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Herbal Horizons: Development and Assessment of Natural Sunscreen Formulation and Multipurpose Cream

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ABSTRACT:
Traditional medicine is an important source of potentially useful new compounds for the development of chemotherapeutic agents. Moringa oleifera is the most widely cultivated species of a monogenetic family and Citrus sinesis is from familyRutaceae. Moringa oleifera is a tree cultivated originally in northern India, whose ancient use as a medicine has demonstrated its antioxidant and anti-inflammatory properties.Moringa oleifera, often referred to as the drumstick tree, has gained attention for its potential sun-protective properties. The formulation of herbal UV protective sunscreens using orange peel powder and moringa powder presents a promising natural alternative to conventional sunscreens. Both ingredients offer a wide range of skin benefits that extend beyond UV protection, such as antioxidant, anti-inflammatory, and skin-brightening properties. Orange peel powder, rich in Vitamin C and flavonoids, contributes to neutralizing free radicals and enhancing collagen synthesis, while moringa powder, packed with bioactive compounds like zeatin and quercetin, provides additional antioxidant and anti-aging effects.This herbal sunscreen not only provides a natural alternative to synthetic options but also promotes the use of sustainable ingredients. The findings suggest that the combination of moringa and orange peel powder can offer an effective, eco-friendly solution for UV protection, warranting further clinical studies to confirm its efficacy and safety.The natural remedies are more expectable in the belief that they are safer with fewer side effects than synthetic ones.Herbal formulations havegrowing demand in the world market. It is very good attempt to establish the herbal cream.

I. INTRODUCTION

The largest organ of body is skin comprising nearly about 16 % of body mass. Skin consistof two layer, epidermis and dermis, which mainly consist of formed of epithelial, mesenchymal glandular and neurovascular component. The epidermis is outermost layer and ectodermal in origin. Epidermis serves body's point of contact with environment. Epidermis plays a very crucial physical and biological characteristics in resistance to environment stressor such as infectious, pathogens, UV and chemical agents. Keratinocyte are most abundant cell in epidermis and have tight junction with each other and forms an efficiently physical and chemical barrier. The dermis underlies the epidermis and it is mesoderm in origin. Dermis contains cutaneous structure like hair follicles, sebaceous gland, sweat gland and nerves. The dermis also consistof abundant fibroblast and immune cells which gets actively involve in many physiologic responses in skin. Along with the formation of highly effective barrier, keratinocyte also accumulate melanin pigment as they mature. The blocking of UV penetration is function of epidermal melanin. Melanin is not manufacture in epidermal keratinocyte but found abundantly in this region. Synthesis of melanin is restricted to melanocytes which derived from neural crest and second abundant cell in epidermis. Melanocyte can be found in both dermis and epidermis. Epidermal melanocyte aregenerally positioned in basal layer above basement membrane. Melanocyte produced a pigment is transferred to adjacent keratinocyte in cellular organelles termed as melanosomes by way on melanocytic dendrites. In keratinocyte most of melanin gets accumulate and protect the skin from incoming UV photons by acting as natural sunscreen. Melanin may also have important physiologic effect including regulatory influences over epidermal homeostasis, free radical scavenging to protect against oxidative injury and possibly antimicrobial activity. Melanin chemically consist of Phenomelanin and Eumelanin. Phenomelanin is light coloured sulfated pigment

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resulting from incorporatin of cyotein into melanin precursor. Phenomelanin promote oxidative DNA injury and melanomagenesis by generating free radicle in melanocyte in absent of UV. Eumelanin is effective in blocking UV. It is dark pigment expressed abundantly in skin of heavily pigmented individual. Eumelanin determines skin complexation and fair person are having have low eumelanin UV sensitive. Occupational expose to sunlight human get expose to UV radiation.UVexposure however has increased dramatically now a days because of outdoor leisene activity.UV is being component of EMR, UV photons fall between wavelength or visible and gamma radiation. UV energy issubclassified into 3 types:-

1. UVA –highest energy (315-400)
2. UVB –least energetic photon (280-320)
3. UVC – shortest wavelength (100-280)

Skin physiology get affected by UV in acutely and in delayed manner. Induction of inflammation is one of acute effect of UV on skin. Cascade of cytokines, vasoactive, and neuroactive mediatorin skin that together result in inflammation response and sunburn are induced by UVB. Keratinocyte activates apoptosis pathways by 4 dieif dose of UV exceeds threshold damage. Apoptotic keratinocyte lignidentified by plenoric nuclei and we considerd as “sunburn cell”. UV also lead hyperkeratosisi.e increase in epidermal thickening altering keratinocyte physiology and activating DNA repair,etc.

