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FORMULATION AND EVALUATION OF HERBAL SUNSCREEN GEL

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❖ Abstract-

Sunscreen is a product that protects against harmful UV rays from the sun. UV rays are classified as UVA and UVB.
Herbal cosmetics are quite popular on the market due to their unique features and low side effects. The appeal of herbal cosmetics stems primarily from the impact produced by herbal extracts and their natural adaptability for routine usage in daily life. In addition, herbal cosmetics have less side effects than synthetic products.
This study aimed to create a cost-effective herbal sunscreen gel with latex from Aloe Barbadensis (Liliaceae) and Curcuma longa root (Zingiberaceae) to provide UV protection, antioxidant, anti-inflammatory, and anti-modulatory properties.
Sunscreen is a substance that protects against the damaging effects of the sun by encapsulating ultraviolet radiation (uv) photons, which are classified as two categories. There are two types of ultraviolet radiation: UVA and UVB. Because of their strong ultraviolet ray absorption and antioxidant action, neutral substances derived from plants have recently been considered possible sunscreen resources. Sunscreen can limit the intensity of UV radiation that reaches the skin, potentially lowering the risk of sun-induced cancer.

❖ KEYWORDS

Herbal sunscreen gel, sun protection factors (Spf), uv protection.

❖ Introduction:-

Herbal sunscreen, also known as Herbal sunscreen block or herbal sustain lotion, is a topical product that protects the skin from UV rays, reduces sunburn, and lowers the risk of skin cancer through herbal ingredients. Sunscreen protects the skin from the sun's detrimental effects, such as erythema in the short term and actinic photo-aging and skin cancer in the long term.

Sunscreens protect the skin from harmful UV radiation and lower the risk of skin disorders induced by them. Broad-spectrum sunscreen is being studied to mitigate the long-term effects of intense UV exposure.

Turmeric is generated by Curcuma longa, a zingiberaceous rhizomatous perennial herbaceous plant. This plant contains essential oils, tannins, and curcumin. Curcuma longa extract provides numerous health benefits, including anti-flatulent, anti-inflammatory, anti-fungal, anti-parasitic, and anti-cancer qualities. A 2009 study conducted at the University of Texas found that curcuma no longer inhibits apoptosis as previously thought.

Physical blockers are effective against both UVA and UVB rays. Titanium dioxide and zinc oxide are the most commonly used physical blockers. These sunscreens are chemically inert, safe, and offer full UV protection. Their only disadvantage is their unappealing visual look when applied to the skin. Micro-sized or ultrafine grades have been created by reducing particle size, resulting in less whitening. In some goods, vivid fluorescent colors were applied.

Photo protection -While sunscreen can protect against UVR, it is most effective in preventing sunburn from UVB radiation. Sunscreen alone offers inadequate UVA protection and may lead to longer outdoor exposure durations. Sun avoidance is the best way to guard against sunburn, especially for people who burn easily.

Sun protection -It is vital to protect skin and eyes from the damaging effect of the sun because exposure to Ultraviolet radiation contributes to ageing skin and is the main cause of skin cancer. The SPF can be measured by applying sunscreen to the skin of a volunteer and measuring how long it takes before sunburns occurs when exposed to an artificial sunlight source

What is spf-SPF (used sun protection factor) is a global method that measures the amount of sun protection a sunscreen provides when applied to the skin at a thickness of 2 mg/cm2. SPF 15 sunscreen offers over 93 UVB protection, while SPF 30+ increases this to 97. The effectiveness of a sunscreen depends on how much is applied, therefore the difference between SPF 15 and SPF 30 may not be evident during use. When sweating significantly or exposed to water, a sunscreen with SPF 15+ can give appropriate protection if worn correctly.

2.Sensitive skin-IF you have fair skin that burns easily you should choose a broad-spectrum sunscreen with a high SPF.

