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FORMULATION AND EVALUATION OF HERBAL SUNSCREEN CREAM

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ABSTRACT

In recent years, the demand for herbal cosmetics has increased due to growing concerns about the side effects of synthetic products. This project aims to formulate and evaluate a herbal sunscreen using natural,s kin-friendly ingredients with photo protective and antioxidant properties. The key herbal and natural ingredients selected for this formulation include Aloe vera (skin soothing and hydrating),Butterfly pea flower extract (rich in antioxidants and anthocyanins),Coconut oil (natural moisturizer and UV barrier), Rose water (cooling and anti- inflammatory),and Vitamin Ecapsules (powerful antioxidant that protects skin from UV- induced damage).

The formulation was prepared in the form of an oil-in-water (O/W) emulsion, ensuring proper blending of the aqueous and oil phases. The prepared herbal sunscreen wase valuated for various parameters including physical appearance , pH, spreadability , washability , and stability at different storage conditions. The Sun Protection Factor (SPF) was assessed using in vitro UV spectro photo metric analysis following the Mansur method .The product alsound erwent skin irritation testing and micro bialload analysis toensure safety and quality.

The results showed that the herbal sunscreen had an aesthetically acceptable appearance, goodstability, adequate SPF value, and was safe for topical application. Thus, the study concludes that a combination of herbal and natural in gradient scan effectively provide sunprotection and be a safe alternative to synthetic sunscreens

KEYWORD: *Herbs, Herbal Sunscreen Cream*

INTRODUCTION

Herbal sunscreen also known her bal sunblock. Herbal suntanlotionisal otion,spray or other topical product that helps protect the skin from the suns uv radiation and which reduce sunburnan do ther skin damage Sun screen can be classified intotwo types sunscreen. Physical sunscreen Those that reflect the sunlight.

1)*Chemicalsunscreen*

Thos ethatabsorbtheuvlight Sun screen agents are for externaluseonly. Theus e of sunscreen as photo protect ingagents for uv protection. the sunscreen formulation is which when applied topically protect the treated area from sunburn sunscreen depends on ability to protect against uv induced sunburn and their chemopreventive activity . Excessive solar ultraviolet radiationare responsible for various skin damage ssuch assun burn,skin pigmentation premature aging and photo carcinogenesis.Themain mechanism of skin damage byuv radiations is formation of Reactive Oxygen Species(ROS) that interact with proteins lipids and subsequently alter them.UVB and to a lesser extent UVA are responsible for inducing skin damages .

Sun screens hould containan tioxidant agent inaddition to sunblock agent to be effective in prevention of photoaging and skin cancer .plants due to their antioxidant potentialare known as attractive option to beusedin Sunscreen formulation for prevention of skindamageduetosolar radiation.sunscreen is topical product that protects the skin against harmfuleffects of the sun.

Classification of sunscreen and them echanism of photo protection

Sunscreen are classified as either topic balor systemic base do ntherout eof administration topical sunscreen are divided into two classes on their mechanism of protection

Organic Sunscreen Inorganic Sunscreen

Organic Sunscreen

Oragnic sunscreen works by absorbing into skin and converting UV rays into heat.it is thin and ideal for everyday use allow for skincare ingredients to be added easily. Organic sunscreen actives chemical carbon based compound .it contains non mineral active ingredient.

In organic sunscreen

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These ar particles that scatter and reflect uvrays back to the environment they act asphysical barrier to indentultra violet and uvlight they are consideredbroad spectrumastheycoverentireultravioletspectrum.theInorganicsunscreenarealso referredto as sunblock .

Mechanism of photoprotection
Sunscreen act by preventing and minimizing the damaging effects of the ultraviolet sun rays following exposure to the sunscreen have been demonstrated to increasethe tolerance of the skin to uv exposure. They work on two mechanism Scattering and reflection of uv energy from the skin surface mineral based oninorganic sunscreen works on this mechanism they providea coating that blocks sun rays from penetrating through the skin . Absorption of the uv energy by converting it to heat energy thus reducing it sharmful effect sand reduce the depth which can penetratethe skin organic sunscreen works on this mechanism.

