

# Creams: An Overview of Classification, Preparation Techniques, Assessment, and Uses

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## ABSTRACT

Since the beginning of time, creams have been used as topical treatments in cosmetic products and are valued for their ease of application and removal from the skin. Pharmaceutical creams are used for a wide range of cosmetic reasons, including skin protection against bacterial and fungal infections, skin cleaning, beautifying, modifying appearance, moisturizing, and mending cuts, burns, and wounds. These semi-solid preparations are safe for use by the general public and society. Although human skin is often damaged, it is also capable of healing itself. Infection risk exists, particularly in the initial stages of injury, and the natural healing process can take some time. In these situations, the injury site can be treated with medicated creams to promote faster healing and prevent infection. The use of topical drug delivery systems, or pharmaceutical creams, for wound healing has been the main focus of this review. We have included a detailed discussion of the wound healing process, appropriate preparation techniques, cream classification based on function, benefits and drawbacks, characteristics of the various types of creams, ingredients used in cream formulation, and evaluation parameters.

**Keywords:** Creams, Skin, Topical drug delivery system, Wound healing

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## INTRODUCTION

The Greek word "Kosmestikos" which meaning "to adorn" is the source of the English term "cosmetic" Since then, any substance utilized to enhance or beautify appearance has been referred to as cosmetic(Source) In actuality, the word "cosmetics" originated in Ancient Rome. These were usually made by female slaves called "cosmetae" which is how the name "cosmetics" originated. The purpose of cosmetics is to improve attractiveness. The history of makeup spans several centuries. The Egyptians are credited as being the first people to employ makeup to improve their appearance.(1)Back then, makeup was limited to body paint or rudimentary eye coloring. These days, makeup is crucial for both men and women. The desire for youth and beauty has led to a rise in the significance of cosmetics. These days, cosmetics are widely accessible in the form of lotions, perfumes, eye shadows, nail polishes, hair sprays, and lipsticks. After using the base cream, other cosmetics like face powder give the skin a radiance. Then there are lipsticks, which a lot of women of all ages apply. The appropriate amount of wax and cocoa butter are used to make them. Both men and women use cosmetics like colognes, gels, and lotions on a daily basis. In many situations, creams serve as a facial cleanser. Anti-aging creams that can keep skin looking younger for years have been produced more recently. 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. Certain occupations, such as those in show business, emphasize the significance of looks. Makeup has been used by many celebrities and artists to combat harsh lighting and camera flash glare. They use a range of cosmetics to preserve their appearance because they understand how important it is to look well. Recent studies have demonstrated that Makeup aids in shielding the skin from the sun's damaging rays. Many producers of cosmetics have taken advantage of people's need to shield their skin and themselves from the sun's rays. Many producers of cosmetics have taken advantage of people's need to shield their skin and themselves from

the sun's rays. 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.

### 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. In order to limit the pharmacological or the effect of the drug to the skin's surface or within the skin, topical delivery refers to the application of a drug-containing formulation to the skin to treat cutaneous disorders or the cutaneous manifestations of general diseases (such as psoriasis). 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.(2)

Advantages of topical drug delivery system

- Avoidance of first pass metabolism.
- Convenient and easy to apply.
- Avoid of risk.
- Disadvantages associated with intravenous treatment and the various absorption circumstances, such as pH fluctuations, enzyme presence, stomach emptying time, etc.
- Continuous medication input leads to effectiveness with a reduced total daily dosage of the medicine.
- Prevent changes in medication levels between and within patents.
- The medication or its excipients may cause dermatitis or skin irritation.
- Because most medications are poorly fat soluble and have a large molecular weight, they cannot be absorbed via the skin or mucous membranes.
- It can be used only for those drugs which need very small plasma concentration for action.
- Can be used only for drugs which require very small plasma concentration for action
- Possibility of allergic reactions.
- Drugs of larger particle size not easy to absorb through the skin.(3)

### PHYSIOLOGY OF HUMAN SKIN

#### Epidermis

The stratified keratinized squamous epithelium that makes up the epidermis, the skin's outermost layer, varies in thickness depending on the area of the body. The palms of hands and the soles of feet have the highest concentration of it. The epidermis lacks blood vessels and nerve endings, but the dermis's interstitial fluid, which supplies nutrients and oxygen and escapes as lymph, is submerged in its deeper layers.