Ingredients and Methods for preparation of herbal UV protective sunscreen:-

1. Orange

Scientific Name	Citrus Sinesis
Common Name	Santara
Family	Rutaceae
Role	Antioxidant, Anti-inflammatory

2. Moringa

Scientific Name	Moringa oleifera
Common Name	Drumstick
Family	Moringaceae
Role	UV protective, Anti-inflammatory

MATERIALS

1.Orange Powder
2.Extract of MORINGA OLEIFERA
3. Zinc oxide
4.White Bees Wax
5.Liquid Paraffin } OIL PHASE
6.Stearic Acid
7.Borax
8.Water } WATER PHASE
9.Methyl Paraben
10.Rose oil

Citrus sinesis (Orange Powder)

Orange peel powder is a promising natural ingredient for sunscreens due to its antioxidant, anti-inflammatory, and skin-brightening properties. While it cannot replace traditional UV filters, its inclusion in sunscreen formulations can enhance skin protection and improve overall skin health. Future research should focus on overcoming formulation challenges and optimizing its use in cosmetic products.

Moringa oleiferia -

Moringa oleifera is a valued medicinal plant in traditional folk medicine. Moringa oleifera, alsoknown as drumstick tree. Many pharmacological studies have shown the ability of this plant to exhibit analgesic, anti-inflammatory, antipyretic, anticancer, antioxidant, nootropic, hepatoprotective, gastroprotective, anti-ulcer, cardiovascular, anti-obesity,antiepileptic, antiasthmatic, antidiabetic, anti-urolithiatic, diuretic, local anesthetic, anti-allergic, anthelmintic, wound healing, antimicrobial, immunomodulatory, and antidiarrheal properties.

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Beeswax -

Beeswax is an important component of creams because the unique characteristics of beeswax give solidity to emulsified solutions and increase the water holding capacity of creams. It also gives the sunscreen waterproofing power.

Liquid paraffin

Liquid paraffin is used in cosmetics and beauty products, is a highly refined mineral oil which can be found in face creams. This type of paraffin is used as a cheaper way to add moisturizing qualities into a cream. Paraffin is used as an emollient to treat itchy, dry, scaly skin conditions.

Stearic acid

Emulsifier, emollient and lubricant that can soften skin and help to keep product from separating. stearic acid is used in hundreds of personal care products, including moisturizers, sunscreen, makeup, soap and baby lotions.It is also used in adhesive lubricants.

Borax

In cosmetics products borax is used as emulsifier, buffering agent or preservative for moisturizing products, creams, shampoo, gels, lotions. Borax is also called as sodium tetraborate is a powdery white mineral that has been used as a cleaning products.

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Methylparaben
Methylparaben is used as a preservative in cosmetics preparations.

METHOD –
Extraction process of Moringa Oleifera

Fresh drumsticks are selected for processing. They are washed to remove the dust. The sticks are steamed in beaker to facilitate pulp extraction.soft sticks are pressed to extract the pulp,the extracted pulp is dried in hot air oven for 50-55 degree centigrade. It is ground to a fine powder.

Orange Powder preparation:

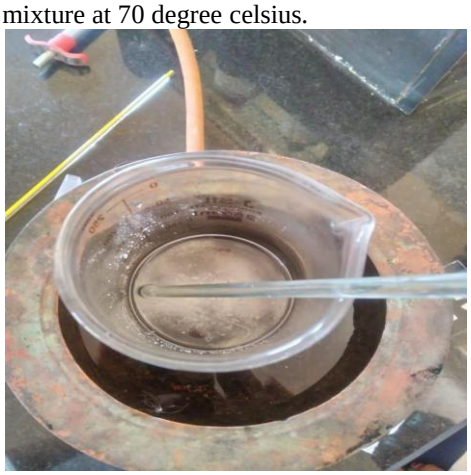
Orange peels were collected from fruit juice stall and after it was washed with lukewarm water and dried under sunlight until they are completely brittle. Then blend or process the dried peels into fine powder.

FORMULATION OF CREAM
Procedure for preparation ofCream:-
1.Preparation of oil phase-

Stearic acid, liquid paraffin, white bees wax was taken into beaker and this mixture was melted at 70 degree celsius.

2.Preparation of aqueous phase-

Alcoholic extracts of crude drugs, borax, water were taken into another beaker and heated this mixture at 70 degree celsius.



3.Addition of aqueous phase to oil phase-

The aqueous phase was added to the oil phase with continuous stirring at 70 degree celsius. Now once the transfer was completed it was allowed to come at room temperature all the while being stirred. Perfume was added at last just before

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the finished product was transferred to suitable container.Then cream was evaluated for various physical parameters.

