International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1068-1074 www.ijprajournal.com ISSN: 2456-4494

Herbal Powder Sunscreens: Exploring Plant-Based Alternatives to Synthetic Formulations in UV Protection

Miss PrajktaSontakke[1], Miss RutujaSonawane[2]
Samarth College of Pharmacy, Maharashtra, India. Under the Dr. Babasaheb Ambedkar University, Lonere.

Date of Submission: 10-10-2025 Date of Acceptance: 20-10-2025

ABSTRACT: Sunscreens are essential for protecting the skin from harmful ultraviolet (UV) radiation, particularly UVA and UVB, which are associated with sunburn, premature aging, DNA damage, and an increased risk of skin cancer. Conventional creams and lotions have limitations, including greasiness, the need for frequent reapplication, the use of chemical preservatives, the risk of skin irritation, and environmental impact. Herbal powder sunscreens have emerged as a promising option because they combine plant-derived bioactive chemicals in a lightweight, non-greasy composition that provides adequate solar protection while decreasing chemical exposure. This research lists major herbal compounds commonly found in sunscreen powder formulations, including Clitoriaternatea (butterfly pea flower), Aloe vera, Tulsi, green tea extract, turmeric, licorice, sandalwood, red raspberry, neem, Multani Mitti, rose petal powder, and rice powder. These compounds have antioxidant, anti-inflammatory, UV protection, and skin-soothing qualities. However, research on herbal sunscreen powders is limited, particularly in terms of formulation stability, clinical efficacy, and scalability in production. Future research should focus on optimizing ingredient combinations, ensuring safety, and creating stable, commercially viable products. Herbal powder sunscreens are a sustainable, natural, and skin-friendly alternative to traditional synthetic sunscreens.

KEYWORDS: Herbal sunscreen, Photo-protection, Antioxidant, Natural Skincare.

I. INTRODUCTION

UV radiation is a huge hazard to worldwide skin health, including premature aging, uneven pigmentation, and an increased risk of skin cancer. Extended exposure to UVA and UVB radiation hastens photoaging, resulting in wrinkles, reduced skin suppleness, and hyperpigmentation. Furthermore, UV-induced DNA damage increases the incidence of both melanoma and non-melanoma skin malignancies. Epidemiological research suggests that UV-related skin problems are becoming more common around the world, especially in areas with significant sun exposure. These changes highlight the urgent need for adequate photoprotective measures. [2] Although various studies have investigated the photoprotective and antioxidant properties of herbal extracts in cream and lotion formulations, their use in powder-based sunscreen systems is mostly unknown. Based on known approaches for emulsion formulations, a conceptual approach is provided for adapting comparable strategies to powder formulations. This conceptual framework is intended to guide future experimental studies in the development of stable, effective, and user-friendly herbal sunscreen powders, thereby expanding current knowledge beyond liquid/cream systems to dry powder applications.

1. Basics of Sunscreens

1.1 Mechanism of UV protection (UVA, UVB, UVC)

Effects of UV radiation on the skin layer:

Sunlight has a range ranging from ultraviolet (UV) to visible light. Ultraviolet radiation is divided into three types based on wavelength:

- **UVA**- wavelengths range from 320-400 nm
- **UVB**- from 290-320 nm
- **UVC**- from 100-290 nm

A. UVA has the longest wavelength of all UV radiation, allowing it to penetrate deep into the skin and reach the dermis. Prolonged exposure can cause skin darkening, premature aging, and wrinkles.

B. UVB rays have shorter wavelengths and predominantly harm the epidermis, with only a tiny percentage reaching the dermis. UVB is responsible for sunburn and can cause DNA damage in skin cells.

C. UVC rays have the shortest wavelength and are virtually completely absorbed by the Earth's ozone layer, thus they do not reach the skin. [2] [7] [12]

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1068-1074 www.ijprajournal.com ISSN: 2456-4494

1.2 Sunscreen Modalities: Physical, Chemical, and Phytochemical Approaches

1) Physical (Mineral) Sunscreens- contain active mineral compounds such as zinc oxide or titanium dioxide, which reflect and scatter UV light from the skin's surface. They offer broad-spectrum protection and are typically less irritating to sensitive skin.

2) Chemical (Synthetic) Sunscreens- These contain organic chemicals such as avobenzone, octocrylene, and oxybenzone, which absorb UV light and turn it into safe heat. They are often lighter on the skin and used in daily cosmetic formulations.

