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Preparation and Evaluation of Sunscreen Gel from Daucuscarota

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ABSTRACT: Sunscreens are used to protect the skin mainly face skin from the harmful effects from the sunlight. Sunscreen, also called sun cream like gel, spray, lotion or any topical products that absorbs some of the sun's ultraviolet (UV) radiation and helps to protect against sunburn, especially for face skin. These sunscreens are included into anti-inflammatory and acne medications Topical acne products, like vitamin A derived tretinoin and benzoyl peroxide, may make certain skin types burn easier by photosensitization and irritation, respectively. They help to prevent the development of wrinkles and sagging skin.Sunscreens also help to diminish the risk of skin cancer and also of sunburn, like skin reaction or skin sensitivity caused by some medications (e.g. tetracycline, sulpha drugs, and phenothiazine such as chlorpromazine).Sunscreens are mostly labelled with a sun protection factor (SPF) that measures the fraction of sunburn-producing by UV rays that reach the skin. Herepreparing a sunscreen which is made from naturally obtained plantDaucuscarota. Itstaproot extract have been used which contains some good features of sunscreen i.e. beta-carotenoid & vitamin A showing antioxidant property. It heals up tan and sunburns and also prevent premature aging of skin. It also lowers skin cancer risk. This gel studied by phytochemical test and evaluation test

KEYWORD - sun's ultraviolet, sunburn, wrinkles, sagging skin, beta-carotenoid.

I. INTRODUCTION

Sunscreen actually prevent skin from high effect of sunlight. Sunscreen in form of creams, lotions or gels which can be applied to protect the skin from excessive sun exposures.[1] They absorb some of the sun's ultraviolet (UV) radiations. So, sunscreens must contain some medicaments which will protect the skin from various sun related burns and tans and also prevents from squamous cell carcinoma.[2] Many types of natural and synthetic chemicals are used in sunscreen which have antioxidant and vitamin A property.[1]

Now-a-days in cosmetic products category sunscreen have gain wide popularity due to additional health benefits apart from beautification.[2]Either separate sunscreens or many other sunscreen loaded cosmetic products are available in market for skin care, hair care, lips care and eye care. Almost all cosmetics companies today offer sun protection creams, with some herbal cosmetics manufacturers claiming to use ingredients from herbal or most provably plant extracts.[4]Sun protection products formulated from organic, inorganic or herbal ingredients. These products have been evaluated with regard to their quality, efficacy, performance as well as acceptability from both testing and user points of view.

PRINCIPLE EFFECTIVENESS OF SUNSCREEN

1. A protective layer can be provided to the skin that prevent the UV – Rays to reach the screen either by absorbing or reflecting them.
- Zinc oxide and titanium oxide both have such susceptibility.
- Preparation reflecting UV-rays are very effective and used extensively.

2. To incorporate substance in preparations to filter the sun-rays by absorbing medium range UV- Range (280mμ - 320mμ) but allowing rays of higher wavelengths to pass. All modern sun–tan preparation are based on this principle and contain such substance.

▪ UV filters – it's mainly three types
- Organic chemical :- compounds that absorb ultraviolet light
- Oxybenzone

▪ Inorganic particulates : -
- That reflect, scatter and absorb effective sun-light (UV light).

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- Titanium oxide, zinc oxide.

▪ Organic Particulates : -
- That mostly absorb highness sun light like organic chemical compounds but contain multiple chromophores.
- May reflect and scatter of light like organic particulates.

3. Biologically effective substances can be used effectively to prevent symptoms of inflammation without reducing of tanning.
- Sunlight liberates histamine in the tissue anti histaminic substances avoid inflammation.

4. Substances that cause and accelerate tanning of the skin can applied.
- Dioxyacetone causes tanning by form of a brown complex with the keratin of corneal layer.
- 8- methoxypsoralene when taken 10-20mg internally 2 hours before unmasking to the sun, accelerates direct tanning and avoid sunburn.

SUN PROTECTION FACTOR (SPF)

The SPF (Sun Protection Factor) of a sunscreen product determines how efficiently it absorbs or reflects by few of the sun's ultraviolet (UV) radiation on the skin exposed to sunlight. It is a measure of protection against mainly UVB rays that causes sunburn. The SPF reveals the relative amount of sunburn protection that a sunscreen can provide an average user when itused correctly.[7]

The SPF of a sunscreen is determine by a highly regulated clinical test, which is using on that bracing solar radiation on human volunteers. It measures time taken for a minimal erythema to appear when sunscreen is applied compared to the minimal erythema dose (MED) without sunscreen. An SPF of 15 means that if it takes 10 minutes for skin to start to burn without sunscreen it will take 150 minutes with that applying sunscreen on skin.

$$SPF = \frac{\text{MED with sunscreen}}{\text{MED without sunscreen}}$$

Most of the renowned brands are found to have a good SPF (closer or higher to the declared value) ranging from 22.46to 34.66. Boutique with an SPF of 2.01 SP factor is the exception with the lowest SPF contents, proving to be misleading against a declared value of SPF 30.[7]