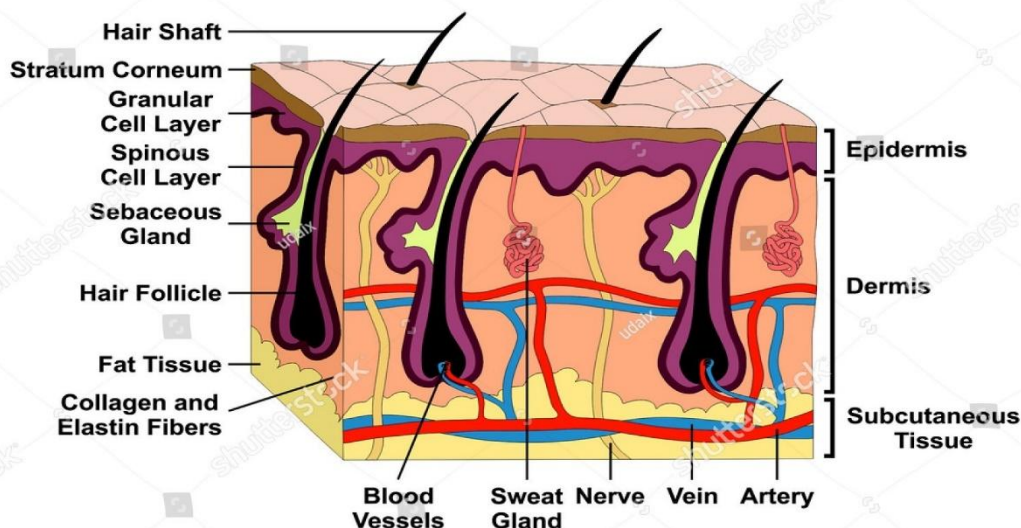


Figure 1: Cross-Section of Human Skin(4)(4)skinSkin

#### Dermis

The dermis is elastic and hardy. It is made of connective tissue, and the matrix is made up of collagen and elastic fibers entwined. Stretch marks, also known as permanent striae, are a result of the rupture of elastic fibers in the skin, which can happen during pregnancy or after obesity. Wrinkles appear as a result of the aging process because collagen fibers lose their ability to bind water and give the skin its tensile strength. The primary cells in the dermis are mast cells, fibroblasts, and macrophages. Varying amounts of adipose (fat) tissue and areolar tissue lie beneath its deepest layer.

### Subcutaneous gland

These are made up of secretory epithelial cells that come from the hair follicle's parent tissue. They are found in the skin of every part of the body, with the exception of the palms of the hands and the soles of the feet, and they secrete an oily material called sebum into the hair follicles. The skin of the groin, axillae, scalp, and face has the highest concentration of them. Sebaceous glands that are independent of hair follicles secrete sebum directly onto the surface in regions where one type of superficial epithelium transitions into another, such as the lips, eyelids, nipple, labia minora, and glans penis.(5)

### FUNCTIONS OF SKIN

Skin performs the following functions:

- a) 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.
- b) Sensation:** See somatosensory system and haptics. Consists of a range of nerve endings that respond to heat and cold, touch, pressure, vibration, and tissue damage.
- c) 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.
- d) 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.
- e) Aesthetics and communication:** Our skin gives others insight into our emotions, physical condition, and overall beauty.
- f) 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.
- g) Water resistance:** To prevent vital nutrients from being washed out of the body, the skin functions as a water-resistant barrier.

### DISEASES OF SKIN

#### a) Vitiligo

A disorder known as vitiligo causes patches of skin to turn white due to the loss of natural colour. It is widespread, affecting around 1% of people worldwide. Melanin, the pigment that gives your skin its typical colour, is produced by cells called melanocytes.

#### b) Scabies

Human scabies mites are the source of the widespread and excruciating skin disorder known as scabies. Though it can afflict anybody at any age, it most frequently strikes the young and old. Tiny parasites, hardly bigger than a pinhead, are the mites that cause scabies. Scratchy markings and red, scaly patches make up the scabies rash; eventually, it may get infected and produce tiny pustules.

#### c) Rosacea

Rosacea is a common rash that typically affects middle-aged people and appears on the central portion of the face. On the cheeks, chin, forehead, and nose, there is a persistent redness that follows an inclination to flush easily. Although the exact cause of rosacea is unknown, many believe that the condition is caused by the blood vessels in the face skin that enlarge too readily.

