.; Walterova, D. Natural phenolics in the prevention of UV induced skin damage. A Review. *Biomed. Papers*, 2003, 147(2), 137-145.
19. Tabrizi H, Mortazavi S.A., Kamalinejad M, An in vitro evaluation of various Rosa Damascena Flower extracts as a natural antisolar agent; *Int. J Cosmetic Science* 2003;25(6):259-265.
20. Khazeli P, Mehrabani M, Abedini A, MagdZadeh. Evaluation of sun protection activity of some medicinal herbs extracts. *Iranian J.Pharm.Res.*2004; 3(2); 48-48(1).
21. Ashawat M S, Saraf S. Comparative sun protection factor determination of fresh Aloe vera Gel Vs Marketed formulation. *Indian J.Pharm.Edu.Res.*2008;47(4).
22. Deep Chanchal and Saraf Swarnlata. Herbal Photoprotective Formulation and Their Evaluation; *The open Natural Products journal*, 2009, 2, 71-72.
23. Waje A, Kale S, Ansari A, Ghoge P, Sonawane A. Formulation and in vitro evaluation of sun protection factor of Hemidesmus Indicus (L) Fam-periplocaceae Hydro-alcoholic extract sunscreen cream; *Int. J.Ph.Sci*, 2010; 2(3):664-668
24. Kale S, Waje A, Ansari A, Ghoge P, Sonawane A. Formulation and in vitro determination of sun protection factor of Ocimum basilicum leaf oils sunscreen cream *Int. J. Pharmacy. Pharm. Sci*, 2010; 2(4)
25. Patil RB, Kale S, Badiyani MD, Yadav AV. Determination of in vitro sun protection factor of Murrayakoenigii essential oil formulation. *Indian J. Pharm. Educ. Res.* 2011;44(4).
26. Golmohammadzadeh S, Reza Jaafari M, Hosseinazadeh H. Does Saffron have antisolar and moisturizing effects. *Iranian J. Pharma Res.* 2010; 9(2), 133-140.
27. Hogde M G, Patil S B, Dhumal P. Comparative sun protection factor determination of fresh extract of cucumber Vs marketed cosmetic formulation. *Res. J. Pharm, Bio, Chem, Sci.* 2010; 1(3); 55.