

A Review on Sunscreen by Using Neem and Curry Leaves

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Abstract: Sunscreens protect the skin from harmful ultraviolet (UV) radiation, preventing sunburn, photoaging, and skin cancer. They work by absorbing or scattering UV light, with different formulations available as creams, lotions, gels, and sprays. For optimal protection, sunscreens should be used in adequate amounts, re-applied frequently, and combined with other sun-protective measures like seeking shade and wearing protective clothing. Abstract on making sunscreen using neem typically describes the formulation and evaluation of a natural, herbal-based sunscreen product that utilizes the inherent photoprotective and antioxidant properties of *Azadirachta indica* (neem). The primary objective is to develop a safe, effective, and natural alternative to synthetic chemical sunscreens, often by combining neem with other herbal ingredients like Aloe vera, tulsi, and cucumber to enhance the protective and soothing effects on the skin. A study evaluated the sunscreen potential of various medicinal plants, including *Azadirachta indica*, *Ocimum sanctum*, *Centella asiatica*, and *Hibiscus rosa sinensis*, using a spectrophotometric method. The *in vitro* method was used for preliminary evaluation of sun protective potential. The results indicated that hydroalcoholic extracts from all tested plants demonstrated sun protective potential. *Azadirachta indica* hydroalcoholic extract showed higher sun protection efficiency compared to the other plants evaluated. The study also found that the photo-protective effect was concentration-dependent. Formulations combining neem with other herbs like Aloe vera and beetroot were developed and evaluated for their UV protective properties. Creams containing neem oil have shown higher *in vitro* SPF (Sun Protection Factor) values than some commercial creams, revealing neem as an alternative for producing multifunctional sunscreens. Neem is also recognized for additional beneficial properties in skincare, including anti-inflammatory, antibacterial, and anti-aging effects, which make it a valuable ingredient in dermocosmetic products. *Murraya koenigii* (L.) Spreng, colloquially known as meethi neem, kari patta or curry leaves belongs to the Rutaceae. The plant is renowned in various traditional system of medicine for its peculiar aroma and therapeutic significance. The plants prosper well in tropical and subtropical climates. *M. koenigii* is significantly used in Indian culinary and complementary system of medicine to mitigate various disorder. UV-radiation perceived as major cause that vitiate the intuitive nature and function of skin. UV-radiation may cause detrimental effect to the usual characteristics of human skin. UV-filters or sunscreens are the agent that could help to assuage the deleterious effect of UV radiation by absorbing and tempering the harmfulness to a major extent. The present study supports the sun protective efficacy of *Murraya koenigii* in concentration dependent manner that could broad cosmeceutical horizon of *Murraya koenigii*. There is a need to grow more and more curry leaves because they are widely used in industries for their best medicinal qualities as an anti-diabetic, antioxidant, antimicrobial, anti-inflammatory, hepatoprotective, antihypercholesterolemic, etc. and for preparing cosmetics.

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I. INTRODUCTION

Sunscreen is a lotion or cream applied to the skin to protect it from the sun's harmful ultraviolet (UV) radiation, which can cause sunburn, premature aging, and skin cancer. It works by absorbing, reflecting, or scattering UV rays

before they can damage the skin. Sunscreen products differ in their ability to protect against both UVA and UVB rays, which is measured by the Sun Protection Factor (SPF), and broad-spectrum products are recommended for comprehensive protection.

