



CREAMS: A TOPICAL DRUG DELIVERY SYSTEM(TDDS)

Suhas Anant Joshi^{1*} and Dr. Avinash Balasaheb Gangurde²

^{1,2}K.B.H.S.S Trust's Institute of Pharmacy, Malegaon (Nashik) Savitribai Phule Pune University.

***Corresponding Author: Suhas Anant Joshi**

K.B.H.S.S Trust's Institute of Pharmacy, Malegaon (Nashik) Savitribai Phule Pune University.

Article Received on 27/05/2022

Article Revised on 17/06/2022

Article Accepted on 07/07/2022

ABSTRACT

The cream is the TDDS, which is regarded as an important component in both cosmetics and pharmaceuticals due to its ease of application and removal. It is classified as a pharmaceutical product and is made using a variety of methods invented by the pharmaceutical industry, such as mixing the two-phase (O & W) phase to make it. After that, the cream is evaluated using a variety of methods, such as pH, viscosity, spreadability, and stability study. Pharmaceutical creams have a wide range of uses, from exfoliating, beautifying, enhancing look, moisturising, and protecting the skin from bacterial and fungal infections to curing cuts, burns, and wounds.

KEYWORDS: Cream, evaluation, cosmetics.

INTRODUCTION

The term 'cosmetic' comes from the Greek word 'kosmestikos,' which means adornment. Cosmetics are any materials used for beauty or promotion of appearances since that time.^[1] Over the last few decades, disease has been treated by administering medications to the human body through various routes such as oral, sublingual, rectal, parental, topical, inhalation, and so on. The TDDS cream can be applied to the skin for a localised effect.^[2] It is a semisolid dosage form that is manufactured using pharmaceutical industry procedures. It is a two-phase combination, such as (O & W) phase, that is continuously stirred to make the final cream preparation. These topical formulations aid in the delivery of the active ingredient into the mucous membrane or the skin's inner layer. The cream can be made as an ayurvedic, herbal, or allopathic formulation, depending on the needs of the patient. The emulsion can be divided into two types: o/w and w/o.^[3]

TOPICAL DRUG DELIVERY SYSTEM

Topical delivery is defined as the application of a drug-containing formulation to the skin to treat a cutaneous disorder or the cutaneous signs of a general disease (e.g. psoriasis) with the goal of containing the pharmacological or effect of the medication to the skin's surface or within the skin. Semisolid formulations in all their varieties dominate the system for topical delivery, but foams, sprays, medicated powders, solutions, and even medica are also used.^[2]

Advantages of topical drug delivery system-

1. Avoiding first-pass metabolism; convenient and simple to use.

2. Risk avoidance.
3. Inconveniences of intravenous therapy and various absorption conditions such as pH variations, enzyme presence, gastric emptying time, and so on.
4. Continuous drug input achieves efficacy with reduced total daily drug dosage.
5. Prevent medication levels from fluctuating between and within patents.

Disadvantages

1. The medicine or excipients may cause skin irritation or dermatitis.
2. Because most medications have a high molecular weight and are fat soluble, they cannot be absorbed through the skin or mucous membranes.
3. Absorption is extremely sluggish.
4. It can only be used for medications that require a very low plasma concentration to work.
5. Can only be used for medications that require a very low plasma concentration to work.
6. Allergic responses are possible.
7. Drugs with bigger particle sizes are more difficult to absorb via the skin.^[4]

Types of skin creams

1.Oil in water (O/W) Creams- An oil-in-water (O/W) emulsion is one in which the oil is dispersed as droplets throughout the aqueous phase and is made up of small droplets of oil dispersed in a continuous phase.

2. Water in oil (W/O) Creams - which are composed of smaller water droplets dispersed throughout an oily phase The emulsion is of the water-in-oil (W/O) type

when water is the dispersed phase and oil is the dispersion medium.^[5-7]

CLASSIFICATION OF CREAMS

All skin creams classified on following 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.

Types of creams according to function, characteristic properties and type of emulsion-

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. It's a cream-based product that gives the skin a moisturised, smooth finish (either matte or radiant). It hydrates the skin, makes it sweat-resistant, and gives it a dewy sheen.

Vanishing creams: are so named because when they are applied to the skin, they appear to vanish. Stearic acid is used in these compositions. The cream leaves a dry but tacky residue coating on the skin after application, which also has a drying effect. As a result, these are commonly utilised in hot locations where perspiration is a problem.

Foundation creams: These creams are used as a make-up foundation basis. It functions as an adhesive basis for powder make-up application. They provide emollient and environmental protection to skin that is neither too greasy nor excessively dry. Multicolored make-up is applied to the face to create an even, consistent colour that matches the complexion, conceal defects, and change skin tones.

2. Cleansing creams

These creams are used for body washing, personal hygiene, and beauty, all of which are vital in cosmetics. Make-up, surface grime, and oil can all be removed from the face and neck with cleansing creams or lotions.

3. Winter creams

These are w/o formulations, which means the oil content is greater than the water content. These lotions are used to treat chapped and dry skin. Cold cream is also known as moisturiser or moisturising cream. Emollient activity is required in cold cream. When used, it should provide a cooling feeling and leave no occlusive oil layer on the skin.

4. All-purpose and general creams

These creams are now used more than ever before. These creams are slightly oily but not greasy, and they spread easily on the skin. This can also be used as a night cream, nourishing cream, or protective cream for sunburn prevention or relief, or to treat roughened skin areas.

