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FORMULATION AND EVALUATION OF ANTI-AGING POLYHERBAL COSMETIC FACE CREAM

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ABSTRACT

Skin aging is the results of a continual deterioration process damage to cellular DNA and protein. the main aim of our study is to develop a polyherbal anti aging cream. We have used herbal ingredients in our preparation which are butterfly pea flowers, aloe Vera gel, tulsi leaves, turmeric oil. This indicates the presence of anthocyanins, butterfly pea contains anthocyanin which are natural anti oxidant that slow down the aging process, tulsi leaves are used as an anti-bacterial and skin luminous, Aloe Vera gel used as a moisturizer and turmeric oil are used to brighten dark circle and reduce acne. These are some of the basic drugs used to formulate the cream. In quality evaluvation of formulation[f1-f5]were done on different parameters like pH, viscosity, spreadability and phase separation.F3 is better formulation than all other formulation.there were no change in physical properties of anti-aging cream. The formulation showed good spreadability, no phase separation and good consistency. It is found that viscosity of the cream is adequate. Thus polyherbal cosmetics formulation is safe to use was stable at room temperature and can be safely used on the skin.

KEYWORDS: Herbal cosmetics, Polyherbal cream, Butterfly pea flower, Tulsi leaves, Aloe Vera gel, Turmeric oil, Anti-aging cream.

INTRODUCTION

- Aging is a natural biological process characterized by a gradual decline in the structure and function of the body, including the skin.

- The skin, being the largest organ, shows the earliest and most visible signs of aging, such as wrinkles, fine lines, loss of elasticity, dryness and uneven pigmentation.
- Aging is influenced by intrinsic factors (Genetic predisposition, hormonal changes and cellular metabolism) and extrinsic factors (UV radiation, pollution, smoking, and poor lifestyle choices). Intrinsic aging is inevitable and occurs due to the breakdown of collagen and elastin, reduced cell turnover, and diminished natural oil production. In contrast, extrinsic aging is often accelerated by environmental and lifestyle factors, leading to premature skin aging.
- The quest for youthful and healthy skin has been a timeless pursuit, leading to the development of various cosmetic products aimed at mitigating the signs of aging. Among these, anti-aging creams hold a prominent place in the cosmetic and pharmaceutical industries.
- These formulations are designed to combat age-related skin changes such as wrinkles, fine lines, sagging, dryness, and pigmentation.
- With advancements in dermatology and cosmetic science, the formulation of anti-aging creams has evolved, incorporating bioactive ingredients, advanced delivery systems, and novel evaluation techniques. Traditional methods relied on natural ingredients, while modern approaches use advanced science and technology.
- In ancient times, natural remedies were the primary solutions for skin aging. Traditional practices often involved the use of herbs, oils, and other natural ingredients to maintainyouthful skin. For example, aloe vera was used for hydration and healing, while turmeric and sandalwood were renowned for their brightening and anti-inflammatory properties. Milk and honey were prized for their exfoliating and moisturizing effects.
- Ancient Egyptians, for instance, used ingredients like olive oil for skin rejuvenation. Similarly, in Ayurveda, ashwagandha, amla, and saffron were utilized to enhance collagen production and promote skin health. While these remedies were effective to an extent, their results were often slow and lacked precise mechanisms of action, relying heavily on consistency and proper application.
- In contrast, modern remedies have transformed anti-aging skincare with the advent of scientific advancements and dermatological research. Today's formulations are more targeted and efficient, thanks to the incorporation of bioactive ingredients like retinoids (e.g., retinol), hyaluronic acid, and peptides, which actively combat signs of aging by stimulating collagen production and improving skin hydration.

- Antioxidants like vitamin C, coenzyme Q10, and plant extracts such as butterfly pea flower protect the skin from oxidative damage caused by free radicals. Additionally, advanced technologies, such as nanotechnology and liposomal delivery systems, ensure deeper penetration of active ingredients for enhanced efficacy.
- Herbal-based cosmetics are gaining momentum as they align with consumer preferences for natural, sustainable, and eco-friendly skincare products. This study explains the therapeutic potential of Clitoria ternatea to develop an innovative anti-aging formulation that meets both efficacy and safety standards.
- The butterfly pea flower (*Clitoria ternatea*), has emerged as a valuable ingredient in skincare, particularly in anti-aging products. This flower is rich in bioactive compounds like anthocyanins, flavonoids, and proanthocyanidins, which make it a powerhouse of antioxidants. These antioxidants play a crucial role in neutralizing free radicals, thereby protecting the skin from oxidative stress caused by UV rays, pollution, and other environmental factors. By reducing oxidative stress, the butterfly pea flower helps preserve collagen and elastin, the key proteins responsible for maintaining skin firmness and elasticity, effectively combating wrinkles and fine lines.
- The unique colorant properties of the flower also add aesthetic appeal to the formulation, without the need for synthetic dyes. Furthermore, the multipurpose activity of the flower extract ensures not only anti-aging benefits but also moisturization, improved skin tone, and enhanced protection against UV-induced damage. By combining natural ingredients with modern innovations, skincare products today can target the root causes of aging more effectively, providing long-lasting results and promoting overall skin health.[1,2,3,4]

Cosmetics

- The word ‘Cosmetic’ derived from a Greek word – ‘kosmetikos’ that means to adorn. From that time any materials used to beautification or promoting appearance is known as cosmetic.
- Cosmetics are used to enhance appearance. Makeup has been around for many centuries. The first known people who used cosmetics to enhance their beauty were the Egyptians. Makeup those days was just simple eye coloring or some material for the body. Now-a-days makeup plays an important role for both men and women. The importance of cosmetics has increased as many people want to stay young and attractive.[5]
- Cosmetics are readily available today in the form of creams, lipstick, perfumes, eye shadows, nail polishes, hair sprays etc. Other cosmetics like face powder give glow to the

skin after applying the base cream. Then we have lipsticks, which are applied by many women of all ages. They are made from wax and cocoa butter in the desired amount.