1:Understanding Herbal Sunscreen
Sunprotection has become a vitalpart of modern skincare due tothe increasing awareness about the harmful effects of ultraviolet(UV)radiation. Prolongedexposure tothe sun'sUVrayscan lead to various skin problems such as sunburn, prematureaging, hyper pigmentation, and even skincancer. Sunscreen saretopical products formulated to protect the skin by absorbing orreflecting harmful UVrays. However, most commercially available sunscreen sare made using synthetic chemical sthatmay causeirritation, allergies, or environmental concerns.

In response to these concerns, the demand for herbal or natural sunscreens hassignificantly increased.Herbal sunscreens,alsoknownas natural orplant-basedsunblocks ,are formulated usingingredients derived fromplantsthat possessnatural UVprotective, antioxidant,and healing properties.These formulation snotonly provide sunprotectionbut also nourish and improve the overall health of the skin.

Herbal ingredients like AloeVera , ButterflyPeaFlower ,CoconutOil , RoseWater ,and VitaminE are commonly used insuchproducts. The senaturalin gradient shave minimal side effects,are biodegradable, and offer the rapeutic benefits beyondsunprotection.
Formulatingand evaluating such aherbalsunscreennotonlypromotes natural skincaresolutionsbut also opensdoorsto eco-friendly and sustainable cosmetic innovations.

2:Importancs of Herbal Sunscreens
Herbal sunscreen saretypically designed to block orabsorbharmful UVAUVB rays. They also reduce the risk of oxidative stressby offering
sunscreens ,Herbal Sunscreen Shaveseveral Advantages

1. Safety : Natural ingredient sare gentle on the skinandsuitablefor sensitive skin types.
2. Minimal Side Effects :Unlike syntheticin gredients,herbsareless likely to cause irritation, redness, or allergic reactions.
3. Environmentally Friendly : Herbal ingredients decompose easilyand do not harmmarine ecosystems, unlike some synthetic sunscreens.
4. Additional SkinBenefits :Manyherbalingredientshaveanti-aging,moisturizing,anti- inflammatory, and soothing properties

Each in gredientusedintheformulationoffersauniquecontribution:
-AloeVera so the sand moisturizes the skin.
- Butterfly Pea Flower is rich in flavonoidsand anti oxidants.
-CoconutOil provides nourishment and hydration.
- RoseWater refreshes and tones the skin.
-VitaminE helps in healing and offer sprotectionagainst freeradicals.

The increasing shift toward green cosmetics and the rise of Ayurvedic and herbal beauty industries have made suchproducts more acceptable and desirable. By formulating a herbal sunscreen,we combinetraditional knowledge with modern scientific method stocreatea product that is both effective and eco-conscious.

LITERATURE REVIEW

1. Surjushe,A.,Vasani,R.,&Saple,D.G. (2008). Aloe vera: short review. Indian Journal of Dermatology, 53(4) , 163–166. DiscussesAloevera's skin-healingandUVprotectiveproperties.
2. Chusak,C.,etal. (2018).Protective effects of Clitoriaternatea flower extract again stoxidative stress in human dermal fibroblasts.Journal of Medicinal Plants Research, 12(8) , 111–117.
Highlight santioxidantandUVprotectionbenefitsof Butterfly Pea Flower.
3. Agero,A.L.,&Verallo-Rowell,V.M. (2004).Arandomizeddouble-blind controlled Trial comparing extra virgin coconutoil with mineral oilasamoisturizerformildtomoderatexerosis.Dermatitis, 15(3) ,109–116.

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→Showscoconutoil' smoisturizingandprotectiveeffectsonskin.

4. Andersen,F.A. (1999).FinalreportonthesafetyassessmentofTocopher
5. AloeVera(Aloebarbadensismiller)
   Aloevera is knownforits hydrating ,healing,and cooling properties.It contains compoundslike aloin and aloes in whichexhibit UV- absorbing properties.It also promotes skin repair after sunburnand improves skin texture (Sanchez et al., 2008).
6. ButterflyPeaFlower(Clitoriaternatea)
   \Richin anthocyanins and flavonoids,Butterfly PeaFlowerhasstrong antioxidantactivity,which helps in neutralizing free radicalsgeneratedbyUV exposure.Italsoimproves skin firmness and reduces inflammation(Ratanavalachaiet al., 2009).
7. CoconutOil(Cocosnucifera)
   Coconut oilactsasa natural moisturizerandbarrier ,providing mildUV protection .Italsocontains lauricacid and capricacid whichpossess antimicrobialandanti-inflammatoryproperties (Fox etal., 2010).
8. RoseWater(Rosadamascena)
   Rose water so othes irritated skin and has anti-inflammatory and antioxidant actions.ItbalancesskinpHandprovidesarefreshingeffectinsuncareformulations (Mahboubi, 2016).
9. Vitamin E(Tocopherol)
   Vitamin E is a potent lipid-soluble antioxidant .I the l psinpreventing UV- induced oxidative damage , improves skin elasticity

Aim

To formulate and evaluate a herbal sunscreen using natural ingredients .