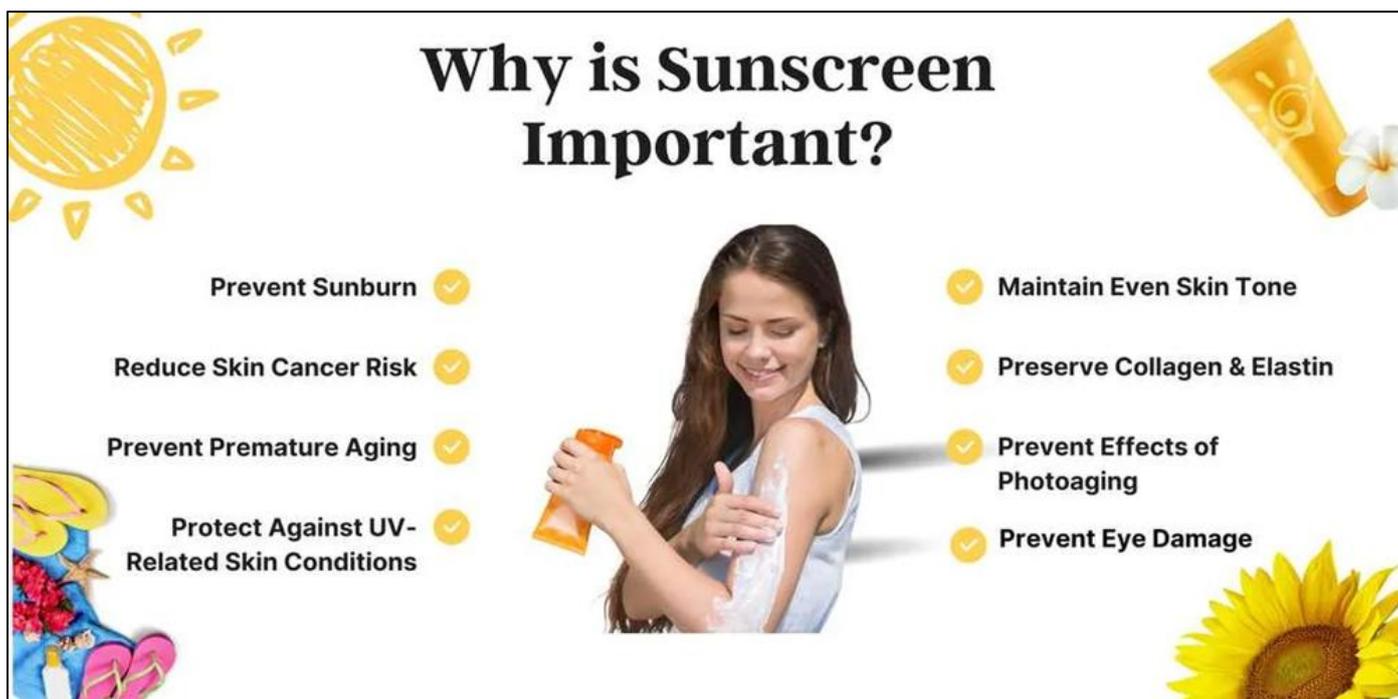


Fig 1 Importance of Sunscreen

Neem, (*Azadirachta indica*) is a versatile medicinal plant widely used in skincare, including sun protection products, due to its rich composition of beneficial compounds. While not a traditional physical or chemical sunscreen agent, neem provides strong antioxidant, anti-inflammatory, and anti-aging benefits that help protect the skin from and mitigate the damage caused by UV radiation.

- **UV Damage Mitigation:** Research indicates that topical application of neem leaf extract significantly helps prevent the formation of wrinkles, skin thickening, and water loss caused by UVB exposure. It does this by boosting the production of type I procollagen and elastin, which maintain skin structure and elasticity.
- **Antioxidant Protection:** Neem is rich in antioxidants, such as rutin, carotenoids, and phenolic compounds, which neutralize free radicals generated by UV radiation, a major cause of skin damage and premature aging.
- **Anti-inflammatory Properties:** The active compounds in neem, such as nimbidin and nimbin, have potent anti-inflammatory effects that help soothe irritated, red, or inflamed skin resulting from sun exposure or underlying conditions like eczema and psoriasis.
- **Skin Health and Healing:** Neem's antibacterial and antifungal properties fight off acne-causing bacteria and

prevent skin infections, which can be exacerbated by sun exposure. It also aids in fading dark spots and hyperpigmentation caused by sun damage.

- **Natural Adjuvant:** In commercial and experimental sunscreen formulations, neem extracts and oil are often combined with conventional UV-blocking agents like zinc oxide or titanium dioxide to create a comprehensive, multi-functional product. It is valued as a natural ingredient for consumers seeking safer, more effective alternatives to synthetic Cosme.

➤ *Botanical Description:*

A fast-growing, evergreen tree that can reach 15–30 meters in height, with a dense, rounded crown and deeply penetrating roots. The leaves are toothed, and the flowers are small and fragrant.

• *Traditional and Modern Uses:*

- ✓ **Medicinal:** Historically used in Ayurveda and other traditional systems for a wide range of ailments, including skin disorders, infections, and fevers. Modern research is validating many of these uses.

- ✓ Pesticidal: Extracts from the seeds and leaves are used as natural insecticides and pesticides for both agriculture and household pests.
- ✓ Cosmetic: Incorporated into many personal care products for skin, hair, and dental hygiene.
- ✓ Other: Materials from the tree are also used in the manufacture of soaps, as a lubricant, and in fertilizer.

