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Review Article

Review on Anti-Fungal Cream

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ABSTRACT

Creams are semi-solid emulsions widely used in pharmaceutical, cosmetic, and skincare industries for their versatility and efficacy. With a history dating back to ancient Rome, cosmetics have evolved to provide therapeutic benefits, ease of application, and targeted delivery. Creams can be classified based on function, characteristics, and composition, and their formulation involves blending oil and water phases with emulsifying agents, preservatives, and active ingredients. Evaluation parameters include pH, physical appearance, spread ability, and irritancy studies. Creams have diverse applications, including pharmaceuticals, cosmetics, skincare, haircare, wound care, sunscreen, insect repellents, massage, baby care, first aid, pain relief, and treating skin conditions, infections, and inflammation. They deliver medication, moisturize, protect, nourish, and support skin health. In summary, creams play a vital role in promoting skin health and addressing healthcare needs across various industries.

INTRODUCTION

Greek word "kosmesticos," meaning "adorn," is the root of the word "cosmetic." When the use of cosmetics began to gain popularity in ancient Rome, this concept first emerged. Generally speaking, cosmetics are products designed to be applied to the human body by methods such as rubbing, spraying, or sprinkling in order to clean, enhance attractiveness, beautify, or alter one's appearance. The term "cosmetics" refersto cosmetics with specific medicinal advantages. These things were often made by female slaves called "cosmetae" in the past, which is where the word "cosmetics" originated. Applying makeup has been a prevalent practice for generations, and its primary objective is to improve one's appearance. The first known people to apply cosmetics for beauty were the Egyptians, who employed simple. Topical medication delivery is the technique of applying a preparation containing a medicine to the skin to treat cutaneous conditions (like acne) or cutaneous symptoms of a systemic disease (like psoriasis). Limiting the pharmacological or other effects of the substance

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to the skin's surface or interior is the goal. The main objective of this distribution approach is to confine the substance's pharmacological or other effect to the skin's surface or inside ofit. For the distribution of different dose forms, three primary strategies are frequently used. Formulations known as topical semisolids are designed to have a local effect when applied to the skin or mucous membranes. In medicine, semi-solids are primarily employed as protective, emollient, and therapeutic agents(**Error! Reference source not found.**

Topical dosage forms are distinguished into following major categories:

- Semisolid topical dosage form
- Cream
- Ointment
- Paste
- Lotion

Topical administration can also be defined as the application of a dosage form containing a drug directly onto the skin to address a general illness or skin condition, such as fungal infections, with the aim of achieving the main goal.

Merits Of TDDS

- Very slow absorption.
- Reduced systemic side effects.
- Improved patient compliance.
- Directly applies the drug to the affected area ,reducing systemic absorption and side effects.
- Improved bioavailability.
- Flexibility in dosing.
- Reduced dosing frequency. (**Error! Reference source not found.**

Physiology Of Skin:

The largest organ in the body, the skin makes up over 15% of the total weight. In addition to providing defense against external physical, chemical, and biological threats, it also prevents excessive water loss from the body and plays a part in thermoregulation.

The structure of skin distinct into 3 layers:

- Epidermis
- **Dermis**
- **Subcutaneous gland**

a) Epidermis:- The epidermis represents the outermost layer of the skin, serving as a delicate yet protective barrier made up of epithelial cells. Epidermis plays important role in safeguarding body against external elements such as moisture loss, temperature fluctuations, and harmful pathogens. It undergoes a continuous process of renewal through the mechanisms of cell division and shedding.

b) Dermis: -

This layer posseses flexibility due to the presence of collagen and elastic fibers are interwoven in the matrix, which is made of connective tissue. Pregnancy and obesity may cause persistent ridges, or stretch marks, which are caused by the rupture of elastic fibers in the skin.

c)Sub-cutaneous gland: The sub-cutaneous layer, referred to as the hypodermis, constitutes the deepest layer of the skin. It is primarily made up of adipose tissue, which consists of fat cells, along with connective tissue. This layer plays a crucial role in regulating body temperature, storing energy, and providing protection to the muscles and bones situated beneath it. The thickness of the subcutaneous layer can differ significantly, with greater fat accumulation observed in specific regions such as the buttocks and thighs. Additionally, this layer houses blood vessels, nerve ending (**Error! Reference source not found.**

