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CREAM: A TOPICAL DRUG DELIVERY SYSTEM(TDDS)

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ABSTRACT

The cream is the TDDS which is considered as an important part in both cosmetics and pharmaceutical because of easy application and easy removal. It categorized under the pharmaceutical product and is prepared by various techniques which are developed by the pharmaceutical industry, are by mixing the two-phase (O & W) phase to form a cream after that evaluated by using a various evaluation process e.g. of pH, viscosity, spreadability, stability study.

KEYWORD: cream, evaluation.

INTRODUCTION[1,2]

Over the last decade, the treatment of illness has been accomplished by administrating drugs to the human body via different roots like oral, rectal, parental, inhalation, sublingual, topical, etc. The cream is the TDDS that can be applied to skin for the localized effect. It is a semisolid dosage form are prepared by techniques developed in the pharmaceutical industry. It is a mixture of two-phase e.g. (O & W) phase which are mixed to formulate final preparation of cream by continuous stirring. These topical formulations are help to the deliver the active medicament in to the mucous membrane or the inner layer of the skin. the cream can be formulated as an ayurvedic, herbal, or allopathic which are used as per their need for their skin conditions. The cream may be classified as an o/w and w/o type of emulsion.

Skin cream is classified based on –

1. **Function** e.g. cleansing, foundation, massage, etc.
2. **characteristics properties**, e.g. cold creams, vanishing creams, etc.
3. **nature or type of emulsion**.

Types of topical cream[3]

- Make – up creams (o/w emulsions)

1. Vanishing cream
2. Foundation cream

- Cleansing cream (w/o)
- Cream for winter (w/o)

1. Cold cream

- Cream for dry skin

1. Moisturizing cream

- All-purpose creams
- Night creams
- Skin protective and hand cream.

Advantages and Disadvantages of cream as a topical drug delivery system.[4, 5]

- Avoidances of the first-pass metabolism.
- Avoid risk.
- Convenient and easy to apply.
- It does not show the side effect on the other body organ.
- Easy termination of medications, when needed.
- Avoid alteration of drug levels inter-and intra-patent variations.

Disadvantages

- Skin irritation
- some drugs show low penetrable through the skin.
- Possibility of allergic reactions.
- small plasma concentration.
- larger particle size drug is showing the poor effect.

MATERIAL AND METHODS

Ingredients used in cream[6]

The ingredient used in the preparation of cream are

Water: - it is a solvent to liquefy other ingredients of the cream. Water is an important and widely used raw material and it is free of any toxins, pollutants, microbes, pathogens, etc.[7]

Oil, fats, and waxes

These are the essential ingredients which are used for formulation and evaluation of cream as an emulsifier (waxes), thickener (fats), and perfuming agent, preservatives (oil) according to function oils are two type

mineral (e.g. – light liquid paraffin, heavy liquid paraffin, liquid petroleum) and glyceride (almond oil, Arachis oil, castor oil, coconut oil).

Vegetable oil: - it works as a barrier to prevents the water loss of the skin.it also is used to increase the thickness of the liquid and oil phase. e.g.-almond oil, germ oil, avocado oil, sunflower oil, etc.

Waxes: - it is used in the preparation of cream e.g.- carnauba wax, ceresin, spermaceti, etc.

Fats: - various types of fats are listed for the formulation of cream which is available from various sources like plants or minerals, animals' origin. glyceride oils and fats are consisting of a mixture of higher fatty acids and glycerine. These combination form soap, or fatty acid (lauric, margaric, palmitic, stearic, are saturated group, and oleic acid unsaturated group) and glycerine, after saponification by using a different process.

Lanolin: - Lanolin act as a lubricant, which gives skin appearance smooth. It is categorized into two types: - 1) hydrous lanolin contains between 25%- 30% water, and 2) anhydrous lanolin has a point of 38^0C- 42^0C and has a slight odor.

Colors: - color are the component that makes the cream's physical appearance good. It obtained from natural sources as well as synthetically made in a laboratory.

Emollients: - emollient act as a moisturizing agent and helps to soften skin or to treat skin that becomes dry. It helps to skin with water loss, and lubricate the skin.

Humectants: - these are the multifunctional ingredient of the cream. It act as a moisturizing, exfoliating agent e.g.- glycerine, hydroxyethyl urea, betaine, sodium PCA, sodium-L-Lactate, etc.[8]

Perfumes: - perfumes are help to hide the bad smell and improved the order of the cream. E.g. of natural perfumes are used for the preparation of cream are – white blossoms, rosy reams, orange blossom.[9]

Vitamins: - vitamins are the important ingredient. it helps to maintain the physiological function of the skin and whole body. e.g.- vit A, B, C, E, etc.