➤ *Neem (Azadirachta Indica)*

Due to its versatility, neem has been recognized globally for its potential to solve problems related to health and agriculture.

Neem has its roots in ancient Ayurvedic practices and has been revered for centuries in Indian households for its powerful healing and purifying properties. It has been hailed as a miracle plant that’s been used in holistic treatment, from skin problems to enhancing immunity. And now, this age-old botanical is breaking into contemporary skincare routines across the globe. As more people are turning to natural and safe alternatives, Neem is emerging as the ultimate go-to for healthy skin. Here is why this ancient botanical has come to be considered essential in the world of modern-day skincare:

Neem may also be a ready source of low-cost analgesic (pain relieving), or antipyretic (fever-reducing) compounds. It is used for these purposes everywhere it is grown. In trials, positive results have been obtained for significant analgesic, antipyretic, and anti-inflammatory effects.

Neem is typically used as a supporting ingredient in commercial sunscreen formulations, often combined with established UV filters like zinc oxide or avobenzone.



Fig 2 Azadirachta Indica Extract

Table 1 Classification of Neem

Order	Rutales
Suborder	Rutinae
Family	Meliaceae (Mahogany family)
Subfamily	Melioideae
Tribe	Melieae
Genus	Azadirachta
Species	Indica

➤ *Curry Leaves*

Curry leaves (*Murraya koenigii*) show potential for sunscreen research due to their antioxidant properties and content of beneficial phytochemicals, which help protect the skin from UV-induced oxidative damage.



Fig 3 Curry Leaves, Kadi Patta (Hindi/Marathi)

Table 2 Classification of Curry Leaves

Kingdom	Plantae
Sub-kingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Sapindales
Family	Rutaceae
Genus	<i>Murraya</i> J.Koenig ex L.
Species	<i>Murraya Koenigii</i> L. Spreng

➤ *Key Compounds and their Properties Include:*

- Carbazole Alkaloids: These are the primary bioactive compounds in curry leaves and are associated with potent antioxidant, anti-inflammatory, and antimicrobial properties.
- Polyphenols/Flavonoids: Compounds like myricetin, quercetin, and gallic acid contribute significantly to the extract's antioxidant capacity by scavenging free radicals and reducing oxidative stress caused by UV radiation.
- Beta-Caryophyllene: This sesquiterpene is found in the essential oil and has properties that can inhibit melanogenesis (melanin synthesis), which helps in reducing dark spots and skin lightening.
- Vitamins and Carotenoids: Curry leaves are rich in vitamins A, B, C, and E, and carotene, all of which act as antioxidants that protect the skin from environmental stressors and oxidative damage.

II. OBJECTIVE

The primary objective of herbal sunscreens is to provide protection against harmful UV radiation from the sun, similar to traditional sunscreens, but with an emphasis on using natural, plant-based ingredients.

- Providing broad-spectrum protection: While standard sunscreens primarily use chemical or physical blockers (like zinc oxide) against UV radiation, neem acts as an herbal adjuvant that helps reflect or absorb some UV rays, contributing to the overall Sun Protection Factor (SPF).
- Minimizing side effects of synthetic ingredients: A core goal of developing herbal sunscreens is to create a product with few or no side effects, offering a natural alternative for consumers who may have sensitivity to synthetic chemicals.
- Enhancing skin health: Neem is rich in fatty acids and antioxidants, which help nourish and hydrate the skin, reduce inflammation, heal minor infections, and fight free radicals that contribute to signs of aging.
- Creating a multi-purpose product: By incorporating neem, the sunscreen can also address common skin issues like acne, blemishes, and rashes, functioning as both a protective agent and a skin treatment.
- Utilizing sustainable and economical resources: Neem is readily available in many regions (especially India), making it an economical and eco-friendly ingredient for cosmetic formulations.

In essence, the objective is to develop a safe, effective, and natural sunscreen that not only protects from the sun's harmful UV rays but also provides additional therapeutic benefits for the skin.

Some benefits of herbal cosmetics include lack of side effects, nourishment of skin and hair, and treatment of conditions like acne, hair fall, and fungal infections.

Sunscreen is a topical product, like a lotion or spray, that protects the skin from the sun's harmful ultraviolet (UV) radiation by absorbing or reflecting it. Regular use helps prevent sunburn, premature aging, and skin cancer.