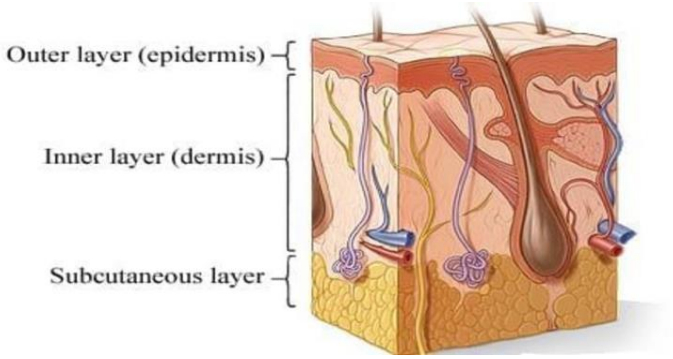
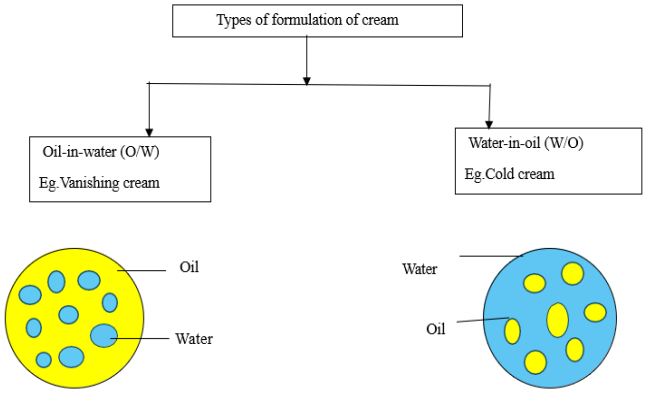


Figure 1. Structure Of Skin

Creams:

Creams are uniform, semi-solid, or viscous formulations which is used for topical application on the skin or mucous membranes for therapeutic, preventive, or protective functions. These formulations typically consist of dispersions or solutions containing one or more active ingredients within suitable bases. To ensure compatibility with skin secretions, the formulations are typically based on eighter water attracting (hydrophilic) or water repelling (hydrophobic).The base must possess qualities such as smoothness, inertness, odorless, and both physical and chemical stability, while also being compatible with the skin and any incorporated medications. Additionally, it should not induce skin irritation or sensitization, nor impede the healing process of wounds. **(Error! Reference source not found.**

Types Of Cream:



Oil-in-water (Oil/Water) creams -: Emulsions consist of minute oil droplets dispersed within a continuous medium, exemplified by oil-in-water (Oil/Water) creams, where the oil is uniformly distributed as droplets throughout the aqueous phase.

Water-in-oil (Water/Oil) creams : Which consist of small water droplets distributed throughout an oil phase. Water- in-oil (W/O) cream is created when oil serves as the dispersion medium and water as the dispersed phase**(Error! Reference source not found.**

Classification Of Topical Creams(Error! Reference source not found.

Table 1: Classification Of Creams

Sr. NO.	**Types**	**Sub types**	**Examples** (Marketed Preparation)

1	Based on its purpose	purifying cream	Uriage
		Base makeup cream	Lakme
2	According to characteristics	Cold cream	Pond's
		Vanishing cream	Nivea

General Ingredients Used in Topical Creams:

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

a)Water: Water is a fundamental component in cream formulations,offering an economical and readily available solvent for dissolving various ingredients.To ensure safety and efficacy.Creams employ purified water that is devoid of contaminants and toxins.The proportion of water in formulation can significantly influence its texture and stability ,sometimes resulting in oil-in-water or water-in-oil emulsions ,depending on the relative quantities of oil and water phases.

b)Oil, waxes and fats: These substances, along with their derivatives, are a necessary component of creams. Depending on their function, waxes serve as emulsifiers, fats as thickeners, and oils as preservatives, fragrances, etc.

1. Mineral oil: Ex. Light and heavy liquid paraffin.
2. Glyceride-oil: Example. Butter, Canola oil.

c)Waxes : Cream is made from a variety of waxes, including beeswax and carnauba wax. Waxes are utilized in cosmetics because they keep the liquid and oil components of an emulsion from separating. These waxes also stick to the skin's surface and thicken the lipid layer.

Fats: Creams are prepared by various types of fats. These substances can be derived from minerals, plants, or animals.

