# REVIEW ARTICLE ON : FORMULATION AND EVALUATION OF POLY-HERBAL ANTI-AGING CREAM.

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## ABSTRACT

*The present study aimed to formulate and evaluate a polyherbal anti-aging cream incorporating extracts of traditionally recognized botanicals with antioxidant and skin-rejuvenating properties. Herbal ingredients such as Aloe vera, Curcuma longa, Emblica officinalis, Azadirachta indica, and Camellia sinensis were selected based on their reported anti-oxidative, anti-inflammatory, and collagen-protective activities. A stable oil-in-water emulsion base was developed, and the polyherbal extracts were incorporated using optimized concentrations to ensure desirable texture, spreadability, and skin compatibility. The formulated cream was subjected to physicochemical evaluation, including pH determination, viscosity analysis, homogeneity, spreadability, and accelerated stability studies. Antioxidant potential was assessed using DPPH radical scavenging assay, while in-vitro anti-aging activity was evaluated through collagenase and elastase inhibition tests. The polyherbal cream demonstrated favorable physicochemical characteristics, high antioxidant capacity, and significant inhibitory activity against collagenase and elastase, indicating its potential to reduce oxidative stress and delay the appearance of aging signs. Overall, the results suggest that the formulated polyherbal cream is a promising natural alternative for anti-aging skincare applications.*

## INTRODUCTION

Skin aging is the result of the continual deterioration process because of damage of cellular DNA and protein aging process is classified into two distinct types i.e., **sequential skin aging** and **photo – aging.** both the types have distinct clinical and historical features. Sequential skin aging is universal and predictable process characterized by physiological alteration in skin function. In the aging process keratinocytes are unable to form a functional stratum corneum and rate of formation from neutral lipids slows down, resulting in dry pale skin with wrinkle. In contrast, photo aging is caused by over exposure to UV rays from sunlight. It is characterized by dry, pale and shallow skin, displaying fine wrinkles as well as deep furrows caused by the disorganization of epidermal and dermal components associated with elastosis and Heli dermatitis. Herbs and plants have already proved useful as a tool in complementary medicine. The premature aging is the degenerative disease characterized by dry, wrinkled, rough skin and black spots. two factors trigger premature aging, namely internal factors such as stress, endurance, hormonal changes and health as well as external factors including ultraviolet rays and free radicals. Free radicals are oxygen containing molecules whose atomic arrangement is unstable and hence, undergo chain reactions that can occur in the body and lead to continuous damage. Free radicals are very reactive and dangerous substances that cause damage

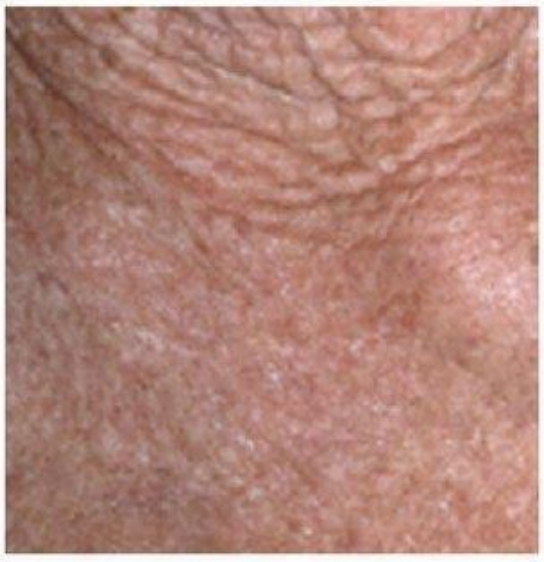
to the tissues of the body which may lead to the development of various diseases in the old age. However, free radicals are possible to overcome by using antioxidant which stops the chain reactions triggered by free radical by donating electrons to unstable molecules. Examples of antioxidant compounds including carotenoids, saponins, flavonoids, vitamin C, etc.