#### d) Psoriasis

About 2% of people have psoriasis, a common skin condition. It tends to come and go randomly and affects both men and women equally, regardless of age. It does not leave skin scars and is not contagious. The skin is an intricate organ consisting of multiple layers.

#### e) Melanoma

Skin pigment cells can develop cancer, a condition known as cutaneous malignant melanoma. The prognosis is typically favorable if it is treated early. It is not communicable. The Greek word "melas," which meaning black, is where the word "melanoma" originates. The dark pigment called melanin is what gives skin its natural color.

#### f) Eczema (Atopic Eczema)

An inflammatory skin condition is atopic eczema. The word "Atopic" refers to a group of disorders that frequently have a genetic foundation, including eczema, asthma, seasonal rhinitis, and hay fever. Changes in the epidermis, such as redness, blistering, oozing, crusting, scaling, thickening, and occasionally pigmentation, are referred to as eczema.

## CREAMS

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.(6) 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.(7)

Since creams are made using methods developed in the pharmaceutical industry, they are regarded as pharmaceutical products. 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".(8)

## TYPES OF SKIN CREAMS

They are divided into two types:

**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.(9-11)

## CLASSIFICATION OF CREAMS

**All the skin creams can be classified on different basis:**

1. According to function, e.g. cleansing, foundation, massage, etc.
2. According to characteristics properties, e.g. cold creams, vanishing creams, etc.
3. According to the nature or type of emulsion.

**Cream types categorized by purpose, distinguishing features, and emulsion type:**

1. Make-up cream (o/w emulsion):
  - a) Vanishing creams.
  - b) Foundation creams.
2. Cleansing cream, Cleansing milk, Cleansing lotion (w/o emulsion)
3. Winter cream (w/o emulsion):
  - a) Cold cream or moisturizing creams.
4. All-purpose cream and general creams.
5. Night cream and massage creams.
6. Skin protective cream.
7. Hand and body creams.

### 1. Make-up cream:

These are primarily o/w emulsions. This cream-based product gives skin a moisturized, silky look that can be either matte or radiant. It gives skin nourishment, a dewy sheen, and is essentially sweat-resistant.

• **Vanishing creams:** The reason these creams are dubbed "vanishing" is that when applied to the skin, they appear to vanish. Stearic acid is the foundation of these compositions. The cream dries out the skin and leaves behind a sticky, dry residue layer after use. This is the reason these are especially used in hot areas where skin perspires.

• **Foundation creams:** These creams function as a base for makeup foundations. It serves as a foundation that adheres to makeup powders. They give the skin, which is neither too dry nor too oily, an emollient effect as well as environmental protection. Multi-coloured makeup is used on the face to cover up imperfections, alter skin tones, and create a consistent, even tone that resembles the complexion.

### 2. Cleansing creams

These creams are used for personal hygiene and beautifying, which is crucial for makeup, as well as for cleansing the body. Makeup, grime, and oil can be removed from the face and neck with cleansing creams or lotions.

### 3. Winter creams

These are w/o formulations, meaning that there will be more oil than water in the mixture. The primary usage of these creams is for dry, cracked skin. Ice cream: It's referred to as moisturizing cream or moisturizer. There must be an emollient effect to cold cream. When used, it should feel cool to the touch and leave no occlusive oil film on the skin.

### 4. All purpose creams and general creams

These days, more people than ever before utilize these creams. These creams spread easily over the skin and have a somewhat oily but non-greasy texture. Additionally, this can be used as a night cream, nourishing cream, protective cream to prevent or treat sunburns, and treatment for regions of skin that have become roughened.

### 5. Night cream or massage creams

These creams are mostly used to cure dry skin or to nourish the skin. Night creams are often creams that are applied to the skin and left on for a few or many hours while you sleep. Massage creams are emollients that are applied to the skin and work as a massage oil.

### 6. Skin Protective creams

These thick-bodied, silky creams are designed to provide the skin a consistent, undetectable layer of protective film. It assists in preserving the skin's protective layer against substances that could cause skin irritation (such as contact dermatitis and occupational dermatitis). preserves the equilibrium of normal to mixture skin and fortifies the skin's inherent qualities.