Objectives

1. To collect and authenticate herbal ingredients (Aloe Vera, ButterflyPea Flower, etc.) used in the sunscreen formulation.
2. To prepare as table herbal sunscreen formulation using natural extracts and oils.
3. To evaluate the physicochemical properties of the prepared formulation (such as pH, consistency, spreadability, etc.).
4. To assesst he sun protection factor(SPF) of the herbal sunscreenusing appropriate in vitro methods.
5. To compare the effectiveness of the her bal sunscreen with commercial sunscreen formulations.
6. To study the stability of the formulation under different environmental conditions.

Plan of Work

1.LiteratureSurvey
*Collectin formation on her balin gredients used in sunscreens.
*Study previous research and standard formulations.
2.Procurement and Authentication of Raw Materials:
*CollectAloeVera,ButterflyPeaFlower,CoconutOil,Rose Water, and Vitamin E.
*Authenticate the plantmaterials and ensurepurity of oil sandextracts.
3.Preparationof Extracts:
*Prepare or obtainsuitableextracts of AloeVeraandButterfly
*Pea Flower using standard methods(e.g.,drying,grinding, solvent extraction).
4.Formulation of HerbalSunscreen:
*Combineall ingredients in ap propriateratios.
*Use standard emulsification and mixing technique stoprepare the formulation.
5.Evaluationof Formulation: CheckpH, spreadability,viscosity, ppearance, and homogeneity.

HERBS PROFILE

Main role of ingredients used in formulation

* Aloevera

Aloevera is a good active ingredient to reach in Sunscreen arsenal. It has been proven to both treat and prevent burnson your skin.the leavesof aloeveraandA. Barbadens is are the source of aloeveragel.aloevera gelis usedincosmeticslotion for its moisturizing and revitalizinaction.it blocks UVA and UVB rays and maintain skinnatural moisture balance. It stop the sunburnan dstimulate immune system intervention.aloeveragel can beusedtohelp withthe healing process of Sun burn it help relieve pain and redness by reducing inflammation the gel also stimulate the production of collagen which help a the healing process.

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Butterfly Pea Flower
Packed With Antioxidant
Butterfly pea flower contain many antioxidant such as flavonoids authocyanin and polyphenols.your skin needantioxidant to improvegeneral health andelasticity.antioxidant helpto minimize fine line and improve your skin and appearance.

Soothes Minor Skin Irritation
Fower it help edcalmitch ingandgenera lirritation. The flower used for use in rejuvenating



Reduce Redness
Because of butterfly pea flowers ability to soothe irritated skin,it also minimize redness caused by acne.dryness,and general irritation. these nourishing properties are further enhanced when combined with other nutrients that benefit skin health.

Improve Moisture Etention
This helps increaseskinturnoverto naturally restore itself .moisture retentionhelpsstop dryness andpromote lipid balance.
Improve the skin barrier
Because butterfly pea flower containplant based antioxidants and antioxidants vitamin such as vitamins ,it help imroveskinbarrier

Suitable for all skin type
Butterfly pea flower is a hidden skinncarer ockstar.It is gentle enough for use onall skin types, matter what time of year it is.

Coconut oil
Coconut oil keeps the skin soft and smooth while preventing premature ageing ofthe 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 antibacterial ,antifungal and antiviral properties which prevents free radical sfromcausingdamageto the skin .coconutoil has anti-inflammatory properties which reduce redneesonskin thiscanbe helpful for both dry and oily skin conditions by reducing inflammation of the skin.

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Rosewater

Rosewater contain vitaminB.which of ten used in Sunscreen and sunproduct.it helps 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 yours 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 andkeep skin healthy and glowing.



Vitamin E Capsule

Vitamin E it provides extra protection against acute UVB damage and protect against cell mutation caused by sun and pollution exposure. Vitamin-E it help cleanseyour skin and removing the impurities from and help improve skin elasticity .vitamin E combination with lemon juice it help to whiten the skin. itis most commonly known for its benefits of skin health and appearance. It has antioxidant and anti-inflammatory properties.