3) Herbal (Natural) Sunscreens- Use plant-derived extracts high in antioxidants and UV-absorbing substances, such as aloe vera, green tea, or coconut extract, to provide mild UV protection as well as additional skin benefits like anti-inflammatory and anti-aging properties. [8] [9] [12]

1.3 Limitations of conventional synthetic sunscreens

Although traditional chemical sunscreens are excellent at protecting against UVA and UVB rays, they have many disadvantages. Skin irritation, allergic reactions, and photosensitivity can all occur as a result of frequent use. Some chemical filters have been linked to systemic absorption, raising questions regarding long-term safety. Furthermore, these sunscreens may have a substantial environmental impact, particularly on marine ecosystems, because some chemicals such as oxybenzone and octinoxate contribute to coral bleaching and reef damage. These disadvantages have sparked increased interest in safer, more environmentally friendly alternatives, such as mineral and herbal sunscreens.

2. Powder Sunscreen Formulations

2.1 Powder Sunscreens: A DistinctAlternative to Cream and Lotion Formulations.

Powder sunscreens are a new type of photoprotective formulation that provides broad-spectrum UV protection in a dry, particle form. Unlike traditional cream and lotion sunscreens, which are emulsion-based (oil-in-water or water-in-oil systems), powder sunscreens use micronized or nanoparticle UV filters that are mixed into a free-flowing powder basis.

Key Features of Powder Sunscreens:

1)Formulation Base

Powder: Composed of crude pharmaceuticals such as clitoreaternatea, which are frequently mixed with natural minerals.

Creams/Lotions: Typically contain oil, water, and emulsifiers, along with chemical or physical UV filters.

2) Mode of Application

Powder: Applied with a brush or puff for a lightweight, matte finish. Ideal for oily or acne-prone skin, and may be easily reapplied over makeup.

Creams/Lotions: Spread straight onto the skin, which typically results in a greasy or occlusive coating.

3) Aesthetic & Functional Advantages

Powders are non-greasy, portable, and enhance cosmetic acceptance.

Pore clogging risk is reduced when compared to heavy creams.

Their ease of reapplication makes them suitable for daily use.

4) Stability and Shelf Life

Powders are often more stable since they are anhydrous (without water) and less susceptible to microbial contamination.

Creams and lotions may need preservatives to prevent microbial growth.

5) Limitations

It may be hard to get uniform coverage, which could leave gaps in UV protection.

Lower SPF ratings are frequently reported compared to well-formulated creams and lotions.

Sweat and humidity have the potential to remove or spread it.

Conclusion

Powder sunscreens are a viable solution for people looking for lightweight, portable, and cosmetically appealing sun protection. However, their efficiency is strongly reliant on formulation quality, particle dispersion, and correct application. They are best viewed as a supplement rather than a full substitute for traditional cream or lotion-based sunscreens.

2.2 Conceptual Framework for Herbal Powder Sunscreen Formulation

Method 1: Crude Plant Powder-Based Sunscreen Formulation

Since standardized protocols for herbal powder sunscreens are not yet available, a conceptual approach can be outlined. Herbal

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1068-1074 www.ijprajournal.com ISSN: 2456-4494

powders with reported antioxidant and photo-protective activity—such **as green tea, turmeric, moringa, aloe vera, sandalwood, or clitoriaternatea, liquorice, neem, red raspberry, clitoriaternatea** —can be selected as the active components. These powders are blended with natural carriers like rice starch, arrowroot, or cosmetic clay to improve flow, texture, and skin adherence. The mixture is homogenized, sieved to obtain fine uniform particles, and then packed into suitable dosage forms such as loose powder jars, compact pans, or brush-dispensing containers. This method represents a theoretical framework highlighting the feasibility of herbal powder sunscreens, though experimental studies are required to evaluate their actual SPF and clinical effectiveness.

Plant Material
↓ (Drying)
Dried Plant Material
↓ (Grinding)
Crude Powder
↓ (Optional: Sieve for uniform particle size)
Ready-to-Use Herbal Sunscreen Powder

Method 2: Crude Powder-Enriched Extract Sunscreen Formulation (Powder Base Version)

In this method, the plant material is first dried and ground into a fine **crude powder**, containing all its natural constituents. To enhance the concentration of active compounds and improve sunscreen efficacy, a **plant extract** is prepared from the same plant and carefully incorporated into the crude powder. After thorough mixing, the combined mixture is **dried again** to obtain a uniform, stable **extract-enriched powder.**

This process ensures that the **active ingredients from the plant** are effectively transferred into the powder base, reducing bulkiness and improving powder consistency. Compared to conventional crude powder sunscreen, this **enhanced powder** provides:

- **Higher UV protection** due to concentrated actives.
- **Better antioxidant activity** for reducing skin damage.
- **Improved stability and homogeneity**, preventing clumping or settling.
- **Optimized texture** for cosmetic use, making it easier to apply and more effective on the skin.