### 7. Hand and body creams

One of the earliest body parts to age is the hands. We frequently wash our hands multiple times a day, removing moisture from them. Using cream keeps the skin looking youthful while protecting and softening it. It makes sense to use hand lotions that replenish plenty of oil because the skin on our palms and fingers requires it to stay supple and to keep from chapping and cracking. More often than not, it is applied to the hands.(12-15)

## GENERAL INGREDIENTS USED IN SKIN CREAMS

The raw materials which are used in a manufacturing of skin creams include:

**Water:** The most crucial and frequently utilized ingredient in any cream recipe is water. These are the most accessible and affordable. Water is a solvent used in skin creams to dissolve other components.

Creams are prepared with water, which is devoid of all pollutants, toxins, germs, and other contaminants. Emulsions can also be formed by water; the amount of water used in the formulation determines this. Emulsions can also be called water-in-oil or oil-in-water, depending on the amounts of water and oil phase utilized in the formulation.(16)

**Fats, oils, and waxes:** These ingredients, along with their derivatives, make up a significant component of creams. Depending on its use, oils serve as a perfuming agent, preservative, emulsifier, and thickening, while waxes perform the same functions. There are two kinds of oil: glyceride and mineral.

**Mineral oil:** Hydrocarbons obtained from petroleum oil make up mineral oil. Mineral oil is a highly refined, colourless, and transparent oil that is frequently used in cosmetics. In addition to seldom triggering adverse responses, mineral oil cannot solidify and block skin pores. It is affordable, lightweight, and helps to prevent the body from losing water while maintaining moisture levels. Cream formulation involves the use of several mineral oils.

#### Examples:

- Light liquid paraffin
- Heavy liquid paraffin
- Liquid petroleum

**Glyceride oil:** Glyceride oil is mostly vegetable oils. Examples of glyceride oils are almond oil, arachis oil, castor oil, coconut oil, olive oil etc.

**Vegetable oil:** Creates a barrier on the skin's surface, slows down water loss, and keeps the skin plump. Additionally, creams and other personal care products can have their lipid or oil part thickened with the application of vegetable oils.(17) For instance, sunflower oil, avocado oil, germ oil, almond oil, etc.



**Waxes:** Ceresin, spermaceti, beeswax, carnauba wax, and others are used to prepare cream. Because they prevent the separation of liquid and oil components in an emulsion, waxes are employed in cosmetic products. Additionally, these waxes thicken the lipid layer and adhere to the skin's surface.

**Fats:** A variety of fats are utilized in the manufacturing of creams. These resources can come from plants, minerals, or animals. Vegetable or animal sources can be found in glyceride oils and fats. They are made up of glycerine and combinations of higher fatty acids. Depending on the technique, when saponified, they yield either soap or fatty acid and glycerine. The lauric, margaric, palmitic, stearic, and saturated groups of fatty acids are the most prevalent ones. The most well-known and liquid unsaturated fatty acid is oleic acid. More specifically, olive oil, almond oil, sesame oil, peanut oil, cocoa butter fat, mutton tallow, lard, and beef stearine are the oils that are most frequently used in various cosmetics.(18)

**Lanolin:** It comes from a sheep's wool fat. There are two forms of lanolin: hydrous lanolin, which has a water content of 25% to 30%. The point of anhydrous lanolin is 38–42°C, and it has a faint smell. These substances lubricate the skin's surface, giving the illusion of smooth, soft skin. In cosmetic and personal care products, lanolin combines well with other ingredients and aids in the formation of emulsion.

**Colours:** Prior to the invention of contemporary technology, natural materials like indigo, saffron, and turmeric were the main sources of color. Colours were created in laboratories after the 19th century and were discovered to be considerably more stable and intensely coloured. They could also be made without utilizing wild-harvested plants.(19)

**Emollients** are products that serve to soften or treat dry skin. They are also frequently referred to as moisturizers. The majority of emollients, such lanolin, squalene, and mineral oil, are types of oil or grease. They function by enhancing the skin's capacity to retain water, lubricating the skin, and covering it with an oil coating to stop water loss.(20)

**Humectants:** These are important multi-functional ingredients found in most skin care formulations. Humectants are hygroscopic organic compounds. These are the materials that can absorb or retain moisture. These has many benefits such as moisturization, exfoliation, etc. Examples of humectant are glycerine, Hydroxyethyl urea, betaine, sodium PCA, Sodium-L-Lactate, etc.(21)

**Perfumes:** Perfume is a substance that imparts a scent or order, including a sweet and pleasant smell. Examples of natural perfumes used in creams are-

- White Blossoms
- Rosy Dreams
- Orange Blossom (22)

**Vitamins:** Vitamins are essential for preserving the skins and bodies overall physiological function. Generally, vitamins A, B, C, E, and so forth are used in the cream formulation.