Cream formulation:

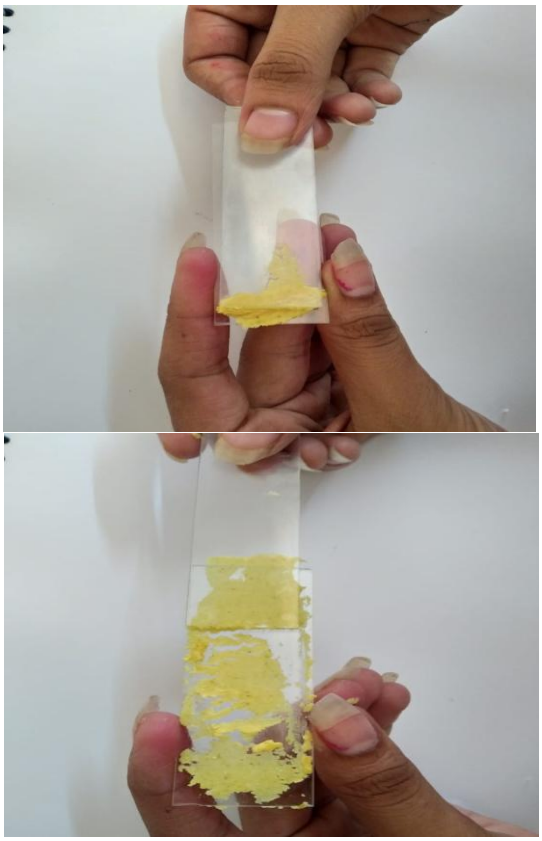
EVALUATION PARAMETERS AND RESULTS:-

1) Physical and chemical characteristics of Moringa oleifera.

Parameter	Result
pH	7
Homogeneity	Passed
Appearance	Yellowish
Odour	Aromatic
Irritancy	No redness
Type of smear	Non greasy
Emolliency	No residue left
Consistency	Good
Washability	Washable

2) Spreadability Test.

The cream sample was weighted as 2 gm and placed on one side of the glass. The other glass was placed on the upper side of it for 1 minute and it has shown below.



3) PH.

The measurement of the pH value of cream was determined by using a pH meter after 2 gm of cream was soluted in 5 ml of distilled water and it came to a pH of 7.

4) Viscosity test.

The viscosity of the formulation was determined by the Brookfield viscometer. At 100 rpm at an average temperature of 32°c and the determination was carried out in triplicate and the average of three readings was recorded.

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5) Accelerated test.

The final formulation was stored in glass vessels to be evaluated in different conditions as follows.

Test	Empty Weight	Total weight
Refrigerator	12.01	14.01
Hot air oven	20.21	22.21
Desiccator	20.29	22.29

6) Skin Irritation Test

The healthy Wistar Albino rats(150-200 gm) were selected into two control and test groups. The test were carried out by employing OECD guideline with little modification. Approximately 24 hrs before the test, fur was shaved (approximately 2x2 cm) area from dorsal area at different site of the trunk and herbal UV cream usually (0.5-1 g) was applied to the 3 sites. A control group receives a base or placebo (such as distilled water or an inert cream). Observation of the sites was done at 24 hr after application, and repeated at 48 hr, 72 hr, 7 days and thereafter. The reactions were compared with control group and no skin irritation was observed in test group.

Fig. Skin irritation test

8) SPF.

SPF is a measure of how much solar energy (UV radiation) is required to produce sunburn on protected skin (i.e., in the presence of sunscreen) relative to the amount of solar energy required to produce sunburn on unprotected skin. As the SPF value increases, sunburn protection increases. Method

Sample Preparation and determination of SPF 1.0 g of sunscreen samples wereweighed, transferred to a 100 mL volumetric flask, diluted to volume with 70 % isopropyl alcohol, followed by ultrasonication for 10 min,and then filtered through cotton. Three trials were performed for each solution by rejecting the first 5.0 ml. Further working standard and constant dilution solutions were prepared for each product with 50 % methanolic solution. The absorption spectra of samples in solution were obtained in the range of 290 to 450 nm using a 1 cm quartz cell, and 50 % methanol as a blank. The absorption data were obtained in the range of 290 to 320, every 5 nm, and 3 determinations were made at each point, followed by the application of the Mansur equation. Mansur equation was used for the determination of SPF of different formulations.

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

9) Solubility.

The solubility of the cream has been tested with different types of solvents as follows.

Chloroform	Soluble
Water	Insoluble
Diethyl ether	Slightly soluble
Alcohol	Partially Soluble

II. CONCLUSION:-

The study attempted to develop herbal sunscreen using extracts of Moringa oliferaand Citrus sinesisand examined their efficacy as UV protective. The formulations F1, F2 and F3 were prepared by varying the composition and evaluated for their physico-chemical properties. This study shows that formulation F2 is more stable and efficient.

Although neither orange peel nor moringa powder can serve as standalone UV filters, their synergistic effects, when combined with traditional UV-blocking agents, enhance the overall efficacy of the sunscreen. The antioxidants in both powders help minimize oxidative stress caused by UV exposure, while their anti-inflammatory properties reduce sunburn and skin irritation. Furthermore, these ingredients are gentle on the skin, offering a safer, more sustainable alternative for individuals sensitive to synthetic chemicals found in commercial sunscreens.

Future research should focus on improving the stability of these natural ingredients in sunscreen formulations, investigating their long-term efficacy through clinical trials, and exploring potential combinations with other natural UV protectants to develop highly effective, broad-spectrum herbal sunscreens. The growing demand for natural skincare products underscores the importance of such innovations, positioning orange

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and moringa powders as valuable components in the future of sun protection.

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