Plant Material
↓ (Drying)
Dried Plant Material
↓ (Grinding)
Crude Powder
↓ (Prepare Plant Extract from same plant)
Plant Extract
↓ (Mix thoroughly with Crude Powder)
Extract-Enriched Powder
↓ (Dry the mixture to remove solvent/moisture)
Final Stable Powder Base
↓ (Optional: Sieve to uniform particle size)
Ready-to-Use Herbal Sunscreen Powder

2.3 Stability of Plant Extracts in Powder Form

Plant extracts can remain active in powder formulations if they are freeze-dried or spray-dried and stored in airtight, light-protective containers. While sensitive components (such as vitamin C and flavonoids) may deteriorate in the presence of heat or moisture, powdered extracts often preserve their antioxidant and calming qualities. Importantly, when applied directly to the skin, the active ingredients are progressively released upon contact with sweat, sebum, or lotion, increasing their functional activity in sunscreen formulations with mineral UV filters.

3. Plant-Based UV Protective Agents

3.1Plants with natural UV-absorbing phytochemicals

Certain plants have bioactive chemicals that can absorb UV radiation and provide photoprotection. These phytochemicals, which include flavonoids, phenolic acids, coumarins, and carotenoids, can neutralize reactive oxygen species (ROS) produced by UV radiation, decreasing DNA damage, photoaging, and pigmentation. Plant-based chemicals are increasingly being investigated as natural alternatives in sunscreen compositions. [6]

3.2 Herbal ingredients commonly used for sun protection:

A) Green tea :-(Camellia sinensis)

Family: - Theaceae

Active Photo Protective Ingredient: - EGCG, Catechins

Uses: Antioxidant, UV protection, anti-aging

B) Aloe Vera: - (Aloe barbadensis)

Family: - Asphodelaceae

Active Photo Protective Ingredient: - Polysaccharides, Vitamins C & E

Uses: - Soothing, moisturizing, UV protection [13]

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1068-1074 www.ijprajournal.com ISSN: 2456-4494

C) Turmeric :-(Curcuma longa)
Family: - Zingiberaceae
Active Photo Protective Ingredient: - Curcumin
Uses: - Anti-inflammatory, antioxidant, skin brightening

D) ClitoriaTernatea(Butterfly pea)
Family: - Fabaceae
Active Photo Protective Ingredient - Anthocyanins, Flavonoids
Uses: - Antioxidant, photo protection, skin soothing

E) Sandalwood (Santalum album)
Family: - Santalaceae
Active Photo Protective Ingredient: - Santalol, Flavonoids
Uses: Anti-inflammatory, skin brightening, photo protection

F) Liquorice :-(Glycyrrhiza glabra)
Family: - fabaceae
Active Photo Protective Ingredient: - Glycyrrhiza, glabra
Uses: Depigmentation, antioxidant, UV protection

G) Neem(Azadirachta indica)
Family: - Meliaceae
Active Photoprotective Ingredient -Nimbidin, Flavonoids
Uses: Antimicrobial, antioxidant, UV protection

H) Rice Powder (Oryza sativa)
Family: - Poaceae
Active Photo Protective Ingredient: - Ferulic acid, Phenolics, Vitamins
Uses: Oil control, UV protection, antioxidant

I) Red raspberry :-(Rubus idaeus)
Family: - Rosaceae
Active Photo Protective Ingredient: - Ellagic acid, Anthocyanins
Uses: Antioxidant, UV protection, anti-aging [11]

J) Moringa- (Moringa oleifera)
Family- Moringaceae
Active Photo Protective Ingredient- Flavonoids, Vitamins A, C, E
Uses: Antioxidant, anti-inflammatory

4. Methods to Evaluate Herbal Sunscreen Efficacy

Herbal powder sunscreens are dry formulations containing plant extracts or phytochemicals that provide UV protection. Evaluating their efficacy requires assessing UV-blocking ability, photo stability, antioxidant activity, and skin compatibility. The methods are slightly adapted compared to creams or lotions because powders need activation by moisture, sebum, or sweatwhen applied on the skin.