**Preservatives:** During formulation, shipping, storage, and consumer usage, the use of preservatives in cosmetics is crucial to preventing microbial and contaminated changes. Antioxidants can also be utilized to guard against changes brought on by oxygen exposure. Low concentrations of synthetic preservatives efficiently preserve the items.(23)

## WOUND AND WOUND HEALING PROCESS

A loss or disruption of the cellular, anatomical, or functional continuity of the deep skin tissue or the living tissues is referred to as a wound. Physical, chemical, thermal, viral, microbial, aggressive, or immunological disturbance to the skin's surface can all result in wounds.(24-28) In addition to having a physical and psychological impact on the patient, wounds can also be very expensive and leave scars that may last a lifetime. The term "wound" often refers to a physical damage that breaks and opens the skin. Mostly based on the method of occurrence and the causing agent, wounds can be categorized as follows (29-30)

**1) Closed wound:** contusion, closed fracture, etc. **2) Open wound:**

- a) Sharp cut.
- b) Laceration.
- c) Abrasion.
- d) Avulsion.
- e) Crush wound.
- f) Punctured wound.
- g) Bite wound.
- h) Burn wound.

The process of cell contraction, migration, and deadhesion following skin trauma or injury is known as wound healing. Platelet aggregation, blood clotting, fibrin production, the inflammatory response to damage, changes in the ground substances, angiogenesis, and re-epithelialization are all involved in wound healing. (31-32) The creation of scars marks the end of the healing process, which is not accomplished until collagen has vigorously knitted the damaged area. The existence of free radicals can impair the healing process of wounds by causing harm to the surrounding skin tissues. Furthermore, a number of variables, including diet, medications, hormones, the kind and locations of the wounds, and certain medical problems, might affect the healing process of wounds. (33-34) Since ancient times, people in India have treated wounds with natural substances derived from plants and animals. This practice was prescribed in the well-known school of Indian medicine known as Ayurveda. (35) Natural products have been utilized for generations in many regions of the world; because to their relatively low side effects, natural products are starting to gain the same importance as alternative medicine. (36) These factors motivate scientific research into complementary and alternative medicine in an effort to improve human health. These are used directly to treat chronic illnesses in their crude or raw form as pharmaceuticals. (37-39)

**AYURVEDIC MEDICINES FOR WOUND HEALING**

**1. Aloe Vera (*A. barbadensis*):** One of the key herbs used in Ayurvedic medicine. It can be used for a variety of skin problems, including cold sores, psoriasis, and burns. It may also be used for inflammation, irritation, or fever. (40-41)

**2. Peppermint (*Mentha piperita*):** This widely used plant has several applications. When used topically, peppermint oil gives the skin a cooling effect. It is a component of toothpaste, mouthwash, aromatherapy, bath preparations, and topical therapies. It is used to reduce inflammation and irritation, soothe pruritus, and speed up the healing of wounds. (42-43)

**3. Turmeric (*Curcuma longa*):** This spice and coloring agent are both utilized in India. It has a variety of therapeutic qualities, including anti-cancer, antidiabetic, antioxidant, anti-inflammatory, antibacterial, antiviral, wound healing, etc. (44-45)

**4. Jatrocurcas:** It has a number of recognized medical benefits. It has antimicrobial, anti-HIV, anti-cancer, anti-bacterial, and wound-healing properties. (46)

**5. Honey:** Honey has been utilized as a traditional medicine since ancient times. Honey contains antimicrobial, antitumor, anti-inflammatory, antioxidant, and cardiovascular stimulant properties. It is also employed as a wound healer and dressing. Infections following surgery in adults and newborns, burns, necrotizing fasciitis, infected and nonhealing wounds and ulcers, boils, pilonidal sinus, venous ulcers, and diabetic foot ulcers have all been treated with honey. (47-)

**6. Ghee:** Made from the milk of cows, this butter has numerous medicinal benefits that include energy cooling, rejuvenation, luster and beauty bestowed, memory and stamina enhancement, intellectual stimulation, and longevity promotion. It possesses hepatoprotective, immunostimulant, antioxidant, and antimicrobial properties. Cow ghee promotes wound healing more quickly than antibiotics. Cow ghee contains a variety of saturated and unsaturated fatty acids that can participate in the metabolic processes necessary for any wound to heal. (51-52).