- Herbal cosmetics are widely used when compared to synthetic cosmetics.
- Herbal Cosmetics referred as Products, they are formulated, using various cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic benefits only, shall be called as "natural cosmetics". The demand of herbal medicines is increasing rapidly due to their lack of side effects.
- Cosmetic products are used to protect exogenous and endogenous harmful agents and enhance the beauty and attractiveness of skin.
- Cosmetics are developed to reduce wrinkles, fight acne and to control oil secretion. For various types of skin ailments formulations like skin protective, sunscreen, antiacne, antiwrinkle and antiaging are designed using varieties of materials, either natural or synthetic.[6]
- Both men and women use cosmetics like colognes, gels, and lotions on a daily basis. In many situations, creams serve as a facial cleanser. Water, soap, and cleansing cream are the greatest cleaning agents.
- For dry, chapped, and hard skin, cosmetic creams act as a skin nourishment. It primarily lubricates, softens, and cleanses the skin of undesirable filth. Vaseline and Lanolin are two common brands of fat creams that are utilized. Dry creams are utilized in the production of soap and gelatin, which serves as the skin's foundation.
- Within the beauty sector, one of the fastest-growing markets is hair care. A lot of young men use oils and gels to keep their hair styled and maintained. To assist prevent dandruff and hair loss, products like hair gels, oils, and lotions have been introduced to the market. Many beauty products manufacturers have utilized the needs of people to protect themselves and their skin from the rays of the sun.
- The Significance of Makeup These days, cosmetics help us feel more confident and improve our appearance. We can see that cosmetics are highly important in our daily lives because there are more of them on the market now than ever before.[7]

Topical drug delivery

- Drugs have been administered to the human body through a variety of routes over the past few decades to treat illnesses, including oral, sublingual, rectal, parental, topical, and inhalation.

- Topical drug delivery systems are localized drug delivery system for local delivery of therapeutic agents via skin to treat the cutaneous disorder. These systems are generally used for local skin infection. The formulations are available in different forms, like from solid through semisolid to liquid. If the drug substance in the solution has a favorable lipid/water partition coefficient and if it is a non-electrolyte, then drug absorption is enhanced via the skin. Dermatological products have various formulation and range in consistency though the most popular derma products are semisolid dosage forms.
- Semisolid formulations, in all their diversity, dominate the system for topical delivery; however, foams, sprays, medicated powders, solutions, and even medicated adhesive systems are in use.

Physiology of human skin

- The skin is the largest organ of the body, accounting for regarding 15% of the overall weight. It performs several very important functions, together with protection against external physical, chemical, and biological assailants, similarly as prevention of excess water loss from the body and a role in thermoregulation.
- The skin is continuous, with the mucous membranes lining the body's surface.
- The skin composed of three layers: the epidermis, the dermis, and subcutaneous tissue.
- The outermost level, the epidermis, consists of a selected constellation of cells called keratinocytes, that perform to synthesize albuminoid, along, threadlike supermolecule with a protecting role.
- The middle layer, the dermis, is fundamentally made up of the fibrillar structural protein known as collagen. The dermis lies on the connective tissue tissue that contains tiny lobes of fat cells called lipocytes.
- The thickness of those layers varies significantly, betting on the geographic location on the anatomy of the body. The eyelid, for instance, has the thinnest layer of the epidermis, measure but 0.1 mm, whereas the thickest stratum layer, measure approximately 1.5mm.The dermis is thickest on overlying epidermis, wherever it's 30–40 times as thick because the suprajacent epidermis.

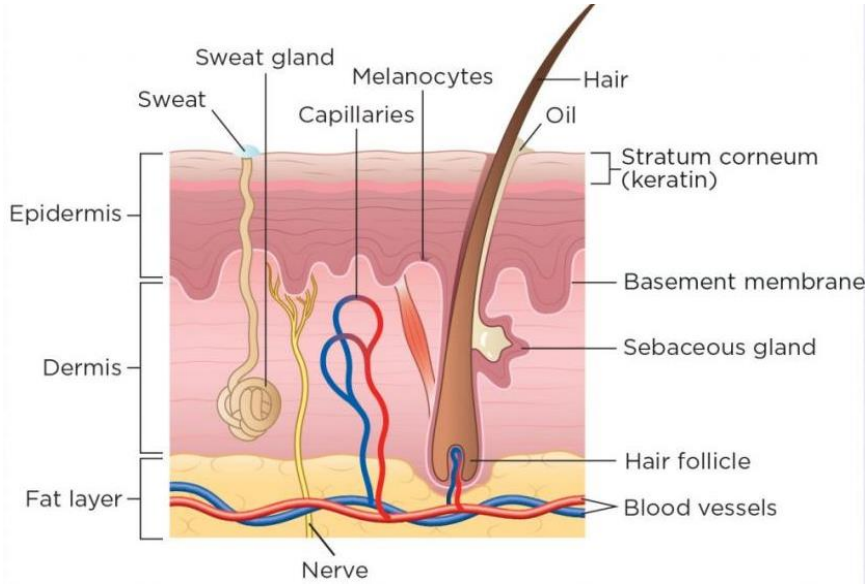

Figure 1

Types of skin layer

1. Epidermis

Definition: The outermost layer of the skin that provides a barrier and protects against environmental damage.

Structure: Composed primarily of keratinized stratified squamous epithelium.

Cell types

- ✓ **Keratinocytes:** Produce keratin for protection.
- ✓ **Melanocytes:** Produce melanin for pigmentation.
- ✓ **Langerhans cells:** Act in immune response.
- ✓ **Merkel cells:** A type of cell in the skin that are involved in touch.

Layers of the epidermis (From outer to inner)

A) Stratum basale (Basal layer)

Location: The deepest layer of the epidermis.

Structure: A single row of cuboidal to columnar cells

B) Stratum spinosum (Prickly layer)

Location: Just above the stratum basale.

Structure: 8-10 layers of keratinocytes connected by desmosomes (protein structures).

C) Stratum granulosum (Granular layer)

Location: Middle layer of the epidermis.

Structure: 3-5 layers of flattened keratinocytes containing.

D) Stratum lucidum (Clear layer)

Location: Found only in **thick skin** (Palms, soles, fingertips).

Structure: Thin, transparent layer of dead keratinocytes filled with **eleidin**, tightens the connection between the cells, facilitating the protective and water-repellent function of the skin a precursor to keratin.

E) Stratum corneum (Horny layer)

Location: Outermost layer of the epidermis.

Structure: 15-30 layers of dead, flat keratinized cells (Corneocytes) embedded in a lipid matrix.

