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FORMULATION AND EVALUATION OF HERBAL SUNSCREEN CREAM

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ABSTRACT: The aim of present study was to formulation and development of herbal sunscreen cream containing Papaya pulp, Tomato juice, Corn starch, Sunflower oil, Coconut oil, Rose water, etc. Oil in water (O/W) base cream was prepared. The in-vitro SPF value of cream was evaluated. The evaluation of cream was done on different parameter like PH, viscosity, spreadibilty, and stability were examined. The prepared cream exhibited highest SPF value 14.54. The herbal cream showed good spreadibilty, good consistency, homogeneity, appearance, pH, ease of removal and no evidence of phase separation. The prepared herbal sunscreen creams were safe to use for Skin.[1] Sunscreening agents should be safe chemically inert, non-irritating non-toxic, photo stable and able to provide complete protection to the skin against damage from solar radiation.[2]

KEYWORDS: Papaya pulp, Sunflower oil, coconut oil, rose water, corn starch, SPF value, Sunscreen cream.

INTRODUCTION:

Cosmetics are defined as "The items with mild action on human body for the purpose of cleaning, beautifying, adding to the attractiveness, altering the appearance, or keeping or promoting the skin or hair in good condition" while functional cosmetics even after falling the cosmetics definition are designated as"Items fulfilling specific conditions like skin whitening, minimizing the appearance of lines in the face and body, protecting from the sun and suntanning".[4]

Today peoples are showing more interest towards herbal Cosmetic comparatively synthetic cosmetic products. The sun protection factor (SPF) creams are applied on skin to protect it from sunburn.The higher SPF value indicates maximum protection from highly energetic UV radiation emitted by sun rays. It is also documented that the herbal sunscreen cream ismore safer and produces minimum side effects and minimum cost compared to cream prepared from chemical substance. [1]Herbalsunscreen(alsoknownasherbalsunblock,suntanlotion)isacream,sprayor topical product containing herbal ingredients which helps to protect from the UV radiations of the sun and hence lowering risk of skincancer.[2]

Sunscreen can be classified into two types:

1) Physicalsunscreen:

Those that reflect the sunlight.

2) Chemicalsunscreen:

Those that absorb the uv light.[2]

Advantages of herbal sunscreen:

- Do not provokeallergy
- Easy tomanufacture
- Cheap incost[4]
- Effective with small quantity

- Be non-toxic and non-irritant
- Be stable toheat
- No sideeffect
- EasilyAvailable.[2]

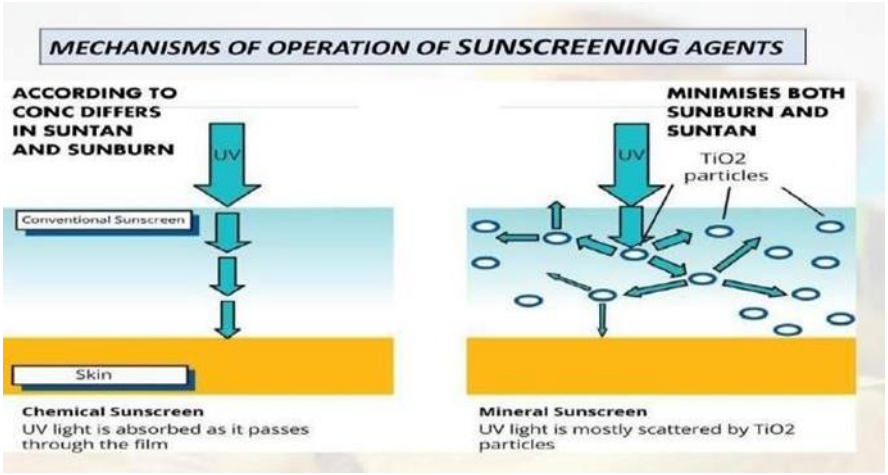
Disadvantages of herbal sunscreen:

- They are difficult to hide taste andodour
- Manufacturing process are time consuming andcomplicated
- Herbal drug haves low effects as compare to allopathic dosage form it also requires long term therapy .[2]

Mechanism of Photoprotection:

Sunscreen act by preventing and minimizing the damaging effects of the ultra violet sun rays following exposure to the sunscreen have been demonstrated to increase the tolerance of the skin to uv exposure. They work on two mechanism:

- Scattering and reflection of uv energy from the skin surface mineral based on inorganic sunscreen works on this mechanism they provide a coating that blocks sun rays from penetrating through theskin.
- Absorption of the uv energy by converting it to heat energy thus reducing its harmful effects and reduce the depth which can penetrate the skin organic sunscreen works on thismechanism.[2]