Sunscreens that have identical SPF ratings will have equal protection against UVB rays under the controlled conditions that are used to evaluate the SPF.[6]The effectiveness of a sunscreen is profound by a number of factors. These include the life span of the product and expiry date, the specific ingredients, overall formulation, water resistance, the amount of time that the sunscreen has been exposed to the sun and the amount applied.[6]

TYPE OF SKIN AND SPF

Tab: - 1 Types of skin and SPF

Type	Description	SPF	Character
I	Always burn easily and never tans	More than 8	sensitive
II	Always burn and tans minimally	6 - 7	sensitive
III	Burns moderately and tans gradually	4 - 5	Normal
IV	Burns minimally and always tans well	2 - 3	Normal
V	Barely burns and tans profusely	2	Insensitive
VI	Never burns and becomes deeply pigmented	None	Insensitive

- Suitable base can be used to make a final product of an aqueous or alcoholic lotion, a cream, oil or an emulsion.
- The vehicle and selection of other components of the product may have effectiveness.
- Certain natural oils such as coconut oil, master seed oil, and olive oil have a fairly high absorption ability of UV - light.
- An anti - oxidant is to be incorporated if a natural oil is used to prevent acridness.

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Daucuscarota

Daucuscarotais a commonly used vegetable in almost of the world. It's commonly called as CARROT. Basically it is the taproot parts of the plant which is being utilized**.**[23]

SCIENTIFIC CLASSIFICATION:

Kingdom: Plantae
Family: Apiaceae
Genus: Daucus
Species: D. carota
Order: Apiales

Fig – 1 Daucas carota root

Benefits of Daucus carota on skin[25]**:**

- The Carotene antioxidants help reduce the risk of cancer.
- The high vitamin A content, in which carrots are known, comes from beta-carotene. Likely, there's a reason why 'carrot' and 'carotene' sound so alike.
- The high level of beta-carotene in carrots acts as an antioxidant to damage of cell to the body through regular metabolism. It help decreasing the aging of cell.
- Vitamin A and antioxidants protect the skin from sun damage, dry skin, acne, premature wrinkling, pigmentation, blemishes and uneven skin tone

MATERIALS:

Formulation of sunscreen gel

Ingredients	Quantities
PEG 2000	2gm
Liquid Paraffin	15ml
Sodium CMC	5gm
Carrot Extract	4gm
Distilled water	5ml
Methyl Paraben	A pinch
Zinc Oxide	1gm
Lavender oil	2drops

Tab: 2 sunscreen gel formulation

Chemical required

- Daucus carota roots
- N-hexane
- PEG 2000
- Liquid paraffin
- Carboxy methyl cellulose
- Methyl paraben
- Zinc oxide
- Alcohol
- Lavender oil
- Distilled water

FORMULATION OF SUNSCREEN GEL:

Methods:

➢ The carrots were shredded and air dried for 20 days.

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Fig. 2 shredded carrot

- The dried shreds were made into powder form.

Fig. 3 Powder form of shredded carrot

- Then 25 gm of powdered carrot was put on maceration in 150 ml of N-hexane for 15days.

Fig. 4 Maceration of carrot powder

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- The required extract was obtained by heating the filtrate of macerated solutions.

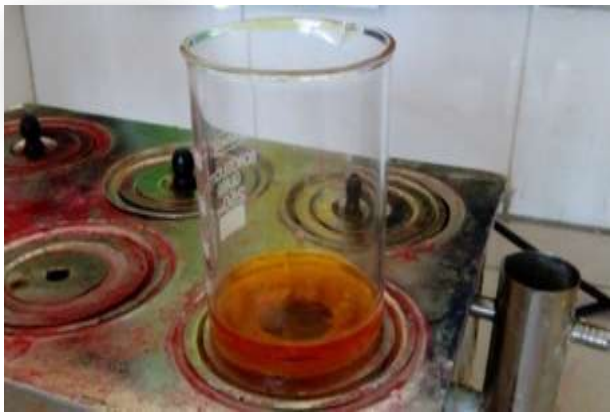

Fig. 5 Extract from Macerated solution

- PEG 2000 was melted at 100˚C in a water bath for about 25mins.
- Liquid paraffin was added to it and stirred for 10mins
- CMC was added to it.
- The mixture was cooled a little.
- A transparent gel was prepared.

Fig. 6 Prepared transparent gel

- To the extract alcohol was added to dissolve it.
- And to it zinc oxide and preservativewas added.
- This drug solution was mixed with the gel and stirred continuously.
- The mixture was stirred again by adding water and allowed to settle.