III. LITERATURE REVIEW

- Gurubarik Neelima et al. (2016) formulation of herbal sunscreen formulation and evaluation of its sun protection activity is an important aspect in the cosmetic industry. The aim of the present study was to formulate and evaluate the sun protection factor of poly herbal sunscreen cream. In this study five sunscreen creams were formulated using various herbal oils and tested for physiochemical parameters such as color, spreadability, viscosity, limit test for lead, consistency, odour, appearance. Studies like thermal stability, phase separation, liquetaction, centrifugation to check stability and patch test for irritancy were done.
- Nslin Jaiswal et al. (2017) formulation of sunscreen having several natural ingredients. inclusive of Henna, Sage (Maramiah), Aloe Vera, Coconut oil, Sesame oil, Almond oil, Dark chocolate, Green Herbal tea, Turmeric water, Saffron extraction, Sesame extract and rash cream, were used to prepare different batches of formulations, based on amounts. followed by various altering processes, such as blending the plant ingredients,

sifting the blended material of any unwanted residues, boiling a weighed amount of the blended herb with certain amount of water, along with a combination of other ingredients, and finally filtering the liquid material of any wastes.

- A. Mosa et al. (2019) The aim of this research was to develop sunscreen cream formulation with natural ingredients and calculated sun protection factor (SPF) for it. The sunscreen is prepared using water phase that includes distilled water as a main solvent, glycerine as a moisturizer, Arabic gum as a thickener, and citric acid as a preservative. The oil phase is composed of one of the following oils: paraffin oil, olive oil, sesame oil or pond oil, and beeswax foundation as emulsifier. Zinc oxide and titanium dioxide are both employed in sunscreen as inorganic physical sun blockers.
- Zeel shaal et al. (2022) formulated and evaluated Poly herbal skin clarifying and UV protection cream is a herbal cream which was formulated for the purpose of moisturizing, hydrating, making skin supple, antiaging, antiwrinkle, depigmentation, antioxidant. maintaining skin Ph, nourishing. UV protection and treatment of various skin discases like hyperpigmentation, wrinkles, acne, skin aging, photoaging, tanning. Herbal cream was formulated by using crude drugs like Aloe barbadensis (Aloe vera). Azadirachta indica(Neem), Daucus carota(Carrot seed), Citrus limon(Lemon peel), Chrysopogon zizanioides (Vetiver root), Panax ginseng (Ginseng). Ginkgo biloba, Cucumis sativa(Cucumber seed) respectively.
- Aman S. Maharaj et al. (2023) the objective of the present work was to develop sunscreen cream containingaloe vera, coconut oil, vinca, rose water, vitamin E. Ultraviolet radiation has been demonstrated to cause skin disorders, including sunburn and relative symptoms of prolonged exposure. It has been reported that sunscreen have beneficial effect in reducing the incidence of skin disorders (sunburn, skin aging) through their ability to absorb the rays and release from the body in the form of heat.

IV. MATERIAL AND METHODS

➤ On Basis of Marketed Product

This recipe creates a moisturizing base with the added benefits of neem's skin properties and a physical sun-blocker (zinc oxide).

• Carrier Oils and Butters:

- ✓ ¼ cup coconut oil (natural SPF of around 4-6)
- ✓ ¼ cup shea butter (natural SPF of around 3-4)
- ✓ ½ cup almond oil or olive oil

• Thickener/Water Resistance:

- ✓ ¼ cup beeswax pellets

- *Active UV Blocker:*
- ✓ 2 tablespoons non-nano zinc oxide powder (provides an estimated SPF of 20+; use a mask to avoid inhaling the powder)
- *Neem Component:*
- ✓ 1 ml to 2 ml neem extract or a few drops of neem oil
- *Optional Enhancements:*
- ✓ 1 tsp red raspberry seed oil or carrot seed oil (believed to naturally boost SPF)
- ✓ A few drops of essential oil (like lavender) to help with the strong smell of neem oil
- ✓ Vitamin E oil capsules (broken open) for added antioxidant properties and preservation

➤ *Method*

- Melt ingredients (except zinc oxide and neem): Combine the coconut oil, shea butter, carrier oil (almond or olive), and beeswax pellets in a glass jar. Place the jar in a saucepan filled with a few inches of water (a double boiler method) over medium heat.
- Combine: Stir the ingredients frequently until the beeswax and butters are completely melted and combined.
- Cool slightly: Remove the jar from the heat and let the mixture cool for a few minutes. This prevents the zinc oxide from clumping and ensures the neem's properties are not degraded by excessive heat.
- Add zinc oxide and neem: Carefully add the non-nano zinc oxide powder and the neem oil or extract. Wear a mask to avoid inhaling the zinc oxide powder.
- Mix thoroughly: Stir or whisk the mixture well to ensure the powder and neem are evenly distributed throughout the mixture.
- Store: Pour the mixture into a clean, airtight container (preferably dark or opaque to protect from light). It will thicken as it cools. Stir a few times as it cools to ensure the zinc oxide remains incorporated.
- Usage: Apply generously to exposed skin before sun exposure and reapply every two hours, or immediately after sweating or swimming, as this recipe is not waterproof.