Characteristics of an ideal sunscreen:

In Order to ensure optimal patient compliance, an ideal sunscreen would be:

- A combination of physical and chemicalagents
- Broadspectrum
- Cosmeticallyelegant
- Non-irritant
- Economical
- Hypoallergenic

The common indications for the use of sunscreens in dermatology are in the prevention and management of:

- Sunburn
- Freckling,discoloration
- Photoaging

- Skincancer
- Phototoxic/photoallergic

MATERIALS AND METHOD:

Papaya (Caricapapaya):

Papaya is indeed a boon in treating dry skin issues and helps in hydrating the skin. There are special antioxidant and enzymes present in papaya which help in treating dry and flaky skin. Papaya is rich in antioxidant such as lycopene which may defend against the signs of aging. Papaya in can also remove the damaged keratin that can build on the skin and form small bumps. The moisturizing property of papaya helps in removing the dead skin cells dryness and skin lines.[4]

[7]

Tomato (Solanum lycopersicum):

Tomato juice on face works as a natural astringent and constricts wide spores and inhibits the accumulation of dirt and oil. It helps to protect from sunburn and sun tanning. Tomatoes are full of antioxidant including vitamin C. One can use tomato to remove the spores and blackheads of the face. The main ingredient lycopene in tomato helps to lighten, whiten, and brighten the skin, hence it is mostly preferred in the herbal cosmetic preparation. All this aspects makes tomato a versatile and a popular ingredient for skin conditions.[4]

[8]

Coconut oil:

Coconut oil keeps the skin soft and smooth while preventing premature ageing of the skin. Coconut oil for skin use as a moisturizer, remove dead skin cells. Coconut oil moisturizing dry skin including in people with condition such as eczema. Promoting wound healing it have anti-bacterial, antifungal and antiviral properties which prevents free radicals from causing damage to the skin. Coconut oil has anti-inflammatory properties which reduce rednees on skin this can be helpful for both dry and oily skin conditions by reducing inflammation of the skin.[2]

[9]

Rose water:
Rose water contain vitamin B. Which often used in Sunscreen and sun product. It helps to bolster the effectiveness of SPF. Rose water can be used to lighten the skin pigmentation. Rose water can remove oils and dirt from your skin by unclogging your pores. It helps maintain pH level of your skin.It is hydrating and nourishing agent for skin and protect skin against harmful environmental aggressors, gulabjal has antioxidant levels that tackle free radicals and keep skin healthy andglowing.[2]

[10]

Sunflower oil:
Sunflower oil is an excellent source for beta-carotene, a richly pigmented, fat-soluble compound present in certain fruits, vegetables, grains and oils. Beta-carotene can be converted into vitamin A, which compound possesses many antioxidant properties that can be beneficial towards the appearance and health of your skin. Understand the potential side effect of Beta-carotene and appearance with your physician before adding sunflower oil to your diet. It is use for restoring in the skin moisture sun protection make up removal anti-aging.

[11]

Green tea (Camellia sinesis):
Green tea's anti-inflammatory properties can help to reduce the skin irritation, skin redness and

swelling. Apply in green tea on the skin can so the minor cuts and sunburns too. Due to its effective properties, studies have also found topical green tea to be an effective remedy for dermatological conditions. Green tea can help to lighten the dark spots and blemishes from the skin making it good for complexion conditions. The powerful antioxidant property can help to get fresh and glowingskin.[4]

[12]

Beeswax(Ceraalba):

It is derived from honey bees of the genus Apis and it is a natural wax. Mainly Beeswax foundation is used as an emulsifier and thickener and can also be used for emulsion stabilization. Beeswax is used for melting the solids to facilitate the mixing with the water phase's ingredients by heating and mixing method. Its most important purpose is to compose a creamytexture.[16]

[13]

Rose oil:

Rose oil is an essential oil obtained from Rosa damasena and Rosa centifolia belonging to family Rosaceae. The rose oil along with rose oil is first discovered in Persia. Rose oil and rose water is used in various preparation especially facial and skin treatment. Cleotropa who is famous for her ancient beauty secretes use rose oil in her face masks. Rose oil is also act as moisturizer. It also wildly used as cleansing agent and skin tonner in diluteform.[15]