Formulation of sunscreen cream Formulation of butterfly pea flower extract:

To make an extract of butterflypeaflower for her balsunscreen, steep aboutad ozenfreshordried flower leave sin acup of boiling water . After about 15 minutes ,strain the liquid anddiscardthe leaves.The deep blue water is the nready to beusedin Sunscreen cream.

Butterfly Pea Flower Contain

Solubleminerals	8.94mg
Ash.	0.9mg
Crudeprotein.	41.27mg
Solublecarbohydrates.	29.18mg

Formulation of sunscreen cream was prepared by following procedure

Ihave totake butter fly pea flower extract.thenIhave take aloeveragel because ithas provent oboth treat and preventburn son skin.The

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naddedrose water inmixturerose water provide cooling effect.then gradually add coconut oil and vitamin E.all the ingredients were mixed vigorously using spatula for about 20-30min and placed .

List of ingredients used in formulation

Aloevera.	5 gm
Rosewater.	2ml
Butterfly peaflower Extract.	4gm
vitaminE.	2gm
coconutoil.	2ml

Final Product



Evaluation of sunscreen cream for sun screening activity Effectiveness of sunscreen:

The effectiveness of unscreenisusually expreesed by sunscreen protectionfactor(SPF),which is the ratio of uv energy required to produce aminimal erthemal dose inprotected skin to unprotected skin.A simple,rapid and reliable in vitro method of calculating thes pfisto screentheabsorbance oftheproduct between290-320nmatevery 5nmintervals. SPFcanbecalculated by applying the following formula known as Mansur equation.

- ***SPFs*** pectrophotometric=CF×€EF(wavelength)×I(wavelength)×Abs(wavelength)
  WhereCF=correction factor(10),EE=erythmogenic effect of radiation with wavelength,Abs=spectrophotometric absorbance values at wavelength. ThevalueofEE×Iconstants.
- ***PH of the cream***
  The ph meter was calibrated usingstand ardbuffersolution.about0.5ofthecreamwasweighed and dissolved in 50.0ml of distilled water and its pH was measured.
- ***Homogeneity***
  The formulations were tested forthehomogeneitybyvisualappearanceandbytouch. Appearance: The appearance of creamwasjudgedbyitscolour,pearlscenceandroughnessandgraded.
- ***Removal***
  Theease of removal of the cream applied was examined by washing the applied part withtap water.
- ***Irritancy test:***
  Thecream was applied to the specified area and time wasnoted.Irritancy,erythema,edema,was checkedifa nyforregularinte rvalsupto24hrsandreported.
- ***After feel***
  Emolliency,slipperinessandamountofresidueleftaftertheapplicationoffixedamountofcream was checked.
- ***Type of smear***
  After application of cream,thetypeorfilmorsmear formedontheskinwerechecked.

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Types of skin and SPF

Types.	Description	SPF.	Character
1	Always burn easily.Andnever tans	Morethan8.	Sensitive
2	Alwaysburnand tan. Minimally	6-7.	Sensitive
3	Burn moderator and.Tangradually	**4-5**	Normal
4	Burnminimaland. Alwaystanwell	**2-3**	Normal
5	Barelyburn and tan. Profusely	**2**	Insensitive
6	Never burn and. Become deeply Pigmented	None	Insensitive

Obse vations

Sr.No.	*Parameters*	*Observation*
1	Colour	Dark white
2	Odour	Characteristics
3	Spreadability	Good and uniform
4	PH	6.5
5	Testforlrritancy	No.irritation reation

Benefits of sunscreen

- Reduceriskofskincancer
- Protect againstsunburn
- Avoid inflammation and redness
- Avoid blotchy skinandhyperpigmentation
- StopDNAdamage
- Prevent theearlyonset of wrinklesandfinelines
- Lowerskincancerrisk
- ShieldsfromharmfulUV ras
- Maintainthebrightnessofyournaturalcomplexion
- Maintainthelookandtextureofyourskin
- Delayspremature signsofaging
- ReflectsUVAandUVBrays
- Worksimmediatelywhenappliedontheskin.