➤ *Essential Ingredients*

The core components for a DIY neem sunscreen involve an oil/wax base, an aqueous (water-based) phase, and the active sun-blocking agent.

- UV Protection Active Ingredient: Zinc oxide or titanium dioxide powder. This is the most crucial ingredient for actual sun protection.

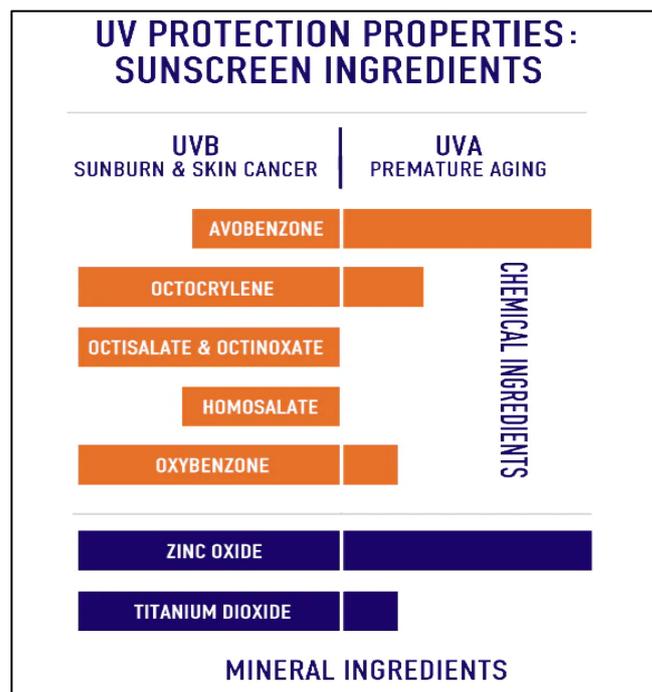


Fig 4 Ingredients Related to Sunscreen

- **Neem Oil:** Provides anti-inflammatory, antioxidant, and potential mild photoprotective properties



Fig 5 Neem Oil

- **Carrier Oils:** Jojoba oil, coconut oil, sesame oil, or sunflower oil act as emollients and help create a smooth consistency.



Fig 6 Carrier Oil

- **Neem Extract:** This is the signature ingredient, known for its natural anti-bacterial and antioxidant properties. It is used to help manage acne, protect against

environmental stressors, and soothe skin. The compound azadirachtin within neem helps absorb some UV radiation.



Fig 7 Neem Extract Market

- **Aloe Vera:** A highly common ingredient that provides soothing and hydrating properties, which helps calm irritated skin and relieve dryness.

- **Antioxidants/Vitamins:** Ingredients like Vitamin E are often added for extra antioxidant benefits to combat free radical damage caused by sun exposure.



Fig 8 Alovera



Fig 10 Vitamin E Capsule

- **Glycerin:** A humectant that draws moisture into the skin, helping to maintain hydration and a soft, supple feel.

- **Turmeric Extract:** Curcumin (active compound) has natural UV-absorbing properties, especially in the UV-B ranges. Acts as a natural SPF booster when combined with oils (like coconut,sesame,or almond oil



Fig 9 Glycerine



Fig 11 Turmeric Extract

- ✓ Plant Profile: Turmeric
- ✓ Botanical Name: Curcuma Long
- ✓ Family: Zingiberaceae (Ginger family)
- Liquorice Extract: Glycyrrhizin reduces redness,itching,and irritation caused by sunburn. Liquorice contains glabridin (a flavonoid) which has strong UV-absorbing properties.Help block UVB-induced pigmentation and prevent tanning.