E.X. 30+ If you have skin that tans readily you could choose a broad-spectrum sunscreen with intermediate SPF. E.X. 8-15+

❖ SKIN ANATOMY

- **HIGHLIGHT OF HERBAL SUNSCREEN GEL SKIN ANATOMY**

As the body's largest organ, skin protects against germs, regulates Body Temperature and enables touch (tactile) sensations. The skin's Main layers include the Epidermis, Dermis and hypodermis and is prone to many problems, including skin cancer, acne, Wrinkles and Rashes. The outer layer of the skin has cells that contain the pigment melanin. Melanin protects Skin from the sun's ultraviolet rays. These can Burn the skin and reduce its Elasticity, leading to Premature aging. People tan because sunlight causes the skin to produce More melanin And Darken .

Three layers of tissue make up the skin:

1] Epidermis, the top layer.

2]Dermis, the middle layer.

3]Hypodermis, the bottom or fatty layer

❖ NEED :

1)Wearing sunscreen is one of the best and easiest ways to protect your skin's Appearance and Health at any age.

2) Used regularly, sunscreen helps prevent sunburn, skin Cancer and premature Aging.

3)To help make sunscreen a part of your daily routine .

4) Used consistently and daily, sunscreen is proven to significantly lower your risk of Developing Cancerous cells as UV radiation is the top contributing factor in causing skin Cancer.

- **AIM – Formulation and evaluation of herbal sunscreen gel .**
- **OBJECTIVE –**
  - **Must absorb a broad range of UV rays causing sunburn**
  - **must be stable in the presence of sunlight.**
  - **Should be able to provide complete protection for skin**
  - **Should be safe effective, chemically inert, at low concentrate**

- **MATERIAL AND EQUIPMENT:-**

APPARATUS	**Beaker, Stirrer, water bath, heating metal, test tube measuring cylinder , thermometer, spatula**
INSTRUMENTS	**Weighing balance, magnetic stirror Digital PH meter**
CHEMICALS	**Carbapol 934,methyle paraben, Zinc oxide , glycerine**
INGREDIENTS	**Aloe Vera, Turmeric, Sunflower oil,Lemon, Rose water**

❖ EXPERIMENTAL WORK

○ METHOD

- **Preparation of aloe Vera gel**

• The gel base is prepared by dispersing carbapol 934 in distilled water .

• Clear Mucilaginous gel was scooped with spoon.
• Raw aloe heat at 80 degree celsius with constant stirring.
• Then extract was mixed in Carbapol base with constant stirring in magnetic stirror.

Fig:

- **Finally transfer to stirlized container, and stored in refrigerator.**

❖

TURMERIC EXTRACT:-

• In Turmeric extract decoction method are used.
• Take 5gm ground turmeric powder. Then boiling turmeric extract at 60 degree celsius.
• Then cool extraction and filtered with filter paper.

❖ **LEMON EXTRACT –**

• Take a fresh lemon juice
• then diluted in water
• adjust the PH solution
•Then filter muslin clean

Formulation Table:-

Sr. No.	Ingredients	F1	F2	F3	F4
1	Carbapol 934	1gm	1.5gm	2gm	1gm
2	Aloe Vera	8ml	9ml	7ml	8ml
3	Turmeric extract	2ml	2ml	1.5ml	1.5ml
4	Sunflower oil	2ml	1.5ml	1.5ml	2ml
5	Lemon extract	1ml	1ml	2ml	1ml
6	Methyl paraben	1gm	1gm	1.5gm	1gm
7	Zinc oxide	2gm	1.5gm	1gm	2gm
8	Glycerine	1ml	2ml	1.5ml	1.5ml
9	Rose water	2 drop	2drop	2 drop	2drop
10	Distilled water	Q.S	Q.S	Q.S	Q.S
11	Perfume	Q.S	Q.S	Q.S	Q.S

➢ FORMULATION OF SUNSCREEN GEL:-

SUNSCREEN WITH PREPARED CARBAPOL 934 BASE

• Herbal sunscreen were prepared by combining several herbs with carbapol 934 Foundation.

• One gm of carbapol was soaked with distilled water.

• Additionally component such as aloe Vera gel, turmeric ,lemon extract, rose water, Glycerine, was add and mixed continuously.