Lanolin : The two forms of lanolin—hydrous lanolin, which has a water content of 25–30%, and anhydrous lanolin, which has a faint odor and a melting point of 38°C to 42°C.Which is derived from sheep's wool fat and lubricate the skin's surface, giving it a silky, smooth appearance.

d)Colors: Before the development of modern technology, color was mostly derived from natural substances like indigo, saffron, turmeric, and others. After the 19th century, it was found that colors produced in labs were more stable and intense. They could also be produced without the usage of wild plants.

e)Emollients: Emollients are productsthat help soften or treat dry skin. The majority of skin care products contain humectants, which are significant, multipurpose ingredients.

f)Humectants: Hydroscopic organic compounds are called humectants. These are the substances that have the ability to absorb and hold into moisture. Example:Glycerin.

g)Perfumes: These are the substances that impart a scent or odor ,such as a pleasant smell are known as perfumes. For Example: Rose water.

h)Preservatives: Preservatives are plays important role in cosmetics to avoid contamination and alterations the growth of microorganisms during various stages,including formulation,transportation,storage,and consumer to use ,can be employed to prevent changes brought on by oxygen exposure. Low concentrations of synthetic preservatives effectively preserve the product[**(Error! Reference source not found.(Error! Reference source not found.**

ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

1) Easy to apply.
2) To avoid first pass metabolism.

3) Avoid of risk.
4) Patient convenience.
5) Effective use of law dose daily dose of drug with follow-up treatment.
6) No specific drug Administration ration on any age groups.
7) Water washable, easy to wipe away.
8) Targeted delivery.
9) Improved bioavailability.
10)Non-invasive and easy to use, improving patient compliance.
11)Reduced risk of drug interactions· (**Error! Reference source not found.(Error! Reference source not found.(Error! Reference source not found.**

DISADVANTAGES:

1) Irritation caused because alteration of skin physiology.
2) Hydrophilic drugs having less penetrability.
3) Allergies may caused due to incompatibility.
4) Only narrow plasma concentration drugs incorporate into formulation.
5) Active ingredients not penetrate deep enough into the skin or tissue.
6) Creams can leave a greasy residue on the skin or clothing.
7) Creams can have a shorter shelf life due to stability issues·(**Error! Reference source not found. (Error! Reference source not found.(Error! Reference source not found.**

Fungal Infection:

Definition:

A fungal infection, also known as mycosis, is a disease caused by the overgrowth of fungi, such as yeasts or molds, on the skin, in the body, or on internal organs. Fungal infections, also known as mycoses, are a growing concern worldwide. They can affect anyone, but those have use immunosuppressive treatment patients suffers mostly.

Types Of Fungal Infection:

a)Superficial Fungal Infections: In superficial infections affect the outer layers of the skin, hair, and nails. Examples include –
Ringworm –
Jock itch –
Nail fungus-

b)Deep Fungal Infections: These infections penetrate the inner tissues and organs of the body. Examples include: -
Pneumonia (lung infection)
Meningitis (infection of the brain)
Bloodstream infections - Organ infections (such as those affecting the kidneys or liver)

Figure 2: Fungal Infection of Skin

Overview Of Fungal Skin Infections:

Fungi typically inhabit moist areas such as the vaginal region, beneath the breasts, and where the warm,moist cervices between the toes create an environment that's essential for skin irritation. Yeasts (like Candida or Malassezia furfur) or dermatophytes (like Epidermophyton) are commonly responsible for fungal skin infections. The startum corneum represents the outermost protective layer of skin is where many of these

fungus only exist. Because they have more skinfolds than typical, obese people are more prone to these conditions, particularly if the skin inside a skinfold deteriorates and becomes inflammatory (intertrigo). Fungal infections are also more common in people with diabetes. It's odd that rashes on healthy portions of the body can result from fungal infections in other areas.

Symptoms:

1)Alterations in the skin may manifest as redness, along with potential cracking or peeling.

2)Itching Causes of fungi skin infection:

Imbalance of bacteria is due to following reasons:

➤ excessive use of antibiotics

➤ Hormonal changes/imbalance

➤ loss of appetite

Diagnosis-:

1. Visual inspection: Examination of the affected skin area for characteristic signs such as redness, itching, and scaling.

2. Medical history: Assessment of the patient's medical history, including previous fungal infections, allergies, and medications..

Treatment -:

Antifungal Drugs

Fungal infections are generally managed with antifungal medications. These medications are often administered topically to the infected region, utilizing forms such as gel,cream,lotions.In certain instances, antifungal agents may be prescribed for oral consumption. Alongside pharmacological treatment, maintaining dryness in the affected area through the use of powders or opting for open-toed footwear can prove beneficial.(**Error! Reference source not found.**

Antifungal Cream-:

Antifungal agents are offered in various topical formulations on the market, including creams, ointments, and powders designed for dermatological treatment.