**Table 2: Examples of some plants currently investigated for wound-healing applications.**

<b>Herb</b>	<b>Main Constituents</b>	<b>Physical Forms and Administration Routes</b>	<b>Laboratorial and Clinical Evidence</b>
Aloe Vera (53-57)	Soluble sugars, nonstarch polysaccharides, lignin, polysaccharides, glycoproteins, and antiseptic agents	Forms: solutions, creams, mucilage, gels, and dressing Routes: topical and oral	Anti-inflammatory and antimicrobial activity; stimulate cell proliferation

Hippophaerhamnoides (sea buckthorn) (58-59)	Flavonoids (e.g., quercetin, isorhamnetin), carotenoids (e.g., alpha, beta-carotene, lycopene), vitamins(C,E,K), tannins, organic acids, triterpenes, glycerides of palmitic, stearic, oleic acids and, amino acids	Forms : aqueous leaf extract, seed oil Routes :topical and oral	Antioxidant and anti-inflammatory activities; stimulate the healing process; improve wound contraction and epithelialization; increase the hydroxyproline and protein content in the wound
Angelica sinensis (60)	Essential oils and water-soluble ingredients; ferulic acid is the main active constituent	Forms: ethanol extract, ferulic acid dissolved in DMSO Routes: n.a (in vitro tests)	Stimulate the proliferation of human skin fibroblasts, the secretion of collagen
Catharanthus roseus (Vinca rosea) (61-62)	Contain two major classes of active compounds: alkaloids (e.g., vincamine) and tannins	Forms: leaf ethanol extract Routes: topical	Antimicrobial activity against Pseudomonas aeruginosa and Staphylococcus aureus; increase wound strength, epithelialization, and wound contraction
Calendula officinalis (marigold) (63)	Triterpenoids and flavonoids	Forms: gels, aqueous extracts, hexane, and ethanolic extracts dissolved in DMSO Routes: Topical	Anti-inflammatory and antibacterial activities; stimulate the proliferation and migration of fibroblasts in vitro

### ALTERNATIVE MEDICINES/CREAMS FOR WOUND HEALING

**1. Soframycin:** According to IP, Soframycin skin creams are created with 1% w/w of framycetin sulphate as the primary ingredient. Soframycin skin cream is used to treat a variety of conditions, including scabies, sycosis barbae, impetigo, otitis externa, cuts, burns, ulcers, furunculosis, and lice.

**2. Neosprine:** Neomycin sulphate, polymyxin B sulfate, and bacitracin zinc are the three antibiotics that make up this compound. Topical ointment can be used to heal wounds, minor cuts, and burns that have specific skin infections. By eradicating the bacterium that causes these diseases, these antibiotics function.

**3. Silver nitrate:** This prescription topical solution works as an antiseptic, caustic, and antiinfective agent on skin wounds and burns.

The negative effects of silver nitrate are not well documented in the literature. One possible application for silver nitrate is as a sclerosing or cauterizing agent (67). In **Silver Sulphadiazine:** In patients with severe burns, this drug is used in conjunction with other therapies to help prevent and treat wound infections. In order for silver sulphadiazine to function, microorganisms that could infect an open wound must not proliferate. This lessens the possibility that the bacteria may infect nearby skin or blood, where it could result in a dangerous blood infection (sepsis). Silver sulphadiazine is a member of the sulfa antibiotic medication class.

In patients with second- and third-degree burns, silver sulphadiazine cream is used to both prevent and cure wound infections. Due to the possibility of severe adverse effects, silver sulphadiazine should not be administered to premature babies or to newborns during the first two months of their lives. (65)

**4. Cetrimide:** A combination of various quaternary ammonium compounds, including cetrimonium bromide, is an antimicrobial. ICI made the initial discovery, developed it, and marketed it as Cetavlon. It is applied as a 1-3% solution on wounds from roadside accidents.