Maize starch (foeniculum vulgare):
Corn starch may be a convenient and cost-effective remedy for skin irritation, soothing the skin, sunburns and to reduce the skin itchiness. It works as an active ingredient and penetrates the skin. Corn starch is a natural moisture absorbing powder which is often used as an alternative to chemically formulated talcum powder. The anti-inflammatory and anti-bacterial properties help to sooth the irritated skin and refresh the body without harming the skin. It easily soaks the oil and sebum from skin and leaves it as a soft and supple. Excluding sunburns corn starch also helps to remove the stickiness from the skin which occur while applying different ingredients and cosmetics on the skin orface.[4]

Methyl Paraben
Methyl Paraben is frequently used as a preservative in cosmetics to prevent the growth of bacteria and mold in products that would otherwise be susceptible to microbial growth. It is a broad-spectrum antimicrobial agent that is effective over a wide spread pH range.
Parabens are most widely used as a preservative in cosmetic products.[17]

Cetyl Alcohol:
As an emollient, it moisturizes and softens skin. It also acts as a thickener that helps creams feel more luxurious. [19] This medication is used as a moisturizer to treat or prevent dry, rough, scaly, itchy skin and minor skin irritations (such as diaper rash, skin burns from radiation therapy). Emollients are substances that soften and moisturize the skin and decrease itching and flaking. [18]

METHOD OF PREPARATION:
1) Two Different Formulations were prepared with varying concentration of all ingredients named as F1 toF2.
2) Concentration of each ingredient is mentioned in the table below. Required quantity of bees wax and sunflower Oil, Coconut Oil was taken in a beaker and heated on a water bath (PhaseA).
3) In another beaker papaya was mashed. Other ingredients are mixed together and both the solutions are mixed together with continuous stirring till cream like consistency is obtained.
4) Preservative, perfume is added and then packed in suitable container. [4]

Formula: Table1

Sr. No.	Name of Ingredient	Quantity		Role
		20gm (F1)	20gm (F2)	
1	Beeswax	10gm	7.5gm	Humectant
2	Tomato Juice	2ml	2ml	Antisuntone
3	Papaya	2ml	2ml	Vitamin A,C,E, Antioxidant
4	Sunflower Oil	0.4ml	0.6ml	Antioxidant
5	Coconut Oil	0.4ml	0.6ml	Moisturizer
6	Rose Oil	0.4ml	0.6ml	Flavouring Agent
7	Cesto-stearyl Alcohol	1.4gm	2gm	Emulsifier
8	Methyl Paraben	0.4gm	0.6gm	Preservative
9	Maize Starch	1gm	1.5gm	Binder
10	Rose Water	0.4ml	0.6ml	Vehicle
11	Green Tea	1.6ml	2ml	Emulsifier

Formula: Table2

Sr.No.	Name of Ingredients	Quantity	Role
1	Beeswax	7.5gm	Humectant
2	Tomato Juice	2ml	Antisuntone
3	Papaya	2ml	VitaminA,C,E, Antioxidant
4	Sunflower Oil	0.6ml	Antioxidant
5	Coconut Oil	0.6ml	Moisturizer
6	Rose Oil	0.6ml	Flavouring Agent
7	Cesto-stearyl Alcohol	2gm	Emulsifier
8	Methyl Paraben	0.6gm	Preservative
9	Maize Starch	1.5gm	Binder
10	Rose Water	0.6ml	Vehicle
11	Green Tea	2ml	Emulsifier

Instrumentation: WeighingBalance
Apparatus: Measuring Cylinder, Beaker, Glass Rod, Water Bath, Burette, Conical Flask, Tripod Stand.

EVALUATION OF HERBALSUNSCREEN:

- **Evaluation of creamPH**:

0.5 gm cream was accurately weighed and dispersed in 100 ml purified water. The PH of the dispersion was measured using PH meter. Also, the PH is measured by using PH paper.

- **Homogeneity**:

The formulation was tested for the homogeneity by visual Appearance.

- **Appearance:**

The appearance of cream was judged by its colourpearlscence, and roughness and graded.

- **Afterfeel:**

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.