Concept Of Antifungal Cream:

Antifungal creams are topical preparations that inhibit fungal growth, treating fungal skin infections like Tinea pedis, ring root, and Moniliasis. They: -

Relieve symptoms like itching, burning, and redness - Prevent recurrence by creating an environment unfavorable to fungal growth.

- Contain active ingredients like azoles, allylamines, and polyenes that inhibit fungal cell membrane synthesis or function. **(Error! Reference source not found.**

Table 2: Marketed Formulation of Antifungal Creams:

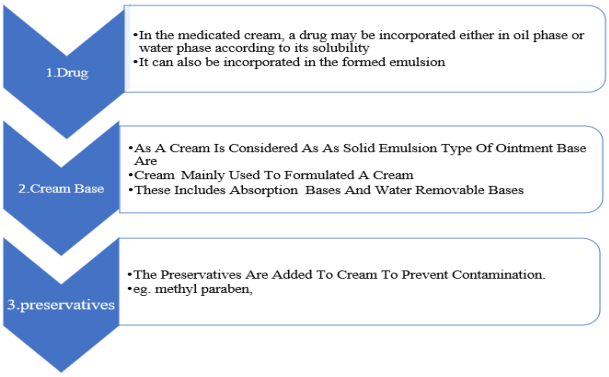
Sr No	Drugs	Uses	(MOA)Mechanism of action	Marketed preparation
1	Clotrimazole	Treatment of fungal skin infection such as ring worm	Inhibits fungal cell membrane synthesis by interfering ergosterol production	Mycolex
2	Miconazole	Treatment of fungal skin infection such as ring worm	Inhibits fungal cell membrane synthesis by interfering ergosterol production	Micatin
3	Terbinafine	Treatment of fungal skin infection such as jock itch	Inhibits squalene epoxidase, an enzyme that plays a role in the formation of fungal cell membranes, as seen in Lamicil.	Lamicil

4	Butenafine	Treatment of fungal skin infection such as jock itch	Inhibitis the fungal cell membranes formation and destroy cell membrane.	mentax

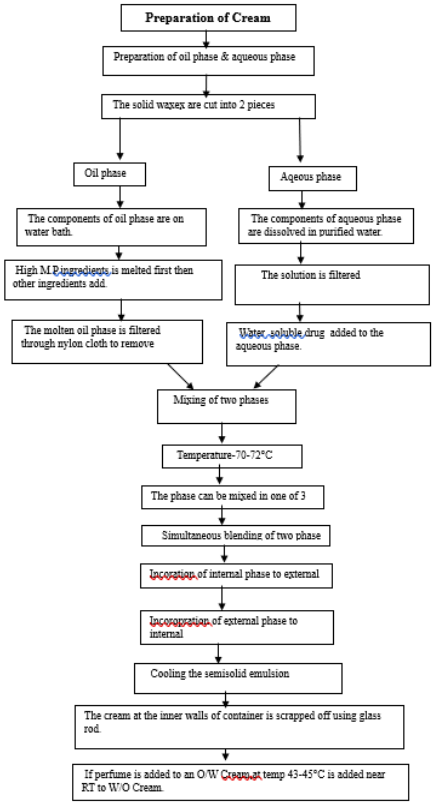
Formulation Of Creams:

Cream are solid emulsions. They essentially consist of an oil phase, and an emulsifying agent. A cream consist of.

1)Drug
2)Cream base
3)Preservatives



Preparation Of Cream



Evaluation Parameters Of Creams:

1.Appearance: The cream's color, texture, and homogeneity are evaluated. A uniform color and texture indicates good quality.

2.Determination Of pH: The cream's pH is measured to ensure it is within the acceptable range (typically pH 5.5-6.5). A pH outside this range can irritate the skin.

3.Viscosity: The cream's thickness and flowability are evaluated. A consistent viscosity ensures the cream spreads evenly. Viscosity measurd by Brookfield Viscometre.

4.Spreadability: The cream's ease of spreading on the skin is assessed. Good Spreadability ensures the cream is easy to apply. Spreadability described as:

Spreadability = l × m / t Where:

m: Mass of the sample.

t: Time taken for the sample to spread. l: Length of surface area.

5.Saponification value: Saponification value is the quantity of alkali needed to saponify a fat or oil, usually represented in miligrams of potassium hydroxide (KOH) for each gram of oil.

