



Formulation And Evaluation Of Herbal Sunscreen Gel

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Abstract: Herbal cosmetics are now become more interesting by people as compared to synthetic cosmetic products. Herbal sunscreen is available in various forms which can be topically available in market formulation. The objective of this study is to collect current data regarding herbal sunscreen development, to review guidelines for its development and to overview use of herbal extract and natural molecules in herbal sunscreen. These herbal Sunscreen product protects the skin from the sun's ultraviolet (UV) radiation which helps in the reduction of sunburn and other skin problems. Its function is based on its capability to absorb, reflect or scatter the sun's rays. The sun protection factor (SPF) of a sunscreen is calculated by comparing the amount of time demanded to produce sunburn on unguarded skin. Sun protecting agents are involved in various classes of compound calculated by comparing the amount of time demanded to produce sunburn on unguarded skin. Sun protecting agents are involved in various classes of compound bearing enormous biological activities like antioxidant, anti-inflammatory effect etc. after the studies, shown that natural products (herbs) plays the essential role in sun protection by their photoprotective activity such as curcumin, garlic compounds caffeic and ferulic acid, apigenin, genistein, resveratrol, carnosic acid, silymarin, tea polyphenols, capparispinosa extract. So sunscreen is safe and easy to use by creating barrier between skin and ultraviolet radiation. [1].

Keywords: *herbal, sunscreen, UV, SPF.*

I. INTRODUCTION

Herbal Sunscreen is lotion, spray or other topical product that helps protect the skin from the sun's ultraviolet (UV) radiation, and which reduces sunburn and other skin damage with the goal of lowering the risk of skin cancer with herbes. However, in the United States, the term suntan lotion usually means the opposite of sunscreen, and instead refers to lotion

designed to moisturize and maximize UV exposure and tanning rather than block it. These are called indoor tanning lotions when designed for use with tanning beds or just suntan lotion if designed for outdoor use and may or may not have SPF protection in them.

Advantages of herbal sunscreen

- (1) Easily available.
- (2) No side effect.
- (3) No special equipment needed for preparation.
- (4) Renewable resources.
- (5) Botanical are easily available.

(6) They are inexpensive.[2]

What is SPF ?

Sun Protection Factor these system is used mostly to determine that how much the sunscreen protect when come in the contact of sun & skin. Sunscreen with SPF of 15 provides >93% protection against UVB and >97% at SPF of 30+ .

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs(\lambda)$$

where,

- CF = Correction Factor (10)
- EE(λ) = Erythral Effect Spectrum
- I(λ) = Solar Intensity of Radiation with wavelength λ
- Abs(λ) = Absorbance of the sunscreen product at wavelength λ
- EE $\times$ I = Constant Value

UV radiation:

Ultraviolet radiation also known as electromagnetic radiation of wavelength of 10-400 nanometers, shorter than that of visible light, but longer than X-rays . these radiation from the sun leading to sunburn, increases risk of skin cancer or premature aging.

II. MATERIAL & METHOD

Carbopol 940

Carbopol is an acrylic polymer. Carbopol is non-toxic and non-irritating so that it is suitable for gel preparation. Carbopol 940 is often used as gelling agent in the gel preparation. Gel formulation consist of active substance, gelling agent and other additives. [7]



fig no 2

Sunflower oil (helianthus annuus)

Sunflower oil is an oil that is obtained from sunflower seeds by pressing, cold pressing method or extraction with a suitable solvent such as hexane. Sunscreen product that contains active chemical ingredients sometime has harmful effects on the skin. Sunflower oil contains vitamin E and act as natural sunscreen which can absorb UVB light. [8]



fig no.3

Turmeric extract (curcuma longa)

Turmeric is produced by Curcuma Longa, a Zingiberaceae rhizomatous



perennial herbaceous plant. Essential oil, tannin, and curcumin are all present in this plant. The extract of curcuma longa has anti-flatulent, anti-inflammatory, anti-fungal, antiparasitic, anti-inflammatory, and anti-cancer properties. Additionally, Curcuma longa has the advantage of inhibiting apoptosis, according to a 2009 survey conducted at the University of Texas.

Fig no 4

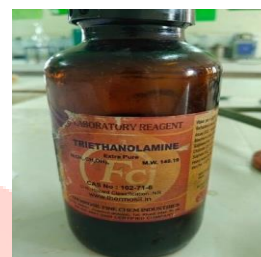
Aloe vera (aloe barbadensis)

Aloe vera is a well-known Liliaceae. This plant is a shrubby or arborescent perennial xerophytic succulent with a pea-green color. It include polyphenol components and chemicals in them. Its 75 potentially active elements include vitamin supplements, minerals, carbohydrates, enzymes, lignin, saponins, salicylic acids, and amino acids. It treated sunburns, including both first and second-degree burns. Aloe vera gel has been found to protect human skin from all harmful elements.[3]



Triethanol amine

Triethanolamine is a non active ingredient that does not have any effect on the skin but is only used to balance the PH of formulation and stabilize them. These ingredient improves the feel of the product and the way that it interacts with the skin.