Centella asiatica vernacularly referred to as gout kola it is a tropical herbaceous plant that is the member of the Umbelliferon family and is indigenous to Asian nations such as India, China, Japan, Indonesia centella asiatica shows many activities like ani-inflammatory, antioxidant, anti- bacterial, neuroprotective, memory improving, etc. Centella asiatica leaves contains the saponins, flavonoids and phenolic compounds that shows the antioxidant property.

**Etiologies and Types of Human Skin Aging**: -

Skin aging is a dermatologic change that progresses as a person age or is exposed to ultraviolet radiations (UVR) if no treatment is adopted. The extensive research activities are focused on this skin concern that involves the appearance of unpleasant, observable marks on skin surface due to proteolysis of cutaneous elastic fibers resulting in the reduced cell functions. Skin aging can be divided into two types, that is, intrinsic aging or chronological aging (inevitable phenomenon) and extrinsic or premature or photoaging (evitable phenomenon) owing to the physiological and environmental factors respectively.

Morphologically, photoaging is characterized by dry, rough, pigmented, and abraded skin especially of face and hands in individuals who live in sunny geographical regions and are chronically exposed to direct sunlight Conversely, fine, smooth wrinkles on dry, pale skin impart the characteristics of intrinsic aging. Diagnostically, intrinsic skin aging is identified by seborrheic keratosis which is not a biomarker of photoaging. Pathologically, the photodamaged skin shows vascular damage that is absent in intrinsically aged skin. An increased skin vascularization and angiogenesis are observed in photoaged skin.



(a)

(b)

**Figure 1: - Clinical appearance of extrinsic (a) and intrinsic (b) aging of the skin.**

Microscopically thicker epidermis is another feature of the photoaged skin. The strength and elasticity of the skin is depended on the proper and uniform arrangement of the collagen fibers and elastin in the dermis. the collagen fibers deficiency can lead to the skin aging due to the production of collagenase and thymine dimer in skin on exposure to the UV radiations. Elastin is a fibrous protein that is reduced in thickness from deeper to superficial dermis.it provides the natural elasticity and strength to the human body. The basic and molecular unit involved in the construction of human skin is collagen this collagen is produced from the procollagen. collagen is the protein that present in the connective tissues of the body.

**Reactive oxygen species and photoaging: -**

The main cause of oxidation in the skin is the exposure of skin to the UV radiations and hence it causes different skin problems like wrinkles, acne, lesions and also can cause cancer. when exposure to sunlight the skin molecules absorb UVR which results in generation of the reactive oxygen species (ROS).

Types of ROS: - Type 1 consist of the single excited oxygen molecule Type 2 consist of the oxygen molecules with unpaired electron.
These reactive oxygen entities exert a damaging effect on cellular fractions including cell wall, lipid membranes and DNA producing oxidative stress. ROS in excess can leads to the tissue injury and many skin diseases like aging, cancer, ischemia, and Parkinson's syndrome.

**Benefits and types of antioxidants: -**

The oxidative stress mediated development of disease is managed by use of the safe antioxidant. the centella asiatica leaves shows good antioxidant property it contains the compounds such as saponins, flavonoids and phenolic compound these compounds are efficient for overcoming the skin problems arises due to the UV exposure and makes it fresh, healthy, and young through collagen synthesis.

The antioxidants are used as the antiaging compounds because they are capable of scavenging ROS leaving healthy effect on the skin. by forming the antioxidant complex we can protect the skin from the direct exposure to the UV radiations. there are two types of the antioxidant i.e., **endogenous** and **exogenous**. in general, the oxidative enzymes found in high amount in the epidermal layer than that of stratum corneum and dermis layer. when there is the imbalance between oxidants

and endogenous antioxidant then the exogenous antioxidants are used to balance them.