Fig 12 Liquorice Extract

- ✓ Botanical name: Glycyrrhiza glabra
- ✓ Family: Fabaceae (Leguminosae)

Table 3 Material use on Methodology

Ingredient	Quantity taken	Role of ingredient
Aloe Vera extract	12 ml	85% reflect UV- radiation, SPF (14 16).
Green tea extract	1 ml	Works as a natural UV filter, antioxidant.
Turmeric extract	0.5 ml	Turmeric acts as a natural photoprotective.
Liquorice extract	1 ml	Acts as a UV-protective agent, skin whitener.
Neem oil	1.5 ml	Contain vit. E, vit. C, Moisturiser for dry skin.
Coconut oil	3 ml	Acts as a mild UV filter, natural moisturizer.
Olive oil	2 ml	Mainly used as a natural SPF contributor.
Shea Butter	5 ml	Acts as a mild natural sunscreen, emollient.
Bees Waxes	2.5 ml	Beeswax acts as a natural thickener, stabilizer, emollient.
Glycerine	3 ml	Mainly as a humectant, moisturizer, stabilizer.
Vitamin E oil	1 ml	Vitamin E acts as an antioxidant, moisturizer, photoprotective enhancer.
Lavender oil	0.5 ml	Enhances fragrance, provides skin-soothing.
Water	17 ml	
Total	50 ml	

**SUNSCREEN CREAM
EXAMPLE:**

FORMULA	PERCENTAGES
Methyl salicylate	14.0
Borax	1.8
Beeswax	20.0
Mineral oil	20.0
Water	28.7
Petrolatum	15.0
Perfume	0.5

V. FORMULATIONS

➤ On Basis of Marketed Product

- All the dried and fresh herbs were weighed accurately.
- Then the Freshly extracted Neem extract was mixed with the Aloe Vera Gel.
- Then this aqueous mixture was added to the prepared oil base having coconut oil, bees wax and glycerin.
- Then Rose water was added in the above mixture.
- All the ingredients were mixed using Spatula and then Vitamin E was mixed and placed aside.



Fig 13 Formulated Herbal Sunscreen

Table 4 Herbal Sunscreen Formulation

Sr. No.	Ingredients	Quantity used (per 25 gm)
1	Aloe vera	5gm
2	Neem	2gm
3	Rose water	2.3ml
4	Coconut oil	2ml
5	Vitamin E	2gm
6	Beeswax	3.2gm
7	Glycerin	1ml
8	White soft Paraffin	9 ml

Research indicates that while curry leaf extract is rich in antioxidants that offer photo-protective benefits and can help maintain natural skin pigmentation, it has a low inherent sun protection factor (SPF) when used alone. It is best used as an adjuvant (additive) to enhance the activity of other sunscreen formulations rather than as the sole active ingredient.

The formulation process generally involves preparing a curry leaf extract and then incorporating it into a cream or lotion base.

➤ Preparation of Curry Leaf Extract (Soxhlet Method)

Scientific studies often use solvent extraction methods to obtain the active compounds.

- Preparation of Leaves: Wash fresh curry leaves thoroughly and dry them in the shade at room temperature for several days.
- Powdering: Grind the dried leaves into a coarse or fine powder using a mechanical grinder.
- Extraction: The powder is typically extracted using a solvent like ethanol or a hydro-alcoholic mixture (e.g., 50% water and 50% ethanol) in a Soxhlet apparatus for several hours (6-8 hours).
- Concentration: The resulting liquid filtrate is concentrated using a rotary evaporator or a water bath at a controlled temperature (40-50°C) to obtain a semi-solid or dry extract.

VI. EVALUATION

➤ On Basis of Marketed Products

- Physical Evaluation
 - ✓ Appearance and Colour: Check for uniform colour and smooth, creamy texture without lumps.
 - ✓ Odor: Should be pleasant or herbal; no rancid or off smell.
 - ✓ Consistency: The cream should spread easily without being too thick or too runny.
 - ✓ pH: Measure pH using a pH meter or pH strip; ideally between 5.5–6.5 for skin compatibility.
- Spreadability :Place a small amount of cream between two glass slides and measure the area covered under a certain weight. A good sunscreen cream should spread easily.
- Homogeneity : Examine the cream under a microscope or visually for uniform distribution of herbal extracts and oils; no phase separation should occur.
- Stability :Centrifugation test: Spin the cream at 3000 rpm for 15–20 minutes; check for separation. Storage test: Store samples at room temperature, a elevated temperature (40°C) for 1–3 months; observe changes in color, odor, or texture.
- Sun Protection Factor (SPF) Evaluation :Use in vitro UV spectrophotometric method or a laboratory SPF testing kit to determine SPF value. Compare with standard sunscreen values to ensure adequate UV protection.

