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EMULGEL – A TOPICAL DRUG DELIVERY SYSTEM

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ABSTRACT

In correlation with the other semisolid details, the utilization of gels is by all accounts more beneficial both in beautifiers and drug arrangements. At the point when gel and emulsion are utilized in the consolidated structure, they are suggested as emulgel. Emulgel is the promising medication conveyance framework for the conveyance of hydrophobic medications. Emulgel, an intriguing skin drug conveyance framework, has a double delivery control framework, i.e., gel and emulsion. Emulgel has a few benefits like greaseless, effectively spreadable, effectively removable, emollient, and straightforwardness. Arrangement of emulgel is finished by consolidation strategy. Emulgel is generally utilized for the conveyance of analgesics, calming, against contagious, hostile to skin inflammation drugs and different corrective definitions. Studies on emulgel guarantees a superior future in conveying more quantities of skin tranquilizes as emulgel by their benefits over other medication conveyance frameworks.

KEYWORDS: emulgel, topical preparation, gel, etc.

INTRODUCTION

Topical drug conveyance framework there is two fundamental kinds of skin drug conveyance items remotely utilized topical and inside utilized topical. The remotely utilized topical are spread, showered, or in any case, scattered on the tissue to shield the unhealthy region, while the inside utilized topical are applied to the mucous layer vaginally,orallyor on the rectal tissues for nearby action. The fundamental advantage of skin drug conveyance framework are evading first pass digestion, dodging gastrointestinal inconsistencies, explicit site-specific, improving patient's consistency, conceivable and simple self-prescription, and medications with a short half-life and tight restorative record are additionally exposed to be used, the office is utilized to effectively end meds at whatever point required.[1]

Emulgel is a mix of emulsion and gel, which is a new methodology for skin conveyance of medications.[2] It has a twofold control discharge like emulsion and gel. A gel is a new class of definition; it delivers the medication quicker in contrast with balm, cream, and moisturizer. Consolidation of medication in emulgel definition is reasonable to treat skin problems. Effective utilization of helpful specialists gives different points of interest over the other course of the organization. The presence of a gelling specialist in the watery stage changes over an old-style emulsion into an emulgel. Inside the major gathering of semisolid arrangements, similar to utilization of straightforward gels has extended both in beautifying agents and in drug arrangements.[3]

Emu gels have a few free properties for dermatological utilize, for example, being thixotropic, greaseless, effectively spreadable, without any problem removable, emollient, non-recoloring, long time span of usability, biofriendly, straightforward and satisfying appearance.[4]

Emulgel is emulsions, both of the water-in-oil or oil-in-water type, which is gelled by blending in with a gelling specialist. The emulsion likewise goes about as a controlled delivery drug conveyance framework in which drug particles ensnared in the interior stage experience the outside stage to the skin and gradually get assimilated. The medication arrives at the outside period of the skin in a controlled way through the inward stages which go about as a repository of the medication. Gel catches little medication particles and gives its delivery in a controlled way due to a cross-connected organization. It draws out the contact time of the drug over the skin due to its mucoadhesive property. Since Emulgel has the property of both gel and emulsions it goes about as a double control discharge framework. W/O emulsions are utilized all the more widely for emollient activities and for the management of dry skin and emollient applications while O/W emulsions is generally valuable as a rule restorative goes about like a water launderable medication bases.[5]

Advantages[6,7]

1. Evasion of first-pass digestion.
2. Evasion of gastrointestinal contradiction.
3. More particular to a particular site.
4. Improve tolerant consistency.
5. Appropriateness for self-prescription.
6. Giving use of medication short natural half-life and restricted restorative window.
7. Capacity to handily end medicine when required.
8. Advantageous and simple to apply.
9. Joining of hydrophobic medications
10. Better stacking limit.
11. Better soundness.
12. Creation attainability and low planning cost
13. Controlled delivery
14. No concentrated sonication

Disadvantages[8]

1. Skin aggravation on contact dermatitis.
2. The chance of allergenic responses.
3. The helpless porousness of some medication through the skin.
4. The medication of huge molecule size difficult to retain through the skin.
5. The event of the air pocket during the development of emulgel.

Factors affecting topical absorption of drug[9,10]

Physiological factors

1. Skin thickness.
2. Lipid content.
3. The density of hair follicles and sweat glands.
4. Skin pH.
5. Blood flow.
6. Hydration of skin.
7. Inflammation of skin

Physicochemical factors

1. Partition coefficient.
2. The molecular weight (<400 Dalton)
3. The degree of ionization (only unionized drugs gets absorbed well).
4. Effect of vehicles.

Classification of topical preparation[10]

A. Solid preparation

- Topical
- Poultices
- Plaster

B. Semi-solid preparation

- Ointment
- Cream
- Gel
- Suppository

C. Liquid preparation

- Lotion
- Paints
- Solution
- Emulsion
- Suspension

D. Miscellaneous preparation

- Transdermal drug delivery system
- Topes and gauzes
- Rubbing alcohols
- Liquid cleaner
- Topical aerosol
- Emulgel

The material used in the formulation of emulgel[11,12]

For the preparation of emulgel some constituents are used including drug, which are:

- **Vehicle**
  The vehicle should follow the ideal characters given in the pharmacopeias

- **Aqueous**
  Used are water, alcohol, etc

- **Oil**
  Used are paraffin and Mineral oils

- **Emulsifies**
  Some examples are tween 80, span 80, sodium stearate, stearic acid.

- **Gelling agents**
  Used to prepare gels, which enhance the consistency of preparation.

- **Penetration enhancers**
  Help to absorb drug to skin.