**Endogenous antioxidant: -** The compounds present in the endogenous antioxidant cannot synthesized by the body. The endogenous antioxidant in dermal and epidermal layer of skin exposed to the sunlight are depleted under the increased levels of the UVR generated ROS. This depletion results in the destroying the activity of these antioxidants which leads to the skin diseases and skin damage. With the age the endogenous antioxidants are steadily consumed which causes increases the risk of the oxidative stress then the use of exogenous antioxidant as prevention strategy is essential.

From the above discussion we can conclude that skin cells are damaged by the oxidative stress of the ROS

**Exogenous antioxidants: -** There are many natural and synthetic compounds present in the exogenous antioxidants. The synthetic compounds like monoethanolamine, diethanolamine, sodium lauryl sulphate and triethanolamine but these compounds show some adverse effects like allergy, dermatitis and contact dermatitis. The natural antioxidant is nontoxic and nonirritant to the skin also they don't produce any unwanted effect on skin.

**Stratum corneum as target site for Antioxidants: -** The normal skin maintains the homeostasis of the body due to the presence of the stratum corneum. the stratum corneum is the uppermost layer of the epidermis it acts as a water barrier. it mainly contains the lipids i.e., cholesterol, ceramides, triglycerides, free fatty acids, and cholesterol sulphate. When we use the cholesterol sulphate in high concentration it inhibits the des3quamation. Many factors affect the synthesis of the lipids present in the stratum corneum mainly related to enzymes, environments, cosmetics and free fatty acids. other contents of the stratum corneum are proteins, enzymes and water.

**Wrinkle formation: -** Wrinkles are formed due to the distortion of the elastic fibers, diminished collagen contents and uneven types of collagens. due to the activation of the MMPs there is decrease in the type IV collagen. the MMPs are collagen degrading enzymes. also, the activation of MMPs can cause upregulation of the collagenase and gelatinase. The skin wrinkles can be reduced by using the topical formulations which contains the bioactive compounds which inhibit the MMPs which would increase the collagen level.

The skin color depends on the amount of the melanin in the skin the melanocytes cells are responsible for the production of melanin. Melanin is synthesized by the oxidative reactions which are inhibited by using skin whitening agents like zinc oxide. hence the stratum corneum is the primary site for many Phyto antioxidants for the skin protection against the UVR mediated oxidative stress. These Phyto antioxidants stimulates the regeneration of the stratum corneum to protect and underlying the epidermis from harmful effects of the UVR and also promotes the growth.

**DRUG PROFILE AND EXCIPIENTS**

**CENTELLA ASIATICA**

**Fig 5: - Centella asiatica**

- **SYNONYM**: Hydrocotyleasiatica L.
- **BIOLOGICAL SOURCE**: Obtained from plants of *centella asiatica*.
- **FAMILY: Apiaceae**.
- **KINGDOM:** Plantae.
- **MORPHOLOGICAL FEATURES:**
- The plant is a small trailing herb and it is the only species of Centella found .
- Leaves are fleshy, orbicular to reniform
- **CHEMICAL CONSTITUENTS:** isoprenoids (sesquiterpenes, plant sterols, pentacyclic triterpenoids and saponins) and phenylpropanoid derivatives (eugenol derivatives, caffeoylquinic acids, and flavonoids).triterpenoid saponins, triterpenoids, essential oils, flavonoids, phytosterols, and other active ingredients.

**USES:**

- To avoid the growth of anti-aging skin while helping your skin look younger.
- Widely used as a blood purifier as well as for treating high blood pressure, for memory enhancement and promoting longevity.
- Relieves, strengthens, and intensely moisturizes your skin to help restore its healthy appearance

**NEEM OIL**

Fig 6: - Neem oil

- **SYNONYMS**: Margosa oil, Neem tree, Indian lilac
- **BIOLOGICAL SOURCE**: - Neem consists of almost all the part of the plant which are used as drug of *Azadirachta indica*.
- **FAMILY: Meliaceae**
- **KINGDOM**: Plantae
- **GEOGRAPHICAL SOURCE: -**

India is native of Azadirachta.