To assess the Saponification Value (SV) of cream, a meticulous and standardized methodology is employed. Initially, a sample of cream weighing between 2 and 3 grams is carefully measured and placed into a flask. Subsequently, 20 to 25 milliliters of ethanol is introduced into the flask, along with a 0.1 Normal (N) potassium hydroxide (KOH) solution. The resulting mixture is titrated with the 0.1 N KOH solution until a pink hue is observed, signifying the completion of the reaction.

Saponification Value (mg KOH/g) = (A x N x 56.1) / W Where:

A = Volume of KOH solution used (mL) N = Normality of KOH solution

W = Weight of fat or oil sample (g)

6.Acid value: The amount of KOH (KOH0.1N) necessary to stabilize the free fatty form ofacids found in 1 gram of a fat or oil is expressed in milligrams of KOH per gram of the sample.

Weigh 2-3 grams of the sample and transfer it into a flask. Introduce 20-25 mL of 95% ethanol into the flask. Incorporate 1-2 drops of phenolphthalein indicator into the mixture. Proceed to titrate the solution with 0.1 N KOH until a pink coloration is observed. Document the volume of KOH solution utilized. Subsequently, compute the Acid Value using the appropriate formula.

Acid Value (mg KOH/g) = (Volume of KOH x Normality x 56.1) / Weight of sample

7.Homogeneity: simply evaluated by visually. The condition of having a consistent composition and uniformity throughout a substance or mixture

8.Removal: The removal parameter predict residential time of antifungal cream on site of action and those evaluated simply by applying the cream patch on skin area and wash without rubbing under running water.

9.Dye'stest: The dye's test applicable along Scarlet Red or other fat-soluble dyes. When Scarlet Red is introduced to an oil-in-water (O/W) emulsion, it integrates into the oil droplets dispersed within the aqueous phase, leading to the formation of red droplets in a clear or white liquid. Conversely, when the dye is incorporated into (Water/Oil) emulsion, it dissolves in the external lipophilic phase, resulting in a consistent red hue throughout the emulsion. By examining the dye's distribution, one can ascertain that is formulation is of the Oil/Water or Water/Oil type.

10.Irratancy study: Irritancy study is an organoleptic based evaluation parameter where the cream patch is applied on dorsal area of palm exact on 1sq.cm and leave it for specified time and if irritation caused by cream immediately terminated by washout.

Applications Of Creams:

Creams Have Various Applications Includes:

1) Pharmaceuticals: Delivering active ingredients for topical treatment of skin conditions, pain relief, and inflammation.
2) Cosmetics: Moisturizing, nourishing, and protecting the skin, as well as providing a base for makeup.
3) Skincare: Hydrating, anti-aging, and soothing skin irritations.

4) Haircare: Nourishing, conditioning, and styling hair.
5) Wound care: Protecting and promoting healing of minor cuts, scrapes, and burns.
6) Sunscreen: Providing protection against UV rays and sunburn.
7) Baby care: Soothing and protecting sensitive skin.
8) First aid: Treating minor injuries, such as scrapes and burns.
9) Pain relief: Topical creams for pain management, e.g., lidocaine, capsaicin, or diclofenac.
10) Skin conditions: Creams for eczema, psoriasis, acne, rosacea, or dermatitis.
11) Infections: Fungal infections ,e.g., neomycin or clotrimazole..
12) Inflammation: Steroid creams for reducing inflammation, swelling, or redness.
13) Fungal infections: Creams treating athlete's foot, ringworm, or candidiasis.
14) Skin allergies: Creams for allergic reactions, contact dermatitis,orhives. [**Error! Reference source not found.**[**Error! Reference source not found.**(**Error! Reference source not found.**

- **Creams are used to:**

-Deliver medication
-Moisturize and hydrate
-Protect and soothe
-Nourish and condition
-Enhance appearance.

CONCLUSION:

Cream are topical formulations which is widely use. Creams are a versatile and effective dosage form used in pharmaceutical, cosmetic ,and skincare industries, with a rich history dating back to ancient Rome. They provide therapeutic benefits, convenience, and targeted delivery, and understanding skin physiology is crucial for optimization. Creams have extensive applications across various sectors, offering benefits such as medication delivery, moisturization, protection, and nourishment. Future directions include developing novel formulations, investigating natural ingredients, advancing nanotechnology, expanding applications, and standardizing evaluation parameters. Recommendations include interdisciplinary collaboration, continued research investment, regulatory guidelines ,and public education on proper usage and benefits. Overall, creams play a vital role in promoting skin health and addressing healthcare needs, and continued innovation will further enhance their effectiveness.

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