Preservatives: - preservatives are the most important ingredient of the cream. It helps to preserve the formulation from various types of microorganisms and contamination during storage and consumer use.[10]

Method of preparation

- Preparation and evaluation of cream: -
- Preparation of cream.[11]

O/W emulsion-based cream was formulated by dissolving the oil-soluble component in the O-phase (part-A) and heated to 75^oC. after that the preservative and other water-soluble components are mixed in the W-phase (part-B) and heated to 75^oC heating, the W-phase was added to the portion of the O-phase with continuous stirring until cooling of emulsifier. The formula was shown in table no 1.

Table no 1: - The composition and the number of ingredients used to make a cream.[11]

Components	Ingredients	F1	F2	F3	F4
Oil phase	Stearic acid	1.5	1	1	0.5
	Cetyl alcohol	1.5	1	0.5	0.5
	Almond oil	0.5	0.5	0.5	0.5
Aqueous phase	Active extract	0.1	0.1	0.1	0.1
	Triethanolamine	0.2	0.2	0.2	0.2
	Glycerine	0.5	0.5	0.5	0.5
	Benzyl alcohol	0.2	0.2	0.2	0.2
	Water	qs	qs	qs	qs

Evaluation of cream

Determination of physical parameters :- it is evaluated by its color, pearlescence, roughness, and graded. The pH was measured by dissolving the 0.5 gm of cream in 50.0 ml of distilled water after calibration of the pH meter with a standard buffer solution. The viscosity of the formulation was examined by using a Brookfield viscometer at 100 rpm, using spindle no. 7. The homogeneity is tested by visual representation and touch.

Determination of robustness[12]

In this evaluation method placed the 3g of cream in between the two-glass slide and pressed by placing the 1000g weight for 5 min to obtain a film of constant density after that 10g of weight was added to it, and the plate was subjected to pull. Then the upper glass slide move over the lower plate to cover the distance of 10g is noted. The spreadability (S) can be calculated by using the formula-

$S = m \times L/t$

Where,

S – spreadability.

m – weight tied to the upper glass slide.

L – length moved on a glass slide.

t – the time is taken.

Determination of wetness, type of smear, and emollience

It determines the type of film or smear formed on the skin surface after the application. Emollience, slipperiness, and the amount of residue left after was checked. By washing the applied part with water examined the ease of elimination of cream.

Determination of emulsion type[12]

Dilution test

A dilution test was performed to the determination emulsion type e.g. O/W type, or W/O type by diluting the emulsion either water or oil. The O/W type emulsion is stable as water is the dispersion medium when it is diluted with water, when the O/W type cream is diluted

with water, it remains stable. the emulsion breaks If diluted with oil. The W/O type cream breaks by adding the water in place of an oily liquid. O/W emulsion can easily dilute with water, and W/O emulsion is easily diluted with an oily liquid.

Dye solubility test

In this method, an emulsion is blended in with a water-soluble color (amaranth) and observed by using microscope. O/W type emulsion shows the red (continuous phase). If continuous phase colorless, then it is w/o type. likewise, if an oil-dissolvable color (Scarlet red C or Sudan III) is added to an emulsion and the persistent stage seems red, at that point it is w/o emulsion.

Determination of chemical parameters

Irritancy test: - Mark a region (1 sq. cm) on the left-hand dorsal surface. Then cream was applied and time was noted. Checked Irritancy, erythema, and edema regular intervals up to 24 hr. and reported.

Stability tests

1. **Agitation test:** - it is conducted with the help of a reciprocating shaker by placing the required quantity of non-aqueous cream container on shaker at room temperature for 24 hr. (60 cycle/ min) and observed signs of separation.

2. **Centrifugation test**: - it is conducted by placing the 5 g of non-aqueous cream in a centrifuge tube and centrifugation at 3500 rpm for 30 min. observed signs of separation

3. **Accelerated stability testing**[13]: -It was performed by observing the formulation at 40°C ± 1°C for 7 days. And the other two formulations at 40°C ± 1°C for 20 days at room and observed on 0th, 5th, 10th, 15th, and 20th days.

CONCLUSION

The cream is the topical pharmaceutical preparation which is used for the treatment or cure of the various type topical or skin related problem e.g. – psoriasis. it is most preferred as compared to the other conventional system for treatment. It has several advantages including ease of application, fewer chances of side effects, non-invasive process, and higher patient compliance.

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