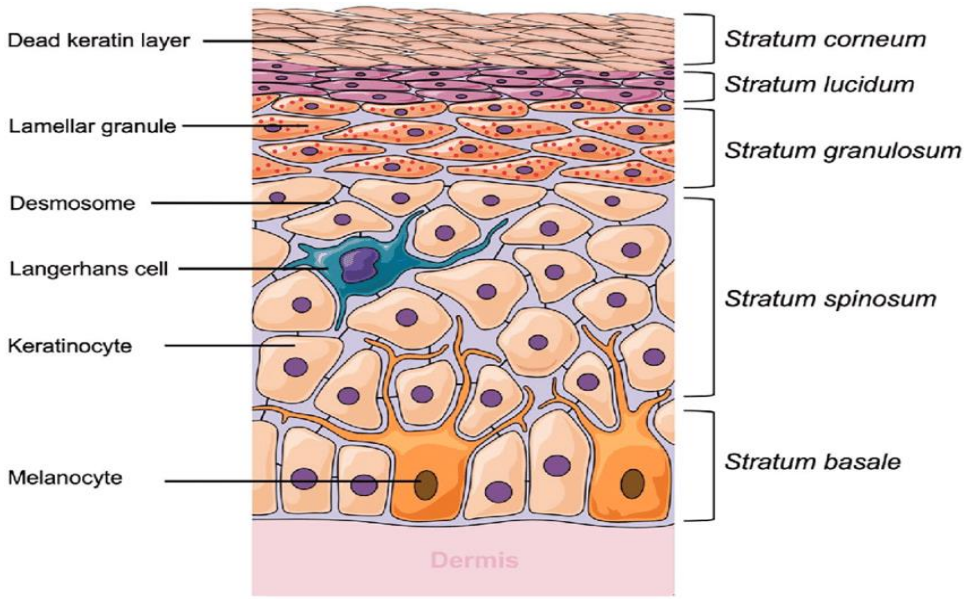

Figure 2

2. Dermis

Definition: The middle layer of skin beneath the epidermis. The dermis includes the majority of the skin and provides its pliability, elasticity, and strength. It protects the body from mechanical injury, binds water, aids in thermal regulation, and includes receptors of sensory stimuli, providing structural support and nourishment.

Structure: Made of dense irregular connective tissue, mainly collagen and elastin fibers.

Collagen and elastin are proteins that work together to provide structure, strength, and flexibility to the skin

- ✓ **Collagen:** Provides structure, strength, and support. Collagen fibers make up about 50–90% of the skin.
- ✓ **Elastin:** Provides stretchiness and allows the skin to return to its original shape. Elastin is about 1,000 times stretchier than collagen.

Both collagen and elastin are produced by fibroblasts and are found in the dermis, a connective tissue layer deep in the epidermis. The amount and quality of collagen and elastin fibers decreases with age, which can lead to wrinkling.

Divisions

- ✓ **Papillary layer:** Upper thin layer containing capillaries, nerve endings, and dermal papillae.
- ✓ **Reticular layer:** Deeper thick layer with dense collagen fibers, blood vessels, sweat glands, and sebaceous glands.

Cells: Fibroblasts, mast cells, macrophages.

3. Subcutaneous layer

Definition: The hypodermis, also known as the subcutaneous tissue or superficial fascia, is the deepest layer of the skin, located beneath the dermis and above the underlying muscles and bones.

Structure: Composed of loose connective tissue and adipose tissue.

Components

Fat: The subcutaneous layer consists mainly of fat. The fat forms a layer that insulates the body from cold and helps absorb shock and damage to the internal organs. It also provides structural support for skin.

Blood vessels: Facilitate circulation.

Nerves: Contribute to sensation.

Functions of skin

Skin performs the following functions:

1. **Protection:** The skin's Langerhans cells, which are a component of the adaptive immune system, act as an anatomical barrier to protect the body from pathogens and damage between the internal and external environments.
2. **Sensation:** Consists of a range of nerve endings that respond to heat and cold, touch, pressure, vibration, and tissue damage.
3. **Heat regulation:** The skin's blood supply exceeds its needs by a large margin, enabling precise regulation of energy loss through radiation, convection, and conduction. Constricted blood vessels significantly lower cutaneous blood flow and retain heat, whereas dilated blood vessels increase perfusion and heat loss.
4. **Control of evaporation:** The skin acts as a semi-impermeable, relatively dry barrier against fluid loss. The significant fluid loss in burns is a result of the loss of this function.
5. **Aesthetics and Communication:** Our skin gives others insight into our emotions, physical condition, and overall beauty.
6. **Storage and Synthesis:** Provides a place to store water and fats, and when UV light strikes specific areas of the skin, it initiates the synthesis of vitamin D.
7. **Water resistance:** To prevent vital nutrients from being washed out of the body, the skin functions as a water resistant barrier.

Cream

- ✧ The topical preparations that can be applied to the skin are called creams. Creams are characterized as viscous liquid or semi-solid dosage forms that vary in consistency depending on the type of oil and water they contain.[14]
- ✧ Creams serve a variety of cosmetic functions, including cleansing, beautifying, enhancing appearance, protecting, and therapeutic.
- ✧ These topical formulations are intended to deliver drugs locally, into the mucous membrane or the skin's underlying layer. These products are intended to be applied topically to improve the drug's site-specific delivery to the skin for skin conditions.
- ✧ Both medicated and unmedicated creams are widely used to treat dermatoses and other skin conditions. People can use creams that are allopathic, herbal, or ayurvedic based on the needs of their individual skin conditions.
- ✧ They include one or more drug ingredients that have been diluted or spread in an appropriate base.

- Based on phases, creams can be categorized as either w/o or o/w types of emulsion. Traditionally, semisolids that are formulated as either oil-in-water (vanishing cream) or water-in-oil (cold cream) have been referred to as "creams"[15,16]

Figure 3

Ideal properties

- **Stability:** The cream should be chemically and physically stable.
- **Texture:** The cream should be smooth and free from grittiness.
- **Melting point:** The cream should melt or soften at body temperature and be easy to apply.
- **Base:** The base should be non-irritant and should have no therapeutic action.
- **Medicament:** The medicament should be finely divided and uniformly distributed throughout the base.
- **Container:** The container should protect the cream from external factors like heat.
- **Washability:** The cream should be easily washable with water.
- **Spreadability:** Creams spread evenly over the skin, offering good coverage.
- **Absorption:** Easily absorbed into the skin, especially O/W emulsions.

Advantages of cream

- Convenience and easy to apply
- Smoother consistency
- Exhibit better contact with the skin
- Avoid first pass metabolism
- Easily washable
- They have soothing action on inflamed areas
- Suitable for various types of skin conditions
- Increased patient compliance

Disadvantages of cream

- ✧ May have stability issues
- ✧ Water content makes them prone to microbial contamination.
- ✧ Some ingredients can cause sensitivity or irritation.
- ✧ Poor permeability of some drugs through the skin.

Classification of creams

According to the nature or type of emulsion

- ✧ **Oil-in-Water (O/W) creams**: which are made up of tiny oil droplets distributed throughout a continuous phase, and an emulsion known as an oil-in-water (O/W) emulsion is one in which the oil is distributed as droplets throughout the aqueous phase.
- ✧ **Water-in-Oil (W/O) creams:** which are made up of tiny water droplets scattered throughout an oily phase. The emulsion is of the water-in-oil (W/O) type when the dispersed phase is water and the dispersion medium is oil.

According to purpose/function

- ✧ **Moisturizing creams:** Hydrate and protect the skin, especially for dryness.
- ✧ **Medicated creams:** Contain active pharmaceutical ingredients (e.g., clotrimazole cream for fungal infections).

Figure 4

- ✧ **Cleansing creams:** These creams are used for body cleaning purposes and it is used for personal hygiene and beautification which is important for cosmetics. Cleansing creams or lotions can be used for the removal of make-up, surface grim, oil mainly from the face and neck.