It is also cultivated in Nepal Pakistan Bangladesh and Sri-Lanka.

Neem is a fast-growing tree that can reach a height of 15-20 m, rarely to 35-40m. It is evergreen.

- **CHEMICAL CONSTITUENTS:**
- Various parts of the plant are used for various therapeutic and commercial purposes due to presence of different type of chemical in different parts of this plant. Some of them being: Leaf: - quercetin, nimbosterol, nimbin

- Flower: - nimbosterol, kaempferol Bark:- nimbin, nimbidin, nimbosterol
- Seeds: - Azadirachtin, Azadiradione, nimbin, vepinin
- Azadirachtin: - Provide repellent, anti hormonal and anti feedant properties. Nimbin:
  - Provide anti -inflammatory, anti-pyretic, anti-histamine, and anti- fungal
- **USES:**
- All parts of neem tree used as anthelmintic, anti-fungal, anti diabetic, anti-bacterial, anti- viral, contraceptive and sedative.
- Oil of neem used in soap, shampoo, balms and Cream as well as toothpaste.
- Neem gum is used as a bulking agent and for the preparation of special purpose food (For diabetic).
- A decoction prepared from Neem roots is ingested to relieve fever in traditional Indian medicine

**EUCALYPTUSOIL**

**Fig 7:- Eucalyptus oil**

- **SYNONYM**: Dinkum oil, lemon gum tree, blue gum tree
- **BIOLOGICAL SOURCE**: Eucalyptus oil is the volatile oil obtained by the hydro distillation of fresh leaves of *eucalyptus globulus*.
- **FAMILY: Myrtaceae**
- **KINGDOM**: Plantae
- **CHEMICAL CONSTITUENTS:**

Cineole (eucalyptol, 70-85%) Citronellal
Terpenes: - pinene, camphene, phellandrene
Polyphenolic acid: - caffeic acid, gallic acid Flavonoids: - Eucalyptin, Rutin

**USES:**

Anti-inflammatory and anti-bacterial properties which can help to sooth acne prone and congested skin heal damaged skin and provide deep nourishmentEucalyptus also boosts circulation, a critical element for healthy vibrance and glow. Anti- inflammatory properties reduce redness and other inflammatory conditions, making the oil a super skin soother.

ROSE OIL

**METHODOLOGY**

1. **Selection and Preparation of Herbal Ingredients**

Keymedicinal plants are chosen for their **antioxidant, anti- inflammatory, and skin- rejuvenating properties**:

- **Rose Petals (Rosa spp.)**: Moisturizes, protects against UV damage, stimulates collagen.
- **Marigold Leaves (Tagetes erecta L.)**: Anti-aging, antioxidant effects.
- **Lemon Peel (Citrus limon)**: Provides Vitamin C, brightening effects.
- **Aloe vera gel**: Hydrating, anti-wrinkle, improves skin elasticity.
- **Carrot (Daucus carota)**: Rich in β-carotene and Vitamin A, antioxidant.
- **Turmeric (Curcuma longa)**: Anti-inflammatory and antioxidant.

**2. Extraction of Bioactive Compounds**:

- **Maceration**: Powdered plant material is soaked in solvents like ethanol, methanol, or water for 24- 48 hours to extract phytoconstituents.
- Filtration using Whatman paper, followed by concentration to obtain viscous extracts
- For Aloe vera, gel extraction from the inner mucilage is conducted, blended, and filtered.

**3 . Cream Formulation Techniques**

Two primary phases are involved: **oil phase and aqueous phase**.

**3.4 Emulsion Types**

- **Oil-in-water (O/W):** Non-greasy, easily washable, suitable for normal-to-oily skin.
- **Water-in-oil (W/O):** Provides occlusive barrier, reducing water loss, suitable for dry skin.