5. Night creams or massage creams

These creams are mostly used to nourish the skin or as a dry skin treatment. Night creams are creams that are applied to the skin and left on for a few or many hours during the night. Massage creams are emollient creams that are applied to the skin during massage.

6. Skin protective cream

These creams have a smooth, thick texture and are designed to create an undetectable, homogeneous protective film barrier on the skin. It aids in the maintenance of the skin's barrier against pollutants that may irritate it (contact dermatitis and occupational dermatitis). Strengthens the skin's natural characteristics and keeps normal to mixed skin in balance.

7. Hand and body creams

One of the first places to exhibit signs of ageing is the hands. We wash our hands frequently during the day, removing moisture. Cream softens and protects the skin while also making it appear younger. Because the skin on our palms and fingers requires oil to keep supple and avoid chapping and cracking, it makes sense to use hand creams that replenish the oil. It's more commonly utilised on the hands than on other regions of the body.^[8-11]

EVALUATION PARAMETERS OF CREAMS

1. pH determination: The pH of the cream can be determined at room temperature using a standard digital pH metre and an acceptable amount of the formulation diluted with a suitable solvent in a suitable beaker.
2. Physical appearance: The colour, roughness, and grade of the cream can all be used to determine its physical appearance.
3. Spreadability: Adequate amount of sample is taken between two glass slides and a weight of 100gm is applied on the slides for 5 minutes. 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'. 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 = $n \times 5.61/w$ Where, n = the no. of ml of 0.1 N KOH solution. w = the weight of substance in gram

6. Viscosity: Viscosity of prepared creams can be determined by using Brookfield Viscometer
7. Homogeneity: The homogeneity of the formulation was assessed visually and texturally.
8. Removal: The ease with which the creams applied could be removed was tested by washing the affected area with tap water.
9. Dye test: The cream is poured with the scarlet dye. Put a drop of cream on a slide, cover it with a cover slip, then look at it under a microscope. The o/w type of cream has a red dispersed globule and a colourless ground, whereas the w/o type has the opposite condition.
10. After feel: Emolliency, slipperiness and amount of residue remaining after the application of set amount of cream was examined.
11. Type of smear: After applying the cream, the type of film or smear that formed on the skin was examined.
12. Irritancy study: On the left hand dorsal surface, draw a 1sq.cm area. The cream was applied to the designated area, and the duration was recorded. Irritation, erythema, and edoema were examined at regular intervals up to 24 hours and reported.
13. Accelerated Stability Study: According to ICH recommendations, an accelerated stability study is done for formulation.^[12]

CONCLUSION

Creams are semisolid preparations that are frequently accepted by society. Because the skin is the most visible component of the body, it is also the most prone to injury. Topical formulations, such as creams, are the most favoured treatment for cuts, burns, and wounds. Due to the evident benefits, research and development for the creation of medicinal creams for wound healing has increased in recent decades. Pharmaceutical creams will continue to be a fascinating and enticing subject of research for years to come, thanks to advancements in the pharmaceutical sector and industry. In the coming years, creams will be prepared, formulated, and evaluated using more complex technologies and methodologies. Creams with herbal ingredients are likewise in high demand.

REFERENCES

1. Shah RN, Methal BM, A Hand book of Cosmetics, 1.
2. Myers D, Surfactant Science and Technology, VCH Publishers, 1992; 209-247.
3. Sahu T, Patel T, Sahu S, Gidwani B. Skin cream as Topical Drug Delivery System: A Review. Journal

of Pharmaceutical and Biological Sciences, 2016; 4(5): 149-154.

4. 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.
5. Mohiuddin AK, "Skin Care Creams: Formulation and Use" American Journal of Dermatological Research and Reviews, 2019; 2: 8.
6. Chapter 11. Semi-solid dosage forms. In: Alekha Dash, Somnath Singh, Justin Tolman. *Pharmaceutics: Basic Principles and Application to Pharmacy Practice*, published by Academic Press, 2013. ISBN 0123868912, 9780123868916
7. Swarbrick J, Rubino JT, Rubino OP. Chapter 22. Coarse Dispersions. In: Remington: The Science and Practice of Pharmacy Volume 1, edited by David B. Troy, Paul Beringer, published by Lippincott Williams & Wilkins, 2006. ISBN 0781746736, 9780781746731
8. Jamshiya S, "Formulation and Evaluation of Herbal Skin Cream for Wound Healing" (Doctoral dissertation, RVS College of Pharmaceutical Sciences, Coimbatore.
9. Rani S, Singh N, Gautam SP, "Formulation, Evaluation Optimization and Evaluation of Dendricream for wound healing activity of Artemisia Indica" World journal of pharmacy and pharmaceutical sciences, 2016; 5(8): 1483- 1497.
10. Esimone CO, Ibezim EC, Chah KF, "Factors affecting wound healing" Journal of Pharma Allied Sciences, 2005; 1: 294-299
11. Avinash G, Priyanka B, "Wound healing potential of Indian medicinal plants" International Journal of Pharmacy Review & Res., 2013; 2: 75-87.
12. Aswal A, Kalra M, Rout A, "Preparation and evaluation of polyherbal cosmetic cream" Der Pharmacia Lettre., 2013; 5(1): 838.