Figure 5

- ✧ **Sunscreen creams:** Provide protection against harmful UV rays
- ✧ **Anti-aging creams:** Combat wrinkles and signs of aging using retinoids or peptides.

Figure 6

- ✧ **Foundation creams:** These cream serve as a foundation base for make-up. It acts as an adherent base for application of make-up powders. They provide emollient action and a protective action against environment to the skin which is neither too greasy nor too dry. It is multicoloured make up applied on the face to create an even, uniform colour similar to the complexion, to cover flaws and to change the skin tones.

Figure 7

- **Night cream or massage creams:** These creams are mainly used for the nourishing the skin or as a treatment to dry skin. Creams which are generally applied on skin and left for few or several hours over night are mainly known as night creams. Creams which acts as an emollient by rubbing the cream on the skin with massage is known as massage cream.

Figure 8

- **Hand and Body creams:** We tend to wash our hand several times a day, stripping off moisture. Applying cream softens and protects the skin and it keeps the skin looks younger. Since the skin on our palms and fingers needs oil to stay supple and to prevent it from chapping and cracking.

Figure 9

According to ingredients

- **Natural creams:** Formulated with plant-based or organic ingredients (e.g., Aloe Vera-based creams).
- **Synthetic creams:** Manufactured with chemically derived compounds for specific actions.

According to characteristics properties

✧ **Vanishing creams:** Vanishing cream gets the name from the fact that it leaves no trace when rubbed into the skin. These are oil in water emulsion that contains large percentage of water and stearic acid or other oleaginous components. After application, the continuous phase evaporates, leaving behind a thin residue film of the stearic acid. Because of this reason, these are used particularly in hot climates which cause perspiration on the skin.

Figure 10

✧ **Cold cream:** It is an emulsion of water in oil type. Used as moisturizer, makeup remover and cleanser. The main principle of this involves the slow evaporation of water phase which leads to cooling sensation. Borax and beeswax are used as a emulsifying agents.[17-19]

Figure 11

General ingredients used in skin creams

1. **Water:** Serves as the primary solvent and hydrates the skin. These are the cheapest and easily available.

2. **Emollients: Examples:** Petrolatum, lanolin, mineral oil. Soften and smooth the skin by forming a protective barrier.
3. **Emulsifiers: Examples:** Stearic acid, cetyl alcohol, polysorbates. Stabilize the oil and water phases to create a uniform emulsion.
4. **Humectants: Examples:** Glycerin, Hydroxy ethyl urea, Sodium-L-Lactate, etc. Attract and retain moisture in the skin.
5. **Thickening agents: Examples:** Carbomers, xanthan gum, cetyl alcohol. Provide viscosity and improve the texture of the cream.
6. **Preservatives: Examples:** Parabens, benzyl alcohol. Prevent microbial growth and extend shelf life.
7. **Fragrances:** Add a pleasant scent to the cream. **Examples:** Essential oils or synthetic fragrances.
8. **Colorants:** Provide visual appeal. **Examples:** turmeric, saffron, indigo.
9. **Antioxidants: Examples:** Vitamin E, green tea extract, BHA. Protect the skin from free radicals and environmental damage.
10. **Vitamins:** Vitamins plays an important role in maintaining the physiological function of whole body and the skin. Vitamin A, B, C, E etc. are generally used in formulation of the creams.

Method of preparation

Preparation of o/w emulsion cream

The oil soluble components and the emulsifier are taken in one beaker and melted in a water bath at 75°C.

↓

Other beaker water, preservatives and water-soluble components are taken and melted at 75°C.

↓

After heating water phase are taken in mortar and pestle and slowly oil phase was added and triturated till clicking sound was heard.

↓

Finally, when the temperature cools down, perfuming agents and/or preservatives are added. In this preparation, water content will be more than the oil.

Preparation of w/o emulsion creams

The oil soluble components and the emulsifier are taken in one beaker and melted at 75°C.

↓

Another beaker water and water soluble components are taken and melted at 75°C.

↓

After melting, the oil phase was taken in a mortar and pestle and slowly the water phase was added and triturated till clicking sound was heard.

↓

And when the temperature of the cream will get cooled, then the perfuming agent are added.

In this preparation, water phase will be less and oil phase will be more.[20-27]

Application

- ✧ Skin softening
- ✧ Smoothing
- ✧ Moisturizing
- ✧ Anti-allergic
- ✧ Antiseptic
- ✧ Astringent
- ✧ Cleaning
- ✧ Protective
- ✧ Scabicidal
- ✧ Local anesthetic
- ✧ Parasiticide
- ✧ Germicide
- ✧ Antifungal
- ✧ Fairness
- ✧ Antiaging

Figure 12

Aging

- ✧ Aging can be defined as a spontaneous and unavoidable process that occurs in all living things.
- ✧ Aging is a naturally occurring phenomenon that depends on the progressive loss of homeostasis and physiological functioning of body results in age-related illnesses, injury.
- ✧ Aging is the biological process distinguished by the collection of damage in structure and decrease in function of cells and tissues over time.
- ✧ Premature aging is a 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.
- ✧ Skin is the protective layer of the body of some animal including humans. As the age advances certain changes occur in the skin which are affected by certain extrinsic and intrinsic factors.[28]
- ✧ The Skin undergoes changes as it ages, which include the loss of elasticity, repletion in the epidermal thickness and collagen content, elastic fibre decline, and increased wrinkling and dryness.[29] The aging process is classified into two distinct types "sequential skin aging" and "photo-aging".

1. 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
2. Photo aging is caused by over exposure to UV rays from sunlight.

Figure 13

Causes of skin aging

Intrinsic aging (Natural aging)

- ✓ **Genetic factors:** Natural reduction in collagen and elastin production over time.
- ✓ **Reduced cell turnover:** Slower regeneration of skin cells as we age.
- ✓ **Decreased oil production:** Leads to dryness and loss of skin elasticity.

Extrinsic aging (Environmental factors)

- ✓ **UV Radiation (Photoaging):** Prolonged exposure to the sun damages collagen and elastin fibers, causing wrinkles and pigmentation.
- ✓ **Pollution:** Environmental toxins break down skin barriers and accelerate aging.
- ✓ **Lifestyle:**

i. Smoking: Reduces blood flow to the skin and damages collagen.

ii. Alcohol: Dehydrates the skin, leading to dullness and fine lines.

Nutritional deficiencies: Lack of essential nutrients (e.g., vitamins A, C, and E) impairs skin repair and protection.

Hormonal changes: Declining estrogen levels during menopause reduce collagen and skin thickness.

Stress and Sleep deprivation: Chronic stress and lack of sleep increase cortisol levels, which accelerates collagen breakdown and leads to dull, aged skin.

Dehydration: Lack of hydration reduces skin plumpness, causing fine lines and sagging.