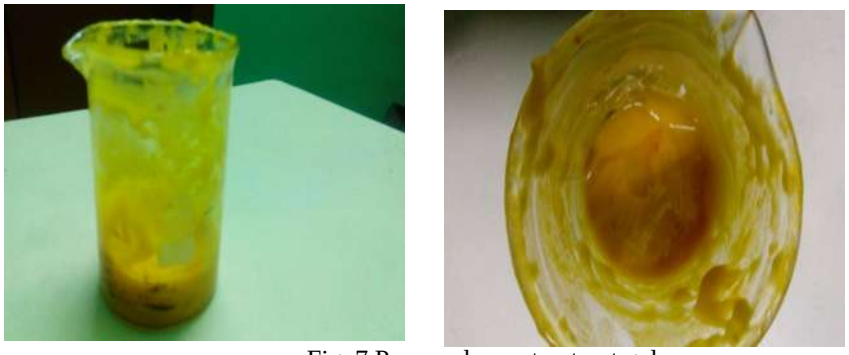

Fig. 7 Prepared carrot extract gel

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- The prepared sunscreen gel was packed in a container and labeled properly.

Fig. 8 Sunscreen gel

Result:

Some phytochemical analysis was performed, as given in the table below:

Serial no	Family of Natural Constituents	Name of Test	Results
1	Saponins	**Froth's test**	+ve
2	Tannins	**Lead acetate test**	-ve
3	Terpinoids	**Salkowski's test**	-ve
4	Flavonoids	**Ferric chlorides test**	-ve
5	Alkaloid	**Mayeyer's test**	-ve
6	Proteins	**Biuret test**	+ve
7	Carbohydrates	**Benedict's test**	+ve
8	Carotenoids	**Sulphuric acid test**	+ve
9	Glycosides	**Lieberman' s test**	+ve

Evaluation:

Physical Properties:

The physical properties of sunscreen gel were determined by its colour, odour and texture. The results are tabulated below.

Organoleptic evaluation of prepared sunscreen gel

colour	odour	texture
Honey Yellow	Characteristic odour	smooth

Tab-4.Physical Properties

Stability studies:

pH of sunscreen gel:

The pH of sunscreen gel was determined using Digital pH meter. 1gm of gel was weighed and dissolved in 100ml of distilled water and left for 2 hours. Till then pH meter was calibrated then pH was measured in triplicate and average values were calculated.

Result: - pH of sunscreen gel was measured in triplicate and average was calculated and results for each are tabulated below. The pH of the Sunscreen gel was observed around 5.6(Average)

1	**5.2**
2	**5.8**
3	**6**

Tab-5. pH of Sunscreen gel

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Wash of property:

Small amount of sunscreen gel was applied on backside of palm and spreaded evenly. Then hand was washed under tap water, and it is observed whether it still feel greasy or not.

Result: -The gel was easily washed.

Spreadability:

The Spreadability was communicated as far as time in seconds taken by two slides to slip off from the sunscreen gel, set in the middle of the slides, under a specific burden. Lesser the time is taken for partition of the two slides, better the Spread capacity.

Two arrangements of glass slides of standard measurements were taken. The sunscreen gel definition was set more than one of the slides. The other slide was set on the highest point of the definition, with the end goal that the gel was sandwiched between the two slides weight was put upon the upper slides with the goal that the gel between the two slides was squeezed consistently to shape a dainty layer. The weight was expelled.

Also, the abundance of definition clinging to the slides was rejected off. The upper slide permitted slipping off openly by the power of weight attached to it. The time taken for the upper slide was noted.

II. RESULT:

The spreadability of wasperpend high by having a low spread of time. Thetherapeuticefficiency of this gels depends on their spreadibility. The gel spreading helps in uniform topical application to the skin, so this prepared gels have a good spreadability and satisfy the ideal quality in topical application.

III. CONCLUSION:

Summer or winter now-a-days sunscreens have become a very important part of all of us. There are many medications which make the skin extra susceptible to sun.As it protects the skin from harmful UV rays of the sun which causes sunburns, premature aging of the skin, melanoma and tan. But choosing a sunscreen which is best suited to be skin is the most important criteria as some chemicals present in the sunscreen may damage our skin. [18] A 2013 study concluded that the diligent, everyday application of sunscreen can slow or shortly prevent the development of wrinkles and sagging skin, the study involved 900 white people in Australia and needed some of them to apply huge amount of sunscreen every day for four and a half years. Results found that people who used sunscreen regularly have smoother skin than those assigned to continue their usual practices. [12]

Some ingredients of sunscreens can causes more sensitive skin. If a sunscreen causes irritation or redness, wash it off and stop using it. Take advice from doctor or pharmacist about using another sunscreen product with different ingredients.

So my present study is on preparing a sunscreen which is made from naturally obtained plant- Daucus carota. Its taproot extract have been used which contains some good features of sunscreen i.e. beta-carotenoid & vitamin A showing antioxidant property. It heals up tan and sunburns and also prevent premature aging of skin. It also lowers skin cancer risk. This gel studied by phytochemical test.

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