• For one hour before adding the preservative.

PREPARED SUNSCREEN WITH THE SUNFLOWER OIL BASE

• In a water bath required a amount of sunflower oil, turmeric extract. Heated for 1hour.

• The oil phase at room temperature other ingredients are aloe Vera , lemon extract,rose water, glycerine.

- **Adding with stirring constant.**

❖ **Until homogenous mixture. Then preservatives added to combinations.**

❖ **Stored in cool place and evaluation.**

Formulation 1st

Formulation 2nd

Formulation 3rd

Formulation 4th

❖ **EVALUATION OF HERBAL SUNSCREEN GEL :**

• DETERMINATION SUN PROTECTION FACTORS —

Calculating the sun protection factors (SPF) may be used to determine how effective a sunscreen Product is. It is sometimes referred to as difference between UV energy required to create Minimum erythema dose (MED) on sunscreen applied human skin and the UV energy required To Produce a unprotected skin.

SPF = MINIMAL ERYTHEMA DOSE FOR PPROTECTED SKIN BY MINIMAL ERYTHEMA DOSE FOR UNPROTECTED SKIN

Formula : SPF = CF × EE × I (λ) × abs (λ)

Where: The SPF value can be calculated by multiplying the correction factor (CF), The erythema Effect spectrum (EE), The intensity spectrum from the sun (I), And also the absorbance (Abs) of the Gel sample.

• SPREADABILITY TEST :

A key elements of a sunscreen is the spread ability indicator. It look at how quickly it spread and How much residue there after touching it. There is extra technique for the spread ability test that Requires as to take sample of slide, apply sunscreen, place another slide to slide off. The time Required to separate the slides it's how it defined.

Spreadability = WXL /T

Where , W=weight attached to the upper slide L=stand for slide length T = times taken in seconds

❖ PH TEST – For improved product stability and expression of sunscreen, the proper ph should Be checked. After this for better accuracy this formulation was kept under observation in digital PH meter .

• IRRITANCY TEST — An essential elements in the assessment exam irritating test. Topical Ingredients applied on the Skin can cause oedema and erythema as antagonist and hypersensitive. A standard 24-hour Irritancy test should be run an reported.

• DETERMINATION OF VISCOSITY — The Brookfield viscometer is use to the test viscosity With the proper number of spindle selected. A 50ml beaker was used to until the spindle grove was Dipped and the rpm was set herbal Sunscreen viscosity was measured the sunscreen. The viscosity Was completed using the factor Obtained from the reading.

• HOMOGENEITY —touching and looking at the sunscreen , we can quickly determined Its homogeneity, consistency and roughness.

• STABILITY — The assessment procedure for sunscreen place a significant emphasis on the Thermal stability. It is necessary to assess the sunscreen expression. Stable By it at increased Temperature.

• IN VITRO—OCCLUSION STUDIES —Skin occlusion in indicated by complete coverage Of the skin surface the follow equation can be Used to determination. The oculasive of herbal Sunscreen.

Occlusive factor:- (f) =(A-B) /A×100

Where, A= water loss without sample by water loss with sample.

• REMOVAL TEST – Sunscreen is applied to skin and in addition to other part therefore ii Should be simple to remove after use . The wearing sunscreen is use. The wearing sunscreen is Increased by easy removed after use. Hence a removal test should be conducted and exported.

- **OBSERVATION —**

ORGANOLEPTIC PROPERTIES

FORMULATION	F1	F2	F3	F4
COLOR	Yellowish	transparent	transparent	transparent
ODOUR	Characteristics	Characteristics	Characteristics	Characteristics
HOMOGENECITY	Homogenous in nature	Homogenous in nature	Homogenous in nature	Homogenous in nature

- **EVALUATION TEST:--**

FORMULATION	F1	F2	F3	F4
Spf value	18	20	26	28
Spreadability	20.1	20.5	21.3	21.6
Feel test	Cool sensation	Cool sensation	Cool sensation	Cool sensation
Removal test	Easily removal	Easily removal	Easily removal	Easily removal
PH test	6.20	6.21	6	6.75
Viscosity	170	180	183	190
Occlusion test	65	73	71	70
Stability test	Stable in accelerated temperature	Stable in accelerated temperature	Stable in accelerated temperature	Stable in accelerated temperature
Irritancy test	No erythema	No erythema	No erythema	No erythema