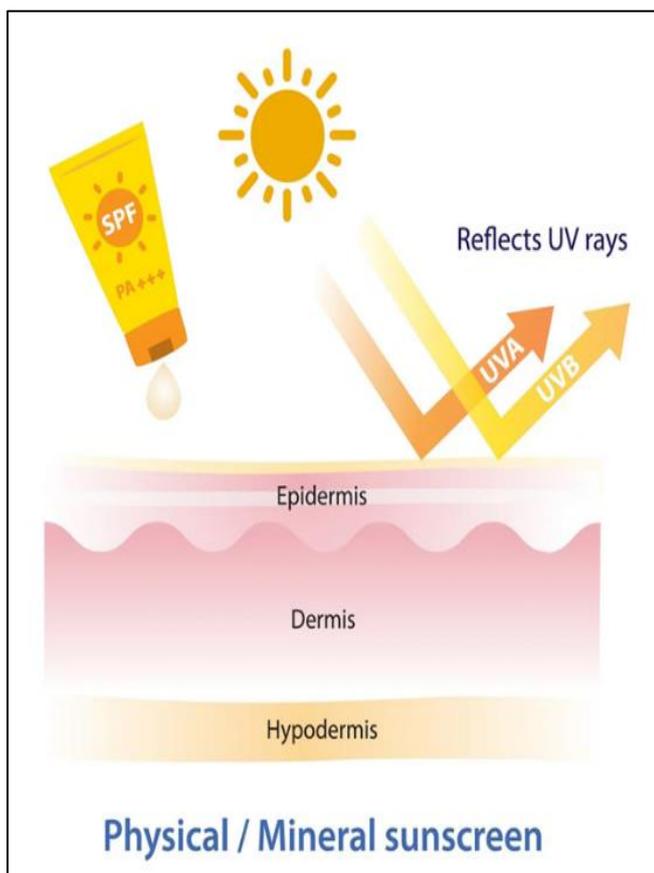


Fig 14 How Sunscreen Works on Our Skin

➤ **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.

➤ **Mechanism of Photoprotection**

Sunscreen act by preventing and minimizing the damaging effects of the UV. Scattering and reflection of UV energy from the skin surface mineral based on inorganic sunscreen works on this mechanism they provides coating that blocks sun rays from penetrating through the skin.

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 this mechanism.

VII. RESULT

Herbal sunscreen is one of the most well known and trust able product for skin care. Herbal sunscreen not only protect the skinfrom harmful UV radiations from sun and environment but also provide nourishment to the skin. It provides numerous vitaminsand and nutrients required to the skin for proper functioning and also provide moisturizing effects. The herbal sunscreen wasprepared from the ingredients mentioned above and was subjected to many

Organoleptic and Physical evaluations to ensuresafety of the formulation. The evaluation parameters were Color, Odour, Skin Irritation, pH value, Removal , physical state,homogeneity, After feel, Spreadabilty etc.

➤ **Organoleptic Evaluation:**

Different parameters were studied such as- color, odour, physical state, solubility.

Table 5 Organoleptic Evaluation

Sr. No.	Test	Result
1.	Colour	White
2.	Physical State	Semisolid with mild greasy nature
3.	Odour	Characteristic
4.	Solubility	Soluble in non-polar solvent

➤ **Physical Evaluation:**

The physiochemical evaluation was carried out with respect to pH value, homogeneity, Removal, Skin irritation test, After Feel,Type of smear, Spreadability.

Table 6 Evaluation Tests of Herbal Sunscreen

Sr. No.	Evaluation Test	Result
1.	pH value	6.5
2.	Homogeneity	Even surface, smooth hand feel
3.	Removal	2-3 splashes of water with rubbing
4.	Skin Irritation	No irritation was felt
5.	After feel	Slight slippery
6.	Type of smear	Transparent
7.	Spreadability	Easily spreadable

Research indicates that while neem offers significant antioxidant, anti-inflammatory, and general skin protection benefits, it is not a standalone, reliable sunscreen. Studies show neem can enhance the Sun Protection Factor (SPF) of professional formulations but homemade "neem sunscreens" are generally considered unsafe and ineffective for proven UV protection.

➤ **Antioxidant Properties:**

Neem contains high levels of antioxidants (like rutin, vitamin E, and carotenoids) which help neutralize free radicals caused by UV exposure, thereby protecting the skin from oxidative stress and premature aging .