- **Removal:**

The ease of removal of cream applied was examined by washing the applied part with tap water.[3]

- **Irritancytest:**

Mark an area (1sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema was checked if any for regular intervals upto 24 hrs and reported.[1]

- **Acid value:**

Take 1 gm of substance dissolved in accurately weighed, in 50 ml mixture of equal volume of alcohol and solvent ether, the flask was connected to reflux condenser and slowly heated, until sample was dissolved completely, to this 1ml of phenolphthalein added and titrated with 0.1 N NaOH, until faintly pink color appears after shaking for 30 seconds.[3]

Acid value =4.5*n/w
= 4.5*0.4/1
=1.8
Where,
n = no. of ml 0.1 M KOH required
w= Weight in gm of substance

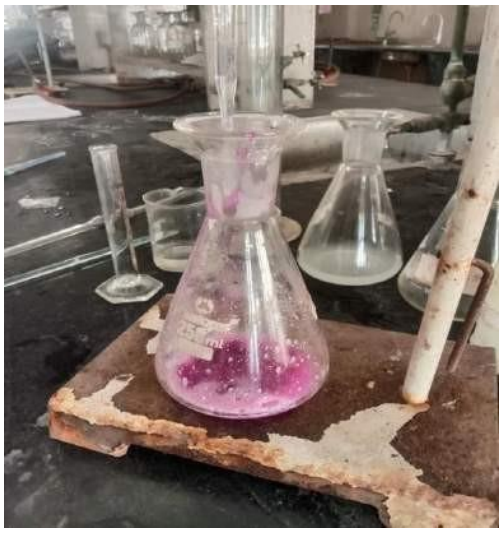


Fig 1: **Acidvalue**

Fig.2: Acidvalue

Saponification value:
Introduce about 2 gm of substance refluxed with 25 ml of 0.5 N alcoholic KOH for 30 minutes, to this 1 ml of phenolphthalein added and titrated immediately, with
0.5 N HCL(a ml) carried out blank titration omitting a substance under examination (b ml) calculate saponification value from the expression.[20]

Saponification value = 28.05(b-a)/w
= 28.05×(19.5-18)/1
=27.3

Where,
w= Weight in gm of substance

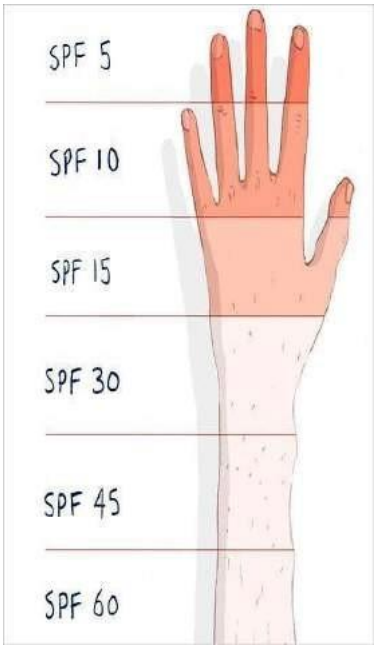
Fig. Saponification value:
SPFValue:
SPF is a scientific measure. It gives an idea of how much lower the risk of skin damage is due to the use of a sunscreen.

It focuses on the time it takes for UVB rays to get through a sunscreen and cause the skin to go red, compared with the time this takes when there is no sunscreen.

The factor is calculated by dividing the sun radiation dose needed to cause skin reddening with the dose needed to cause reddening without sunscreen.
SPF =sunburn radiation dose with sunscreen/sunburn radiation dose without sunscreen

This calculation is based on the application of 2 milligrams (mg) of sunscreen for each square centimeter (cm) of skin surface.
If it takes 15 times longer to burn the skin with a sunscreen on than it does with no sunscreen applied, the SPF is 15.[21]

SPF=160/11
=14.54



[23]

OBSERVATIONS:

Sr. No.	Parameters	Observation	
		F1	F2
1	Colour	Creamy	Creamy

2	Odour	Characteristic	Characteristics
3	PH	5.0	5.5
4	Test of irritancy	No Irritation Reaction	No Irritation Reaction
5	Removal	Easily Removal	Easily Removal
6	Acid Value	1.2	1.8
7	Consistancy	Smooth	Smooth
8	Saponification Value	25	27.3

RESULT:

To be effective in preventing sunburn and other skin damage, a sunscreen product should Have a wide range of absorbance. Formulated cream exhibited no redness, inflammation and irritation. When Formulation was kept for longtime, it found that no change in colour of cream. The cream was easily removed by washing with tapwater.[2]

This prepared herbal sunscreen was Evaluated for various parameters like Appearance, pH Determination, Irritancy, Acid value, Saponification value SPF value.[3]

CONCLUSION:

The use of sunscreen is an important component to sun protection.

UV Radiation causes various precarious and damaging effects on the skin. It causesskin cancer, hyperpigmentation, Photo-aging, sunburn and skin irritation. Herbs are eco-friendly compatible, and widespread compared to syntheticones.[22]

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