1. In Vitro Methods

- **UV Spectrophotometry**:
  - Powder is dispersed in a suitable medium or solvent.
  - UV absorbance is measured in the **290–400 nm range**.
  - **SPF estimation** can be done using **Mansur's equation**.
- **Diffuse Reflectance Spectroscopy**:
  - Measures **UV reflection and absorption** directly from the powder layer.
  - Useful for **compact or loose powder formulations**.
- **Photo stability Testing**:
  - Powder is exposed to UV light to check **retention of photo-protective compounds**.
- **Antioxidant Assays (DPPH, ABTS, FRAP)**:
  - Evaluates **free radical scavenging activity**, which contributes to **indirect photo protection**.

2. In Vivo / Human Skin Models

- **Minimal Erythema Dose (MED) Test**:
  - Powder applied on human skin.
  - After **activation with sweat, sebum, or water**, the **lowest UV dose causing erythema** is determined.
- **SPF Determination on Skin**:
  - Powder is applied in a **standardized amount (mg/cm^2)**.
  - SPF is calculated based on **MED comparison with unprotected skin**.
- **Patch Tests for Irritation**:
  - Ensures the powder **does not cause allergic reactions** or skin irritation.

3. Instrumental / Analytical Methods

- **Tape Stripping + UV Measurement**:
  - Measures **retention and uniform distribution** of powder on the stratum corneum.
- **Particle Size Analysis**:
  - Determines if powder **forms a uniform UV-blocking layer** on skin.
- **HPLC / LC-MS Analysis**:
  - Quantifies **active phytochemicals** responsible for UV protection.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1068-1074 www.ijprajournal.com ISSN: 2456-4494

4. Special Considerations for Powder Sunscreens

- **Activation by Moisture**:
  - Powder requires **contact with sweat, sebum, or lotion** for active ingredient release.
  - Evaluation methods must simulate **skin conditions** for accurate efficacy measurement.
- **Spread ability and Adherence**:
  - Tests ensure powder **forms uniform coverage**, which affects SPF and UVA protection.
- **Stability Studies**:
  - Powder should retain activity during **storage, temperature changes, and humidity**.

5. Advantages of Herbal Powder Sunscreen

- **Safer and less irritating** - When compared to synthetic sunscreens, they are often gentler on the skin and better suited to delicate skin.
- **High in antioxidants** - Protects skin from oxidative stress and free radical damage caused by UV exposure.
- **Anti-inflammatory Properties** – Reduces redness, irritation, and inflammation caused by sun exposure.
- **Photoprotective Effects** - Flavonoids, polyphenols, and carotenoids are natural chemicals that provide broad-spectrum UV protection.
- **Anti-aging benefits** - Include preventing wrinkles, fine lines, and loss of skin suppleness caused by photoaging
- **Environmentally Friendly** – Biodegradable and less harmful to aquatic ecosystems compared to chemical sunscreens
- **Soothing Effect** - Ingredients such as aloe vera and rose have cooling and calming properties for sun-exposed skin.
- **Multi-functional** - In one formulation, it can operate as a moisturizer, antioxidant, anti-inflammatory, and UV protectant

6. Limitations and Challenges

- **Uneven UV Protection** – Difficult to achieve uniform coverage, reducing effectiveness.
- **Reduced Water Resistance** – Loses efficacy with sweat, sebum, or water contact.
- **Frequent Reapplication Needed** – Shorter wear time compared to creams or lotions.
- **Stability and Skin Type Limitations** – Active ingredients may degrade in powder form; may not suit very dry or mature skin.

7. Future Perspectives

Herbal sunscreen powders have significant potential as a safe, natural alternative to synthetic sunscreens. Future research could concentrate on improving broad-spectrum UV protection, increasing the stability and controlled release of active compounds using sophisticated formulation processes, and creating multifunctional products with moisturizing, anti-aging, and skin-brightening properties. Addressing issues like as water resistance and consistent application will improve their effectiveness and consumer acceptance. With the growing need for eco-friendly skincare, herbal sunscreen powders are projected to gain popularity in cosmetic and pharmaceutical products.