Mechanism of aging

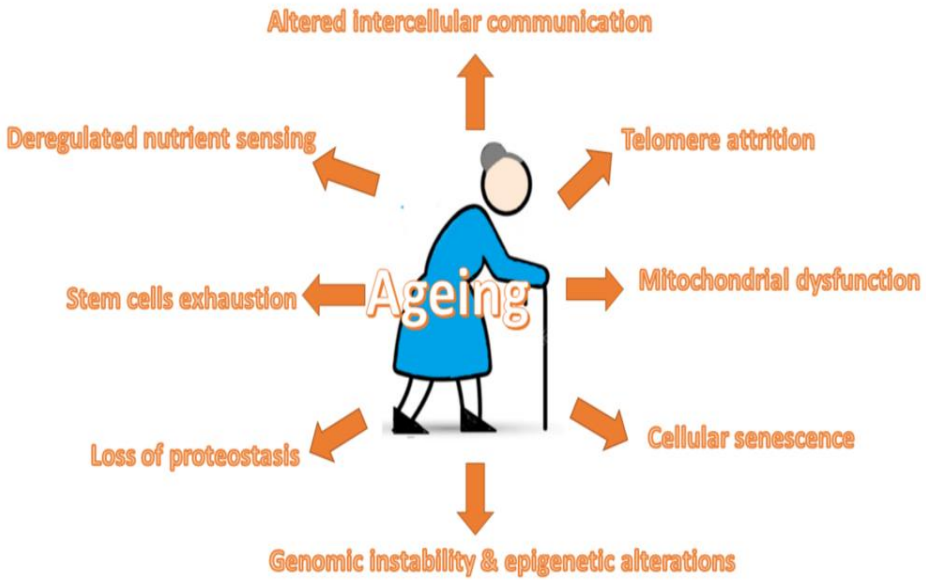

Figure 14

Anti-aging agents

Anti-aging agents are those substances that help in slowing down the effects of aging on your skin and body. They can be natural or synthetic, and they work by different mechanisms, such as protecting against cellular damage, boosting collagen production, enhancing hydration, stimulating cellular renewal, UV Protection, Skin brightening, Moisture retention, etc.

Some examples of anti-aging agents are

Common Name	**Part used**	**Chemical Constituents**	**Uses**
Neem	Leaves of *Azadirachta indica*	Nimbidin, Nimbidal, Nimbin, Limonoids	Antioxidant, Antiseptic, Antiageing, Treatsacne
Aloevera	Leavesof *Aloebarbadensis*	Salicylic Acid, Aloesin, AloeresinA, AloeresinE, IsoaloeresinD	Antioxidant, Cleansing, Moisturising, Soothing.
Amla	Fruits of *Emblicaofficinalis*	AscorbicAcid, GallicAcid, EmblicaninA, Emblicanin B	Antioxidant, Anti-Inflammatory, Anti-ageing, Antimicrobial.
Cucumber	Fruits of *CucumussativusL.*	CucurbitacinD, VitaminC, Folicacid	Antioxidant, Antimicrobial, Cooling, Soothing.
Turmeric	Dried rhizomesof *Curcumalonga*	CurcuminD and curcuminoids	Antioxidant, Antiaging, Moisturizing, Antimicrobial, Treatsacne.
Tulsi	Leaves of *Ocimumsanctum Linn*	Oleanolic Acid, Ursolic Acid, Linalool, RosmarinicAcid	Antimicrobial, Antifungal, Antibacterial, Antioxidant.Anti-aging
Clove	Dried flower buds of *Eugenia Caryophyllus*	Eugenol, Eugenolacetate, Caryophyllene	Antioxidant, Antimicrobial, Antifungal, Anti-Inflammatory.
Ginseng	Dried root of *Panax ginseng*	Ginsenosides, Panaxosides, Chikusetusaponin	Anti-oxidant
Arjuna	Dried stem bark of *Terminalia arjuna*	Arjunine, Arjunolone, and Ellagic acid	Increase production of collagen, Improves skin hydration

Apple	Fresh fruit of *Malus domestica*	Anthocyanin, rutin, epicatechin, catechin	Anti-aging

Drug profile

Butterfly pea

Synonyms: Butterflypea, Bluebellvine,

Asian pigeonwings, Blue pea, Telang flowers

Clitoria albiflora Mattei, Clitoria bracteata Poir, Clitoria zanzibarensis Vatke

Biological sources: Its is obtained from dried flowers or fresh flowers, leaves of *Clitoria ternatea.*

Phytoconstituents: It contains tannins, phlobatannin, carbohydrates, saponins, triterpenoids, phenols, flavanoids, flavonol glycosides, proteins, alkaloids, antharaquinone, antocyanins, cardiac glycosides, stigmast-4-ene-3,6-dione,volatile oils and steroids.

Figure 15

Taxonomic classification

Kingdom: Plantae;

Subkingdom: Viridiplantae;

Infrakingdom: Streptophyta;

Division: Tracheophyta;

Subdivision: Spermatophytina;

Infradivision: Angiospermae:

Class: Magnoliopsida:

Superorder: Rosanae;

Order: Fabales;

Family: Fabaceae;

Genus: Clitoria L.;

Species: *Clitoria ternatea*

Medicinal uses

1) Used in a variety of health concerns such as arthritis
2) Liver problems
3) Intestinal problems
4) Anticonvulsant
5) Antimicrobial
6) Improve overall skin tone and texture
7) Prevent premature aging

Tulsi

Figure 16

Synonyms: Holy basil, Tulasi

Biological source: It is obtained from fresh and dried leaves of Ocimum species like *Ocimum sanctum L*. and *Ocimum basilicum L*.

Family: Lamiaceae

Phytoconstituents: Its contain volatile oils (eugenol 70-80%, beta caryophyllene, linalool, methy eugenol), phenolic compounds (rosmarinic acid, ursolic acid, oleanolic acid, caffeic acid), flavonoids, terpenoids, glycosides, alkaloids.

Medicinal use

1. Tulsi helps to cure fever.
2. It helps to cure skin problems like blackheads, premature aging, acne, etc.
3. Tulsi used to treat heart disease.
4. It prevents blackheads.
5. It prevents skin from acne.

Aloe-Vera

Figure 17

Synonyms: Ghritkumari, Musabbar

Biological source: It is obtained from Dried juice of leaves of Aloe species.

Aloe barbadensis (Curacao aloe)

Aloe ferox (Cape aloe)

Aloe perryl (Socotrine aloe)

Aloe spicata (Cape aloe)

Family: Asphodelaceae

Phytoconstituents: Aloe vera contains amino acids like leucine, isoleucine, saponin glycosides provide cleansing action, vitamins A, C, E, B, B12, and folic acid.