Advantages

- Easilyavailable
- Nosideeffects
- Nospecialequipmentneededforpreparation
- Theyareinexpensive
- Ingredientsareeasilyavailable
- Renewableresources
- Benontoxicandnonirritant
- Beneutral
- Bestabletoheat
- Easytomanufacture

Disadvantages

- Theyaredifficulttohidetasteandodour
- Manufacturingprocessaretimeconsumingandcomplicated
- Herbaldrughaveslowe ffectsascomparetoallopathicdosageformitalsorequireslong term therapy.

Result

To beeffective inpreventing sunburnand otherskindamage ,asunscreen product should have a wide range of absorbance .during the

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storage and handling of cosmetic formulation spreadability and viscosity are the prime parameter which affects the formulation acceptability .the formulated cream exhibited no redness, inflammation andirritation.when formulation were kept forlongtime,itfoundthat nochangeincolourofcream.The cream was easily removed by washing withtap water .

CONCLUSION

The studyattempte dtodevelo pherbalsunscreen creamusingextract ofbutterflypea flower and examined their efficacy for preventing sun burn .

REFFERENCE

1. *Boyd AS, Naylor M, Cameron GS, et al. The effects of chronic sunscreen use on the histologic changes of der matoheliosis. JAm Acad Dermatol. Dec 1995; 33(6):941-6*
2. *DeBuysHV, LevySB, MurrayJC,etal.Mo dern approachestoph otoprotection.Dermatol Clin. Oct 2000; 18(4):577-90.*
3. *DiffeyBL andGriceJ. The influenceof sunscreentypeonphoto protection. Br J Dermatol. Jul 1997; 137(1):103-5.*
4. *DromgooleSHandMaibachHI.Sunscreeningagentintolerance:contactandphotocontact sensitizationandcontacturticaria. J Am Acad Dermatol. Jun 1990; 22(6):1068-78.*
5. *FotiadesJ,SoterNAandLimHW.Resultsofevaluationof203patientsforphotosensitivity ina7.3-yearperiod. JAmAcad Dermatol. Oct 1995; 33(4):597-602.*
6. *MithalBM and Saha RNA. Hand book ofcosmetics, first edition, reprint-2007, Vallabh Prakashan, Delhi 122-124. 7) Gasparro FP, Mitchnick Mand Nash JF. Areview of sunscreen safety and efficacy. Photoc hemPhotobiol.Sep1998;68(3):243-56.*
7. *KaidbeyKH.Thephotoprotectivepotentialofthenewsuperpotentsunscreens.J Am Acad Dermatol. Mar 1990; 22(3):449-52.*
8. *KullavanijayaPandLim HW. Photoprotection.JAmAcadDermatol.Jun2005;52(6):937-58;quiz959-62. LevySB.HowhightheSPF?ArchDermatol.Dec1995;131(12):1463-4.*
9. *Molone yFJ,Collin sSa ndMurphyGM.Sunscre ens:safety,efficacyandappropriate use. Am J Clin Dermatol. 2002; 3(3):185-91.*
10. *NaylorMFandFarmerKC.Thecaseforsunscreens.Areviewoftheirusein preventingactinicdamageandneoplasia. Arch Dermatol. Sep 1997; 133(9):1146-54.*
11. *ahuRK,RoyA,KushwahP,SahuA.Formulationanddevelopmentoffacecreamcontaining natural products. Research Journal of Topical and Cosmetic Science. 2012: 3(1): 16-19.*
12. *.Roy A, Sahu RK, Mutlam M, Deshmukh VK, Dwivedi J, Jha AK. In vitro Techniques toAssesstheProficiencyofSkinCareCosmeticFormulations.PharmacognosyReview.2013:7(14):97-106.*
13. *Sahu RK, Roy A, Kushwah P, Khare M, Mudotiya R. Formulation and development ofwhiteningpolyherbalfacecream.ResearchJournalofTopicalandCosmeticScience.2012: 3(1): 23-27.*
14. *Sahu RK, Roy A, Jha AK, Dwivedi J. Promotion and computation of inhibitory effect on tyrosinase activity of herbal cream by incorporating indigenous medicinal plants. Pakistan Journal of Biological Sciences. 2014: 17(1): 146-150.*
15. *17).Shahriar M, Akhter S, Hossa MI, Haque MA, Bhuiyan MA. Evaluation of in vitro antioxidant activity of bark extracts of Terminalia arjuna. Journal of Medicinal Plants Research. 2012; 6(39): 5286-5298*