REFERENCES

[1]. Ahmad, A., Amini, M. H., &Zakfar, A. M. (2020). Sun Protective Potential and Physical Stability of Herbal Sunscreen Developed from Afghan Medicinal Plants. Turkish Journal of Pharmaceutical Sciences, 17(3), 285-292. https://doi.org/10.4274/tjps.galenos.2019.15428

[2]. P A M Sucharitha1, Peddanna Gari Swetha2, Policherla Siva Sankar2, Pyadindi Manasa2, Rasipogula Larence2, Vorsu Raheswari2, S.Kalpana2, S.Nelson Kumar3 Preparation and Evaluation of Herbal Sunscreen Lotion. International Journal of Pharmacognosy and Chemistry

[3]. Matsumura, Y., &Ananthaswamy, H. N. (2004). Toxic effects of ultraviolet radiation on the skin Toxicology and Applied Pharmacology, 195(3), 298–308. https://doi.org/10.1016/j.taap.2003.08.019

[4]. Miss.NikitaD.Ghorpade [1], Mr.PankajV.Vyawhare[2], Miss, Ashwini B.Chaudhary[3] Formulation and Evaluation of Herbal Sunscreen Cream by Using Moringa Oleifera and Curcuma Longa. International Journal of Pharmaceutical Research and Applications

[5]. Yamini Shah1 ,RajveeMewada 1,* Preparation and evaluation of herbal sunscreen creams, International Journal of Pharmaceutical Chemistry and Analysis Journal homepage: https://www.ijpca.org/

[6]. Ferreyra, M. L. F., et al. (2021). Recent advances on the roles of flavonoids as plant photoprotectants. Plant, Cell & Environment, 44(9), 2683–2700.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1068-1074 www.ijprajournal.com ISSN: 2456-4494

https://pubmed.ncbi.nlm.nih.gov/34453749/

[7]. L. C. Cefali*, J. A. Ataide†, P. Moriel‡, M. A. Foglio‡ and P. G. Mazzola , Plant-based active photoprotectants for sunscreens, International Journal of Cosmetic Science, 2016

[8]. Milutinov J, et al. The Potential of Natural Compounds in UV Protection (PMC). — reviews plant-derived compounds (flavonoids, polyphenols etc.) and their UV-absorbing, antioxidant, antiinflammatory effects.

[9]. Smijs TG, et al. Titanium dioxide and zinc oxide nanoparticles in sunscreens (PMC). — describes how ZnO and TiO_2 scatter/reflect UV, advantages of mineral filters, etc.

[10]. Ruchi Tiwari1, Indu Singh1, Monisha Gupta1, Laliteshwar Pratap Singh2, Gaurav Tiwari1*FORMULATION AND EVALUATION OF HERBAL SUNSCREENS: AN ASSESSMENT TOWARDS SKIN PROTECTION FROM ULTRAVIOLET RADIATION, Journal home page: http://www.pharmacophorejournal.com

[11]. Rozinaparvin Iqbal Patel 1, *, AarifaMustak Patel 2 and BhavyabenDharmeshkumar Modi 3, Formulation and evaluation of herbal sunscreen, World Journal of Biology Pharmacy and Health Sciences, 2023, 13(02), 029–040

[12]. *Abhishek D. Purohit, Rahul A. Bisen, Kajal D.Gajbhiye, Kiran S. Ukey, Aachal H. Baghele, Madhuri I. Sharnagat, Formulation and Evaluation of Sunscreen Lotion Containing Natural and Synthetic Agents, international journal of pharmacy and pharmaceutical research.

[13]. 1Ms. Sonali KhanduJathar, 2Ms. Vaishnavi. S. Sake, 3Dr. Amol NavnathKhedkar, 4Ms. Deepali Dattatray Shinde, Formulation And Evaluation of Herbal Sunscreen Gel, International Journal for Research Trends and Innovation (www.ijrti.org)

[14]. Miss. Waghmode Monika Vasant Prof.Khade. P. Dr. HINGANE L.D. ADITYA PHARMACY COLLEGE, BEED 431122, "Formulation and Evaluation of Herbal Suncreen Cream", International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org

[15]. LaxmikantKantilalBanswal*1, Dhanashri Santosh Mane*2, Mohammad Sadat Khan*3, A Review on Formulation and Evaluation of Herbal Sunscreen Cream, International Journal of Research Publication and Reviews Journal homepage: www.ijrpr.com ISSN 2582-7421