Medicinal uses

1. Used as anti-microbial.
2. Use to cure skin injuries.
3. Use as an anti-inflammatory.
4. Helps to soothe and sunburn.
5. Helps to moisturize the skin.
6. Lightens blemishes on the skin.ch Through Innovation

Turmeric oil

Figure 17

Synonyms: Curcuma, *Curcuma aromatic*, Curcumine

Biological source: Turmeric is obtained from a rhizomatous of *Curcuma longa*

Family: Zingiberaceae

Phytoconstituents

Its contains volatile oils (turmerone 50-60%), curcuminoids (curcumin 2-5%, demethoxycurcumin, 5methoxycurcumin), flavonoids (quercetin), phenolic compounds (ferulic acid, cinnamic acid, vanillic acid), terpenoids, glycosides.

Medicinal use

1. Use to treat disorders of the skin.
2. Use to treat respiratory tract infection..
3. Use treat problems in the digestive system.
4. Use as an antiseptic.
5. It helps to heal acne.
6. Prevents premature aging.
7. Lightens hyperpigmentation.

Rose Oil

Synonyms: Attar, Athar, rose otto

Biological source: It is obtained from a petals of different Rosa species especially *Rosa centifolia L.* and *Rosa damascena Mill*.

Family: Rosaceae

Phytoconstituents: The oil are citronellol (34-55%), geraniol, nerol, paraffin, polyethyl alcohol, rose oxide, eugenol.

Medicinal uses

1. It is used as an essence.
2. It is used to nourish skin.

Figure 18

AIM

To Formulation and evaluation of polyherbal anti-aging cream from the extract of butterly pea flowers.

OBJECTIVE

To prepare herbal cream from the extract of butterfly pea flowers. To perform the evaluation test for the suitable formulation.

1. Physical evaluation
2. Homogenicity
3. Washability test
4. pH Test
5. Phase separation
6. Accelerated stability test
7. Viscosity
8. Type of emulsion
9. Spreadability
10. Irritancy test

Plan of work

Collect the flower

↓

Grinding of flowers

↓

Extraction of flower

↓

Prepare the herbal cream

↓

Evaluate the herbal cream

MATERIALS AND METHODS

Plants collection

The butterfly pea flowers, fresh aloe vera leaves and tulsi leaves were collected from the inner campus of arunai groups of institution.

Product Ingredents & Uses

Si. No	Ingredients	Properties
1	Butterfly pea flower extract	Antioxidants , Provide Anti-aging effect
2	Tulsi leaves extract	Antibacterial ,skin –luminous,
3	Aloe vera gel	Moisturizer ,reduce acne
4	Turmeric oil	Heal wounds, Treat eczema & psoriasis
5	Bees wax	Emulsifying agent, stabilizer, thickness of cream
6	Liquid paraffin	Lubricating agent
7	Borax	Cleansing ,emulsifying agent
8	Methyl paraben	Preservative
9	Rose water	Fragrance
10	Distilled water	Vehicle

Extraction procedure

Butterfly pea (Telang) flower extraction

Fresh telang flower are cut with a size of 1cm and mashed with blender

↓

Macerated with distilled water (1:5) for 15 minutes

↓

And then stirring with a magnetic stirrer at 25°c.

↓

Then filtered and obtained liquid extracts of telang flowers.

Figure 19

Aloe vera extraction

The fresh leaves were collected and washed with distilled water.

↓

Sterile knife was used to cut the leaf outlet lengthwise.

↓

The colorless parenchymatous tissue of the aloe vera plant was removed using a sterile knife

↓

The fibers and impurities are then removed with a cloth of muslin.

↓

A filtrate or the filter product, which is a transparent aloe vera gel was then used in the preparation.

Figure 19

Tulsi extraction

Tulsi leaves were collected and washed with distilled water

↓

And dried with hot air oven

↓

The leaves were then powdered after a proper drying.

↓

In a volumetric flask, 1g tulsi leaf powder plus 10 ml ethanol was taken

↓

Then the solution was heated on water bath at filtered the solution using filter paper.

↓

Clear extract of tulsi leaves was used in this preparation

Figure 20

Chemical tests

1. Test for flavonoids

Shinoda test

Take Conc. Hcl and some pieces of magnesium turnings and mixed it with crude drug extract, observe after few minutes, the development of pink, orange or red to purple colour indicates the presence of flavonoids.

2. Test for phenolic Compounds & Tannins

Fecl 3 test

The alcoholic extract was taken in test tube and add 1% Fecl3 solution, Formation of milky white colour after addition

of fecl3 indicates the presence of tannins and phenols.

3. Test for the steroid

Salkowski test

Take 2 ml of test extract and add 2 ml chloroform and 2 ml conc. sulphuric acid, Shake well the mixture, chloroform layer appears as red and acid layer will show greenish yellow colour.

4. Test for alkaloids

Wagner's test

Take about 1 ml of extract and add to 2 ml of Wagner's reagent (Iodine in potassium iodide), Reddish brown precipitate indicates the presence of alkaloids.

5. Test for carbohydrates

Molisch test

2 ml of sample + 2 drops of Molisch reagent and conc. Sulphuric acid slowly by sides, formation of purple ring indicates presence of carbohydrates.

6. Confirmatory test for anthocyanin

The confirmatory test for anthocyanin was performed using standard procedures sulphuric acid test. 1ml of concentrated H2SO4 was added to 2ml of extract.the presence of anthocyanin would be indicated by orange coloration of the interface.

Sodium hydroxide test

2 drops of 1N NaOH was addedto 2ml of extract. The presence of anthocyanin would be indicated by blue to bluish green colouration.

Cream formulation

The herbs used in the preparation of herbal cream was authenticated by the Department of crop and herbal physiology. The plant material was dried , powder and sieved and stored in a well closed container for further studies.

Method of formulation

Cream are viscous semisolid formulation of w\o emulsion

Procedure

Oil phase

Heat liquid paraffin and beeswax in a borosilicate glass beaker at 70˚c.

Aqueous phase

Another beaker ,dissolve borax, methyl paraben in distilled water and heat 75℃

↓

Aqueous phase was added to oil phase

↓

Then add a measured amount of drug extract, Aloe vera gel, Turmeric oil, Tulsi extract and stir continuously until it forms a smooth cream

↓

Then added a rose oil as a fragrance

↓

Add few drops of distilled water if necessary and mix the cream in order to give a smooth texture to the cream and to mix all ingredients properly.