**4. Incorporation of Active Ingredients and Excipients**

Keyexcipients stabilize the cream and enhance usability:

- **Beeswax:** Thickening agent, moisture retention.
- **Borax:** Emulsifier for cream consistency.
- **Liquid paraffin:** Lubricant and emollient.
- **Methyl paraben:** Preservative.
- **Glycerine and Propylene glycol:** Humectants.
- **Essential oils (Rose, Lavender):** Fragrance and therapeutic activity.

**EVALUATION TEST**

**1) Organoleptic evaluation: -**

The cream thus obtained was evaluated for its organoleptic properties like color, odor and state. The appearance of the cream was judged by its color and roughness and graded.

**2) Stability studies: -**

Stability testing of drug product begins as a part of drug discovery and ends with demise of the compound or commercial product. To access the drug and formulation stability, stability studies were done according to ICH guidelines. The stability was carried out as per ICH guidelines. The cream filled in bottle and kept in humidity chamber maintained at 30+_ 2 *C / 65+_5% RH and 40+_2 *C / 75+_5% RH for 2 months. At the end of studies, samples were analyzed for the physical properties and viscosity.

**3) PH of the cream: -**

The pH meter was calibrated using standard buffer solution. About 0.5g of the cream was weighed

**4. Irritancy test: -**

Mark and area [1sq.cm.] on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythematic, edema, was checked if any for regular intervals up to 24 hours and reported.The ease of removal of the cream applied was examined by washing the applied part with tap water.

**CONCLUSION**

1. Physical evaluation such as color, odor, and consistency were examined by physical examination.
2. The PH of prepared herbal anti-aging cream was measured by using PH paper. It was found to be 5.7-6 which is good for the skin.
3. Stability studies were done by opening and closing the tube in specified time. Here the tube is placed for the one month at room temperature and check any physical and

chemical change in it.

4. The viscosity was checked by the Brookfield viscometer and the viscosity was in the range of 500- 600cps it indicates that the cream is readily spreadable.
5. The after feel was found good like emollience, slipperiness and amount of residue.
6. The cream formulation on skin was easily removed by washing with the water.
7. The formulation shows no redness, edema, inflammation and irritation while performing the irritancy test.
8. The formulation were kept for long time at room temperature and it was found that no change in color of cream.

## REFERENCE

1. *Kaur I.P, Kapila M, Agrawal R, Role of Novel Delivery System in Developing Topical Antioxidants as a Therapeutic to Combat Photo-aging, 6, 2007, 271-288.*
2. *Hema Sharma Datta and Rangesh Paramesh, Trends in Aging and Skin Care: Ayurvedic Concepts, Journal of Ayurveda and Integrative Medicine, 1(2), 2010, 110-113.*
3. *Saraf S, Kaur C.D, Phytoconstituents as Photoprotective Novel Cosmetic Formulations, Pharmacognosy. Rev, 4(7), 2010, 1-11.*
4. *Book of pharmacognosy by C. K. Kokate , A. P. Purohit, S. B. Kokate, 49th edition, Nirali prakashan , chapter no. 11, page no 11.33*
5. *Book of pharmacognosy by C. K. Kokate , A. P. Purohit, S. B. Kokate, 49th edition, Nirali prakashan , chapter no. 11, page no 11.52*
6. *Book of pharmacognosy by C. K. Kokate , A. P. Purohit, S. B. Kokate, 49th edition, Nirali prakashan , chapter no.14, page no. 14.41-14.42*
7. *WWW. WIKIPEDIA.COM*
8. *www.pubmed.com*
9. *Phytochemical analysis and Antioxidant activity of Eucalyptus Globus: A comparative study between fruits and leaves extracts, Zakia bey-Ould Si Said, Sakina Slimani, Hocine Remini, Hayat Idir-Himed, Jean-Paul, SDRP Journal of chemistry engineering and bioanalytical Chemistry, 2015.*
10. *Antimicrobial and Antioxidant Activities and Phenolic Profile of Eucalyptus globulus Labill. and Corymbia*