[16]. Akansha Sudhakar Surushe*PLANT-BASED PROTECTION: A REVIEW ON HERBAL SUNSCREENS, World Journal of Pharmaceutical Science and Research www.wjpsronline.com

[17]. Pawar Anjali M, Somvanshi Trupti R, NikumbhAsmita M, Nehepatil Kartik R, Dr.SuhasSiddeshwar. S, Herbal Horizons: Development and Assessment of Natural Sunscreen Formulation and Multipurpose Cream, International Journal of Pharmaceutical Research and Applications

[18]. Isra Siddique, The Effect of the Addition of Carrot Seed Oil and Raspberry Seed Oil on the UV Intensity of a Sunscreen. Junior Academy Research Article

[19]. Fatima Grace X*, Joan Vijetha R, Rahul Raj S, Shanmuganathan S., Chamundeeswari D, FORMULATION, IN-VITRO EVALUATION AND UV PROTECTIVE STUDY OF POLYHERBAL SUNSCREEN GEL. World Journal of Pharmaceutical Research www.wjpr.net

[20]. BodduPrathyusha*1, G. Anurudh Reddy2, Balaji K3, P. Sujith4, Dr GyatiAshilakari Asthana, A Comprehensive Review of Natural Sunscreens: Efficacy, Safety, and Environmental Impact. International Journal of Pharmacy and Pharmaceutical Research (IJPPR)

[21]. Ms. Sneha U. Gorde1, Ms. Rasika D. Karlekar 2, Mr. Govind V. Ghuge3, Mr. Rohit M. Padhen4, Dr. Nitin H. Indurwade5, Formulations and Evaluation of Sunscreen Cream from Licorice Root Extract, INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY

[22]. Sanket Pawar1, Vishal Rasve2, Sayyed Gaffar3, Sanjay Garje4, FORMULATION AND EVALUATION OF HERBAL SUNSCREEN LOTION FROM LIQUORICE ROOT EXTRACT, INTERNATIONAL JOURNAL OF

PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

[23]. Ms. Shabnam Rahim Sheikh1st, Ms. Jayshree Anil Wasudev2nd Ms. Jagruti Anil Keskar3rd, Mr. Saqlain Khan Gaffar Khan4th Guidance By: Assit Prof. Ms. Pooja G. Sakharkar5th, "FORMULATION AND EVALUATION OF PHYSICAL SUNSCREEN", International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org

[24]. Madhurina Dutta1, Aakash Saha2, SanjibanUtpal Sarkar3, Samata Biswas4, Formulation and Evaluation of Herbal Sunscreen Utilizing Blue Pea Flower Extract, International Journal for Multidisciplinary Research (IJFMR)

[25]. SANDEEP B. PATIL1*, N.S. NAIKWADE1, C.S. MAGDUM2, S.S.SATHE3, SUN PROTECTIVE ACTIVITY OF ClitoriaTernata Linn, Canna Indica Linn FLOWER, Mintage journal of Pharmaceutical & Medical Sciences, www.mintagejournals.com.

[26]. 1Miss. Pranjali G. Vaidya, 2- Ms. SmrutigandhaKamble 3- Mr. Prof.Gulshan Rathi, A Review On formulation and evaluation of turmeric sunscreen. International Journal of Research Publication and Reviews. www.ijrpr.com.

[27]. 1Rohit N Doke, 2Karan S Done , 3Prof.Swamini A Dighe, 4Dr.Tushar T Shelke, Turmeric In Skincare: The Future Of Herbal Sunscreens. Turmeric In Skincare: The Future Of Herbal Sunscreens

[28]. Ruchi Tiwari1, Indu Singh1, Monisha Gupta1, Laliteshwar Pratap Singh2, Gaurav Tiwari1*, FORMULATION AND EVALUATION OF HERBAL SUNSCREENS: AN ASSESSMENT TOWARDS SKIN PROTECTION FROM ULTRAVIOLET RADIATION, Pharmacophore an international journal http://www.pharmacophorejournal.com

[29]. Shivam Tayal1*, Ashwani Gupta2, Jay Chaurasiya3, Mantasha Parveen4 & Yuvraj Singh5, A Comprehensive Study on Formulation of Herbal Sunscreen Using Aloe barbadensis, Cucumis sativus and Solanum lycopersicum, Asian Journal of Basic Science & Research

[30]. Mehak Sharma1and Ajay Sharma11, A Review on Nature Based Sunscreen Agents, IOP Conf. Series: Earth and Environmental Science.