Formulation table

Table 1

Si. no	Ingredients	Composition of formulations				
		F1	F2	F3	F4	F5
1.	Butterfly pea flower extract	0.8ml	0.9ml	1ml	1.2ml	1.25ml
2.	Tulsi leaves extract	1.2ml	1.4ml	1.5ml	1.3ml	1.4ml
3.	Aloe vera gel	1.5ml	1.3ml	1ml	1ml	1ml
4.	Turmeric oil	0.5ml	0.4ml	0.2ml	0.3ml	0.1ml
5.	Bees wax	3.1gm	3.2gm	3.5gm	3.8gm	3.9gm
6.	Liquid paraffin	10ml	11ml	12ml	13ml	14ml
7.	Borax	0.1gm	0.2gm	0.1gm	0.3gm	0.5gm
8.	Methyl paraben	0.01gm	0.02gm	0.03gm	0.04gm	0.05gm
9.	Rose water	2 drops	2 drops	2 drops	2 drops	2 drops
10.	Distilled water	q. s	q.s	q.s	q.s	q.s

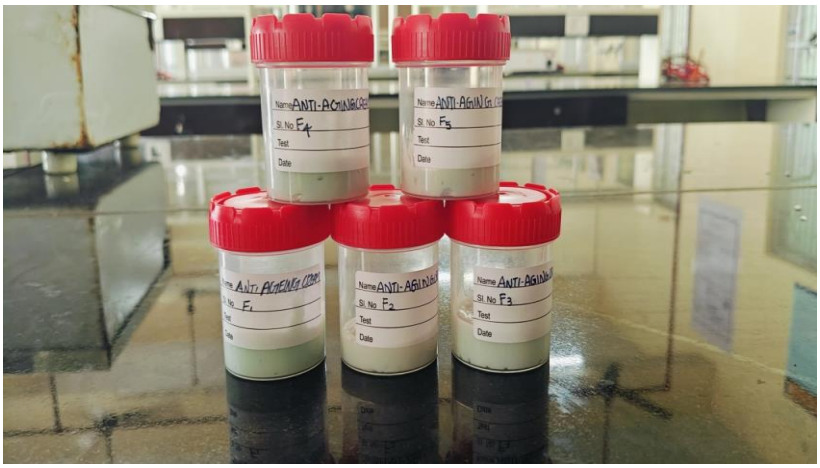

Figure: 21

Evaluation of herbal cream

1. Physical properties
2. Homogenicity
3. Ph of the cream
4. Viscosity
5. Spreadability
6. Type of emulsion test
7. Phase separation
8. Washability
9. Accelerated stability studies
10. Irritancy test

1. Physical properties

The Cream was observed for color, odour and appearance.

2. Homogenecity

All developed creams were tested for homogenecity by visual inspection after the creams have been set in the container. They were tested for their presence of any aggregates and physical contact.

3. pH of the cream

pH meter is used to measure the ph of solution made by dissolving the cream in water. Calibrate the pH meter using standard buffer solution. 0.5gram of cream was taken and dispersed in 50 ml of distilled water and then pH was measured by using digital pH meter.

Figure 23

4. Viscosity

Viscosity of the creams was determined by using Brookfield viscometer. 100g of the cream was taken in a beaker and the spindle was dipped in it for about 5 minutes and then the reading was taken.

5. Spreadability

The spreadability was expressed in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load. Lesser the time taken for separation better the spreadability. Two sets of glass slides of standard dimension were taken. Then one slide of suitable dimension was taken and the cream formulation was placed on that slide. Then other slider was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream between the two slides was pressed uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to the slides was scrapped off. The upper slide was allowed to slip off freely by the force of weight tied to it. The time taken by the upper slide to slip off was noted.

$$\text{SPREADABILITY} = m \times l \div t$$

Where,

m= Standard weight, which is tied to or placed over the upper slide.(30g)

l= Length of a glass slide (7.5cm)

t= Time taken in seconds.

6. Type of emulsion test

Dilution test was conducted to determine the type of emulsion formed. in this method, to find out the oil in water emulsion, it was diluted with aqueous solvent, whereas to find out the water in oil emulsion, it was diluted with oily liquid.

7. Phase seperation

Prepared cream was kept in a closed container at room temperature away from light. then phase seperation was checked for 24 hours for 30 days. Any change in the phase seperation was observed.

8. Washability

Washability test was carried out by applying a small amount of cream on the hand and then washing it with tap water.

Figure 22

9. Accelerated stability studies

Accelerated stability studies was performed on all the formulations by maintaining at room temperature for 30days with constant time interval During the stability studies the parameters like homogenicity ,physical properties ,viscosity and pH are studied.

10. Irritancy test

Mark the area (1 cm2) on left hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and edema if any for an interval up to 24h and reported. According to the results all the three formulations that is F1, F2, F3, F4, and F5 showed no sign of irritancy, erythema and Edema.

RESULT

1. Physical properties

Table 1

Physical properties	F1	F2	F3	F4	F5
Appearance	Good	Good	Excellent	Good	Good
Colour	Pale green	Pale green	Pale green	Pale green	Pale green
Odour	Characteristics	characteristics	characteristics	characteristics	Characteristics
State	Semi-solid and dry	Semi-solid and dry	Semi-solid	Semi-solid and oily	Semi-solid and oily

2. Homogenicity

Table 2

Test	F1	F2	F3	F4	F5
Homogenicity	Little roughness	Little roughness	No roughness	No roughness	No roughness

3. Determination of pH

Table 3

Test	F1	F2	F3	F4	F5
pH	5.06	5.79	5.87	5.88	5.73

According to the results. The pH of all the formulation are within the range of 5 to 6. This is suitable for face

4. Viscosity

Table 4

Test	F1	F2	F3	F4	F5
Viscosity	1350	1560	1600	1650	1720

5. Spreadability

Table 5

S. No	Formulation	Time (Sec)	Spreadability(gcm/sec)
1	F1	6.81 sec	33 g×cm/sec
2	F2	5.00 sec	45g× cm/sec
3	F3	3.85 sec	58g× cm/sec
4	F4	8.00Sec	28g× cm/sec
5	F5	4.70sec	47.8g× cm/sec

6. Type of emulsio

Table 6

Test	F1	F2	F3	F4	F5
Type of emulsion	Water in oil emulsion	Water in oil emulsion	Water in oil emulsion	Water in oil emulsion	Water in oil emulsion

The five formulation was found to be water in oil emulsion.

7. Phase separation

Table 7

Test	F1	F2	F3	F4	F5
Phase separation	No phase separation	No phase separation	No phase separation	Phase separation	Phase separation

Prepared cream was kept in a closed container at room temperature, away from light. then phase seperation was checked.