**5. Betadine:** It contains Povidone Iodine USP 10% w/w (available iodine 1%) as its active ingredient. Bacteriostatic against both gram-positive and gram-negative bacteria is povidone iodine. It is a broad-spectrum antiseptic used for



mycotic and bacterial skin infections, minor surgical procedures, small area burns, and topical therapy or prevention of infection in minor cuts and abrasions.(64)

#### METHODS OF PREPARATION OF CREAMS FOR WOUND-HEALING:

##### • Preparation of o/w emulsion cream

In a single beaker, the emulsifier and the oil-soluble ingredients are melted in a water bath at 75°C. Preservatives and water-soluble ingredients are added to another beaker of water and melted at 75°C. Following heating, the water phase was gradually added to the oil phase in a mortar and pestle, and the mixture was triturated until a clicking sound was produced. Finally, preservatives and/or fragrances are applied when the temperature drops. There will be more water in this preparation than oil.

##### • Preparation of w/o emulsion creams

In a single beaker, the emulsifier and the oil-soluble ingredients are combined and heated at 75°C. Additionally, components that dissolve in water are taken and melted at 75°C in a different beaker. Following melting, the water phase is placed in a mortar and pestle, and the oil phase is gradually added and stirred until a clicking sound is produced. Additionally, the fragrance agent is applied once the cream has cooled down. There will be more oil phase and less water phase in this preparation.

#### EVALUATION PARAMETERS OF CREAMS:

**1. Determination of pH:** The pH of the cream can be measured on a standard digital pH meter at room temperature by taking adequate amount of the formulation diluted with a suitable solvent in a suitable beaker.

**2. Physical appearance:** The physical appearance of the cream can be observed by its colour, roughness and graded.

**3. Spreadability:** A sufficient quantity of material is divided between two glass slides, and the slides are subjected to a 5-minute weight application of 100 grams. Spreadability can be expressed as,

$$S = m \cdot l / t$$

Where,

m = weight applied to upper slide.

l = length moved on the glass slide.

t = time taken

**4. Saponification value:** 2gm of substance refluxed with 25ml of 0.5 N alcoholic KOH for 30min, to this 1ml of phenolphthalein added and titrated immediately, with 0.5N HCl, note the reading as 'a'. Repeat the operation omitting the substance being examined. Note the reading as 'b'.

$$\text{Saponification value} = (b-a) \cdot 28.05 / w$$

Where, w = weight of substance in gram.

**5. Acid value:** 10gm of substance is dissolved in accurately weighed 50ml mixture of equal volume of alcohol and solvent ether, the flask was connected to reflux condenser and slowly heated, until sample was dissolved completely, to this 1ml of phenolphthalein added and titrated with 0.1N NaOH, until faintly pink colour appears after shaking for 30 seconds. Acid value =  $n \cdot 5.61 / w$

Where,

n = the no. of ml of 0.1 N KOH solution.

w = the weight of substance in gram.

**6. Viscosity:** Viscosity of formulated creams can be determined by using Brookfield Viscometer

**7. Homogeneity:** The formulation was tested for the homogeneity by visual appearance and by touch.

**8. Removal:** The ease of removal of the creams applied was examined by washing the applied part with tap water.

**9. Dye test:** The scarlet dye is mixed with the cream. Place a drop of cream in a slide and cover with a cover slip and examine it under a microscope. If the disperse globule appears red and the ground colourless then it is o/w type and the reverse condition appears in w/o type of creams.

**10. After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.

**11. Type of smear:** After application of cream, the type of film or smear formed on the skin were checked.

**13. Accelerated Stability Study:** Accelerated stability study is conducted for formulation according to ICH guidelines

**12. Irritancy study:** Mark an area of 1sq.cm on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema was checked, if any, for regular intervals up to 24hrs and reported. (65)

### CONCLUSION

Creams are semisolid recipes that are generally accepted in society. Since the skin is the body's most accessible organ, accidents can occur easily to it. Topical formulations, such creams, are the best choice for treating cuts, burns, and wounds. The benefits of using pharmaceutical creams for wound healing have led to an increase in research and development in recent decades. It is certain that pharmaceutical creams will continue to be an intriguing and alluring field of study for years to come given the advancements made in the pharmaceutical field and industry. In the upcoming years, cream formulation, evaluation, and preparation will be done using increasingly sophisticated technology and techniques. In the upcoming years, cream formulation, evaluation, and preparation will be done using increasingly sophisticated technology and techniques. Creams with a base in herbal ingredients are likewise becoming more and more popular every day.

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