Zinc oxide

Zinc oxide is a scarcely available minerals with in abilities as it works as a natural UV filters. ZnO is usual used commercially, and it also has modest anti-inflam soothe your skin and can also fight hyper-pigmentation. (Fig No 7)



Methyl paraben

Methyl paraben is a preservative used in cosmetics products, including herbal sunscreen, to prevent the growth of bacteria and mold, thus extending the products shelf life. It is used in sunscreen to prevent microbial growth and spoilage, ensuring the product remain effective and safe for prolonged use. (Fig no.8)

Olive oil (*olea europaea*)

It is a fat derived from the olive fruit. It is made up of triglyceride esters of oleic acid and palmitic acid along with traces of squalene, sterols, (phytosterols and tocosterol), and also consist of polyphenols like esters of tyrosol and hydroxyl tyrosol including oleocanthal and oleuropein. (4) (Fig No.9)



Fig
no.6

Rose oil (*rosa damascene*)

Rose oil is a non volatile oil due to these there is very little amount of odour in the petals. The antiseptic and anti-inflammatory activity of rose oil can be used for the treatment of skin. rose is used for the fragrance and is the natural source. (Fig.No.10)

Almond oil (*prunu amygdalus dulcis*)

Almond oil can offer some natural sun protection due to its vitamin E content which acts as an antioxidant. Almond oil can be used in the combination with a sunscreen to potentially enhance sun protection and provide additional benefits like hydration and nourishment. (Fig.no.11)

Tea extract oil (*camellia sinensis*)

Green and black tea extract can be used and show more benefits in the sunscreen formulation due to their antioxidant and photo-protective activities. Tea extract oil is used for reducing burning from UVB exposure. Also used for soothe skin after sun exposure. (Fig.no.12)



Fig.no10



Fig.no.11



Fig.No.12

III. Formulation composition:

Table no 1: Formulation table

S. no	Ingredient	Quantity	Uses
1	Sunflower oil	3.5 ml	natural uv protection
2	Turmeric extract	2 ml	anti-oxidant
3	Aloe vera gel with cucumber extract	4 gm	skin soothing
4	Triethanolamine	1 ml	stabilizer
5	Zinc oxide	2.5 gm	sun protection agent
6	Methyl paraben	1 ml	preservative
7	Rose oil	0.5 ml	natural fragrance
8	Carbopol 940	1 gm	gel former
9	Olive oil	1 ml	moisturizer
10	Almond oil	1 ml	moisturizer
11	Tea extract oil	1 ml	moisturizer

IV. Procedure: Method for preparation of gel

Step I : Aqueous phase preparation

Aloe vera gel, triethanol amine, zinc oxide, methyl paraben weighed accurately and dissolved in De-ionized water. At 500C temperature and cooled till 350C .Mean while carbopol was added to swell using a homogenizer and heated upto 800C .

Step II : Oily phase preparation

Sunflower oil, turmeric extract, rose oil, lemon oil, olive oil, almond oil, tea extract oil. These was heated upto 45-50 degree and cooled till 350 c .The aqueous phase was added in portion to the oil phase with continuous stirring until cooling of emulsifier took place.



Fig.No.13Carbopolswelling

V. Sunscreen Gel Formulations



Fig. No. 14 Sunscreen formulation(F₁, F₂ & F₃)

VI. Evaluation parameter

Table no.2: Evaluation parameter table

S.No.	TEST	OBSERVATION		
		F ₁	F ₂	F ₃
1	Color	light green	light green	light green
2	Odour	pleasant	pleasant	pleasant
3	Texture	liquefied	Gel	solidified
4	pH	5-6	4-5	4-5
5	Irritancy	non irritant	non irritant	non irritant
6	Viscosity	poor	Excellent	poor

VII. Result

The formulated cream based gel exhibited no redness, edema, inflammation and irritation . The texture and the uniformity of the colour was checked. The emolliency, slipperiness and amount of residue not after the application of fixed amount of cream. The cream was easily removed by washing with tap water. Formulation F₂ shows excellent result texture, pH, viscosity and other parameters in comparisons to F₁ & F₃.

VIII. Conclusions

All natural ingredients shows better result for sun protecting effect. As we had concluded here there was no side effect on human skin by our formulation. It is one of the better option than synthetic sunscreen gel / cream.

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