- **pH adjusting agent**

Method of preparation of emulgel[13,14]

It consists of three steps

Step 1: Formulation of Emulsion (O/W or W/O)

Preparation of oil phase emulsion

The emulsion (oil phase) is prepared by dissolving emulsifier in the oil phase. The emulsifier and oil phase ingredient which are used for the preparation of oil phase emulsion is-

Emulsifier - span 20

Oil phase - light liquid paraffin

Preparation of aqueous phase

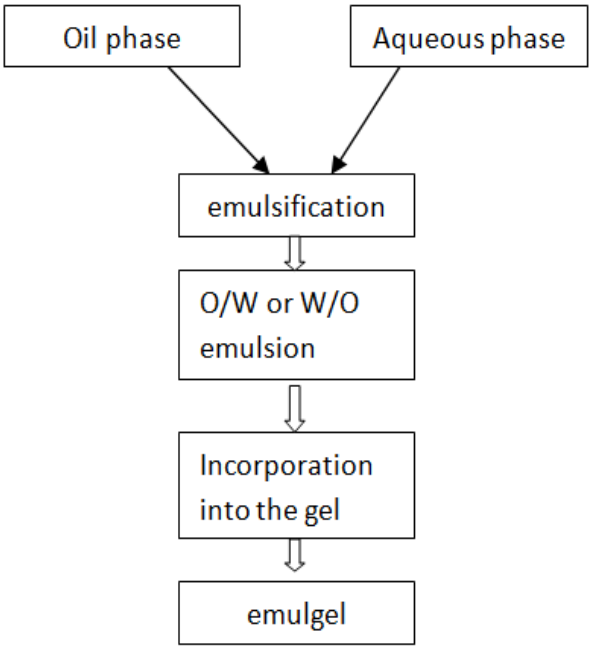
The aqueous phase is prepared by dissolving emulsifier e.g. tween 20 in purified water.

Step 2: Formulation of the gel base

The gel phase is the second important part of the preparation of emulgel. It is prepared by dispersing the polymer in purified water with constant stirring at a moderate speed using a mechanical shaker and the pH was adjusted to 6 – 6.5 using tri ethanolamine.

Step 3: Incorporation of the emulsion into the gel base

This is the final step of preparation of emulgel in which the gel and emulsion are mixed in form of the final preparation emulgel.



Evaluation of Emulgel[16]

Physical Appearance

The Emulgel is checked for their shading, homogeneity, consistency and pH. The pH estimations of 1% Emulgel are estimated utilizing a pH meter.

Spreadability

Spreadability of emulgel is estimated regarding the breadth of emulgel circle created when emulgel is put between two glass plates of unmistakable weight. A gauged amount (350 mg) of emulgel is taken on one glass plate and another glass plate is dropped from a distance of 5 cm. The breadth of the hover of spread emulgel is estimated.

Extrudability study

It is determined by the power needed to expel the emulgel from the cylinder. The technique applied for assurance of applied shear in the district of the program relating to a shear rate surpassing the yield esteem and displaying the resulting plug stream. In this examination emulgel expelled from the lacquered aluminum folding cylinder on use of weight in grams needed to expel at any rate 0.5cm lace of emulgel in 10 seconds. For better extrudability, a greater amount is expelled. For the estimation of extrudability, it is done in three-fold and the normal qualities are determined. The extrudability is then determined by utilizing the accompanying recipe:

Extrudability = weight applied to extrude emulgel from tube (in gm) / Area (in cm2)

Rheological Studies

The thickness of emulgel is resolved at 25°C utilizing a cone and plate viscometer with shaft 52 furthermore, associated with a thermostatically controlled flowing water shower.

Swelling Index

It is controlled by taking 1g of emulgel in a permeable aluminum foil and blended in with 0.1N NaOH kept in a 50ml receptacle. At that point, tests are removed at various time stretches and saved for drying and it is rechecked. The growing list is determined as follows:

Swelling Index = {Wt – Wo/Wo}100

Where, (SW) % = Equilibrium percent swelling,
Wt = Weight of swollen emulgel after time 't'
Wo = weight of emulgel at zero time.

Drug Content Determination

Emulgel is blended in a reasonable dissolvable. Channel it to get a clear arrangement. Decide its absorbance utilizing a UV spectrophotometer. From the standard condition by putting the absorbance esteem focus and medication substance can be gotten.

Drug Content = (Concentration × Dilution Factor × Volume taken) × Conversion Factor

Skin Irritation Test

For this study, emulgel is applied on the shaved skin of rats and its side effect like color change, variation in skin morphology are evaluated up to 24 hours. About 8 rats can be used for the study. The test passes if no irritation is shown. If it fails the test is repeated with another 2 rats.

Ex-vivo drug Release Study

Franz dispersion cell is utilized for the investigation. Emulgel is applied on the outside of the egg layer is cinched between the contributor and the receptor office of the dispersion cell. The receptor chamber contains a newly arranged PBS (pH 5.5) answer for solubilizing the drug. The receptor chamber is blended utilizing an attractive stirrer. The examples (1.0 ml aliquots) are gathered at various periods and examined for drug content by UV-obvious spectrophotometer after suitable weakenings. Medication discharge depends on an element of time.

Stability studies of Emulgel

Security considers are completed according to ICH rules. The plans are put away for 3 months in a solidness chamber at 37±2°C, 45 ±2°C, and 60 ± 2°C. It is then broken down for about fourteen days with a UV SVisible spectrophotometer for drug content. Likewise, the adjustment in pH is checked for assurance of strength.

CONCLUSION

Emulgel is an advanced topical drug delivery system which is used for the treatment of a various type of

topical skin problem. It is formulated by mixing gel and emulsion to form an emulgel. It is mainly used for the delivery of both hydrophobic and hydrophilic drugs. This novel drug delivery becomes a popular formulation.

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