8. Washability

Table 8

Test	F1	F2	F3	F4	F5
Washability	Easily washed with water	Easily washed with water	Easily washed with water	Not Easily washable	Not Easily washable

9. Accelerated stability studies

Table 9

Test	F1	F2	F3	F4	F5
Accelerated stability studies	Stable	Stable	Stable	Not stable	Not stable

10. Irritancy test

Table 10

S. No	Formulation	Irritant effect	Erythema	Edema
1.	F1	Nil	Nil	Nil
2.	F2	Nil	Nil	Nil
3.	F3	Nil	Nil	Nil
4.	F4	Nil	Nil	Nil
5.	F5	Nil	Nil	Nil

CONCLUSION

Due to constant exposure of human skin to the UV radiations present in sunlight causes several pathobiological alterations in cells occur such as increased wrinkling, irregular pigmentation, loss of elasticity and roughness, dryness. For the protection of this symptom of aging herbal cosmetic are used as a therapy. Various active constituents such as phenolic acids and flavonoids appear efficient against UV radiation-induced damage the evaluation test reveals that the formulated anti-aging cream from Clitoria Ternatea, tulsi and aloe vera extract showed that it is safe to be used in the skin to protect from intrinsic and extrinsic aging. In experiments (F1 –F5), different batches of polyherbal anti aging cream were created using clitoria ternatea, tulsi, turmeric and aloe ver among other plants and components. Based on physical properties, homogenicity pH, viscosity, spreadability, type of emulsion, washability, accelerated stability studies as well as the fact that it meets all the criteria needed for a high –quality cream,F3 was chosen as the best formulation out of all of the others.

From this study, it is concluded that it is possible to develop anti-aging cream containing flower extract of Clitoria Ternatea and leaf extract of tulsi and aloe vera and it will help in reducing oxidative damage and give the antioxidant effect to our skin.

REFERENCES

1. Ganceviciene, R., Liakou, A. I., Theodoridis, A., Makrantonaki, E., & Zouboulis, C. C. "Skin Anti-Aging Strategies." Dermato-Endocrinology, 2012; 4(3): 308-319.
2. *Clitoria ternatea* Flower and Its Bioactive Compounds: Potential Use as Microencapsulated Ingredient for Functional Foodsby Ribi Ramadanti Multisona, Shwetali Shirodkar.
3. Mukherjee, P. K., Maity, N., Nema, N. K., & Sarkar, B. K. "Bioactive Compounds from Natural Resources against Skin Aging." Phytomedicine, 2011.
4. Natural anti-aging skincare: role and potential by Idris Adewale Ahmed, Maryam Abimbola Mikail, Norhisam Zamakshshari.
5. Shah RN, Methal BM, A Hand book of Cosmetics.
6. Dr K. W. Quirin, Herbal Extracts in Support of Natural Cosmetics Preservation. Cosmetic Science Technology. Flavex Naturextrakte GmbH, Germany, 2007.
7. Sahu T, Patel T, Sahu S, Gidwani B,"Skin Cream as Topical Drug Delivery System: A Review" Journal of Pharmaceutical and Biological Sciences, Published by Atom and Cell Publishers, ISSN: 2320-1924
8. James WD, Berger TG, Elston DM. Andrews' diseases of the skin: Clinical dermatology. Philadelphia: Elsevier Saunders, 2006; 10.
9. Ross and Wilson. Anatomy and Physiology in Health and Illness, 11.
10. "Gray's Anatomy for Students" by Richard L. Drake et al.
11. "Anatomy and Physiology" by Elaine N. Marieb and Katja Hoehn.
12. "Textbook of Dermatology" by Rook, Wilkinson, and Ebling.
13. Eisen, A. Z., & Wolff, K. *Dermatology in General Medicine* McGraw-Hill, 2018; 7.
14. Chauhan lalita, Gupta Shalini et al, Journal of Drug Delivery and Therapeutics, 2020: 10[5-s]: 281-289.
15. Ansel HC, Popovich NG, Allen LV. Pharmaceutical dosage forms and drug delivery systems. Lippincott Williams & Wilkins, 1995.
16. Rai R, Poudyl AP, Das S, Pharmaceutical Creams and their use in wound healing: A Review, Journal of Drug Delivery and Therapeutics, 2019; 9(3-s): 907-912 http://dx.doi.org/10.22270/jddt.v9i3-s.3042.
17. Tarun G, Goutam R, and Amit K. Comprehensive review on additives of topical dosage forms for drug delivery. Drug Deliv, Early Online, 1-1.
18. Kumar KK. Importance of Critical Quality Attributes in Biopharmaceuticals Development. Research Journal of Tol and Cosmetic Sciences, 2019: 10(1): 29-33.

19. Namjoshi S, Dabbaghi M, Roberts MS, Grice JE, Mohammed Y. Quality by Design: Development of the Quality Target Product Profile (QTPP) for Semisolid Topical Products. Pharmaceutics, 2020: 12(3): 287.
20. Simões A, Veiga F, Vitorino C, Figueiras A. A tutorial for developing a topical cream formulation based on the quality by design approach. Journal of pharmaceutical sciences, 2018: 107(10): 2653-62.
21. Pal A, Soni M, Patidar K, "Formulation and evaluation of polyherbal cream" International Journal Pharmaceutical and Biological Archives, 2014; 5: 67-71.
22. Patel RP, KamaniR, "Formulation Optimization and Evaluation of Mometazone Furoate Cream" Journal of Pharmacy Research, 2009; 10: 1565-1569.
23. Aswal A, Kalra M, Rout A, "Preparation and evaluation of polyherbal cosmetic cream" Der Pharmacia Lettre, 2013; 5(1): 838.
24. Jamshiya S, "Formulation and Evaluation of Herbal Skin Cream for Wound Healing" (Doctoral dissertation, RVS College of Pharmaceutical Sciences, Coimbatore).
25. Avinash G, Priyanka B, "Wound healing potential of Indian medicinal plants" International Journal of Pharmacy Review & Res, 2013; 2: 75-87.
26. Mittal A, Sardana S, "Herbal boon for wounds" International Journal of Pharmacy and Pharmaceutical Sciences, 2013; 5: 1- 12.
27. Rai P, Proudly AP, Das S, Pharmaceutical Creams and their use in wound healing: A Review, from Journal of Drug Delivery and Therapeutics.
28. Swetha M, Iswariya VT, Maryswarnalatha K, etal. Review Articleon Preparationand Evaluation of Herbal Face Cream. Annals of Forest Research, 2022; 65(1): 10315-10323.
29. Shendage A. S, Kale H. B, Jadhav Sunita T. Formulation and Evaluation of Herbal Cold. International Journal of Creative Research Thoughts, 2022; 10(10): b440-b445.
30. Estefania KV, Silalahi J, Sumaiyah S, et al. Formulation and Evaluation of Cream Turmeric Extract Preparations from Turmeric Rhizomes (*Curcuma domestica Val.*). Indonesian Journal of Pharmaceutical.
31. Clitoria extract Lakshmi, CHN., Raju BDP., Madhavi, T., and Sushma, NJ., Identification of Bioactive Compounds By Ftir Analysis And In Vitro Antioxidant Activity Of Clitoria Ternatea Leaf and Flower Extracts, Indo Am. J. Pharm. Res, 2014; 4: 09-2014. ISSN NO: 2231-687.
32. Aloe vera gel Gayan Chandrajith Vidana Gamage, Wee Sim Choo. Hot water extraction, ultrasound, microwave and pectinase-assisted extraction of anthocyanins from blue pea flower. Food Chemistry Advances, 2023.