Fig 15 Antioxidant Properties

➤ *Anti-inflammatory Effects:*

Neem's compounds, such as nimbin and nimbidin, have potent anti-inflammatory properties that can soothe skin redness and irritation caused by sun exposure and other conditions.



Fig 16 Skin Inflammation Study

➤ *UV Protection Potential:*

Neem extracts have been shown to absorb UV radiation and can provide a mild SPF boost when used in professionally formulated and tested products. One study noted a specific polyherbal cream with *Azadirachta indica* had good sun protection potential.

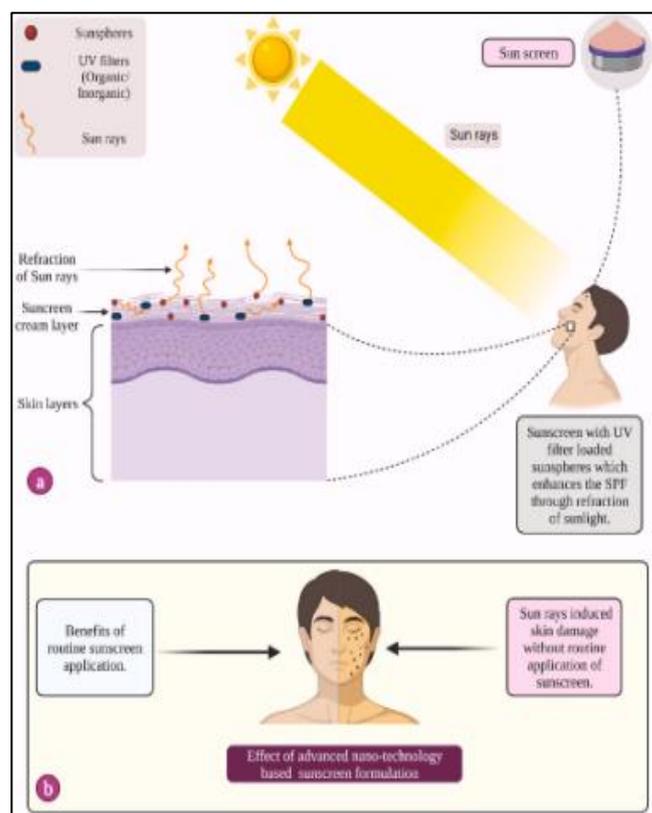


Fig 17 Sunscreen Mechanism

VIII. CONCLUSION

- Days with sunscreen correlated not with days without risk behavior, but with days "sunbathing with the intention to tan," indicating that sunscreens were used as tanning aids to avoid sunburn.
- Overall the formulated herbal sunscreen provides protection to the skin from the harmful UV rays and also many more skinbenefits which enhance the skin naturally.

- Coconut oil and vitamin E also provides some extra benefits to the skin. The finished product passes all the evaluation tests.

In conclusion, Herbal sunscreen is beneficial to protect skin from problems like sunburn and skin cancer. Herbal sunscreen is an alternative source from hazardous chemical products.

- The current research effectively developed and tested a herbal sunscreen cream from natural components with established photoprotective and skin-care benefits. The formulated sample displayed favourable physical traits such as silky feel, acceptable spreadability, emulsion stability, and pleasant natural aroma. Test parameters such as pH, viscosity, and stability revealed that the formulation was safe and could be used topically. In vitro determination of SPF showed adequate protection against UV, validating the possibility of herbal extracts being used as natural counterparts of synthetic sunscreen chemicals.
- In general, the formulated herbal sunscreen cream provides a safer, environmental-friendly, and affordable alternative against detrimental ultraviolet radiation with added skin benefits from the antioxidant and anti-inflammatory herb compounds. Additional research on long-term stability and in vivo SPF testing can further improve its commercial viability.

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This is to certify that the work investigation described in this dissertation, entitled " A REVIEW ON MAKING SUNSCREEN BY USING NEEM AND CURRY LEAVES ", is submitted in the partial fulfilment of the requirement for the degree of Bachelor of Pharmacy, in the faculty of Pharmacy. Dr. Babasaheb Ambedkar Technological University. This work is original as far as my knowledge is concerned and not imitated from anywhere. This work has been carried out in laboratories of the Bhauasaheb Mulak College of D. Pharmacy ,Umred by Sakshi Dnyaneshwar Galande under the guidance supervision Mrs.Bhagyashri S. Bhure , Bhauasaheb Mulak College of D. Pharmacy , Umred . This Project Review is now ready for examination.

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