Table:-Evaluation Test

❖ RESULT & DISCUSSION

➢ RESULT

The sun protection factor (Spf) of the sunscreen formulation was assessed. By measuring the Quantity of uv light that the formulation was able to block, the Spf was calculated. The sunscreen Spf was high 28 which is good. It also has good Spreadability and it is easily removal and it is Gives cool sensation effects. After applied on the skin and it not irritated. And PH is 6.00 and Occlusion factor is 66 and stable in accelerated temperature.

➢ DISCUSSION

The Spf is the quantitative measurements of the effectiveness of a sunscreen formulation. To Effective in preventing sunburn . The result of this study demonstrates that an herbal Topical sunscreen Formulation Shield skin from uv rays. The formulation is safe and good for Skin because it Manufactured with natural component. There are total four Formula , and F 3 has Shown the best Out comes when compared to other. In this herbal sunscreen its main ingredient Aloe Vera, turmeric And sunflower oil and Lemon has been used for centuries for its medicinal properties And it now being using In variety of beauty product including sunscreen. Promoting sunscreen Use is an integral part of prevention programs aimed at reducing UV Radiation induced skin Damage and skin cancers. Protection against both UVA and UVB Advocated. The used Laboratory method, to calculate SPF is an inexpensive and Easy to apply. The SPF is a Quantitative measurement of the effectiveness of a sunscreen Formulation. To be effective in Preventing sunburn and other skin damage . In this research Sunscreen gel added turmeric extract and aloe Vera extract ,Lemon extract ,sunflower oil . From the result obtained in the study we can positively conclude that Officials Sunscreens have significant UV absorbing property. The present work focus on The Scientific amount of herbal in cosmetic. Active constituents extracted from herbals Have a potent UV shielding effective.

❖ CONCLUSION

The spf is the quantitative measurements of the effectiveness of a sunscreen formulation. To Effective in preventing sunburn . The result of this study demonstrates that an herbal topical sunscreen Formulation Shield skin from uv rays. The formulation is safe and good for skin because it Manufactured with natural component. There are total four Formula , and F 3 has shown the Best out comes when compared to other. In this herbal sunscreen its main ingredient aloevera, Lemon extract ,Turmeric and sunflower oil has been used for centuries for its medicinal properties and it now Being using in variety of beauty product including sunscreen .However, it is important to note that herbal sunscreen as effective traditional Sunscreen. The some chemical ingredient contain in sunscreen . It is also important to choose a herbal Sunscreen is safe and effective to way protect your skin from the sun . Overall herbal sunscreen Gel containing aloe Vera, sunflower oil, turmeric is a safe and effective way to protect your skin From the sun. And it's harmful UV rays. It is a good choice for people with dry and sensitive Skin. And those who preferred to use natural product.

➢ FUTURE SCOPE

One of the major concerns affecting the human skin is the exposure to ultra-violet radiations (UVR) causing photo-damage and skin cancers. In order to provide preventive measures against Such incidences, there is an increased demand for sun-protectants. Future sunscreens should Include UVB protection but also significant protection from UVA and high-energy visible light.Consideration of environmental impact will also be important for manufacturers to problem Solve to avoid injury to the aquatic ecosystem. The sunscreen market is constantly evolving to Meet the demand for better sun protection options and is projected to reach $24.4 billion Worldwide by 2029. Public interest in sunscreens and sunscreen ingredients has grown Significantly over the last 10 years, with search trends expanding from general categories of Sunscreens ("chemical sunscreen," "mineral sunscreen," "tinted sunscreen") to specific UV Filters such as "avobenzone," "homosalate" and "meradimate." Beyond new filters, a variety of Novel technologies and approaches are currently being explored, holding promise for solutions To many of the problems of existing sunscreens.

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