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A REVIEW: DEXAMETHASONE EMULGEL IN THE TREATMENT OF CONTACT DERMATITIS

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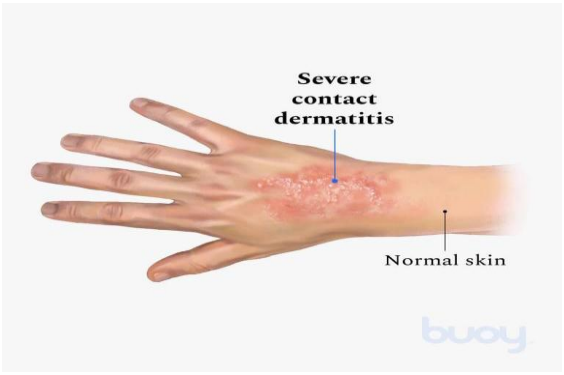
ABSTRACT

Topical drug delivery is a convenient mode of drug delivery to treat localized infections. They are generally applied for the purpose as antiseptics, antifungal agents, skin emollients, and protectants. Topical medications are available in many dosage forms, such as creams, ointments, gels, pastes, and lotions. They have disadvantages like stability problems, stickiness and lesser spreading coefficient, irritation, allergic reactions, poor permeability, poor absorption and difficulty in absorption of large molecule, to rectify this the new concept of Emulgel has been introduced with the main objective to deliver hydrophobic drug molecule. Hence a hydrophobic drug like dexamethasone can be formulated as emulgel in order to treat skin disease like contact dermatitis.

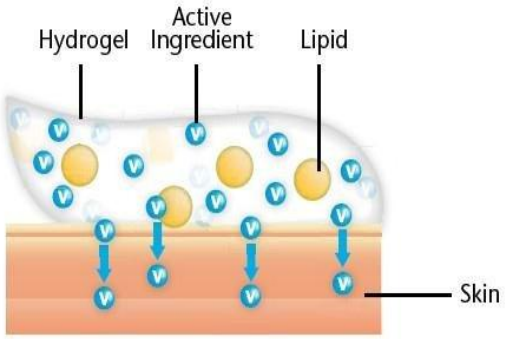
KEYWORDS: Contact dermatitis, Dexamethasone, Formulation, Evaluation.

INTRODUCTION

Contact dermatitis refers to any skin inflammation that occurs as a result of exposure to irritants or allergens. Irritant contact dermatitis (ICD) is a localised inflammatory reaction that occurs when a chemical or physical agent causes direct cytotoxic skin damage leading to skin barrier disruption, cellular changes and release of proinflammatory mediators.[1]



Clinically, irritant CD can occur as an acute or chronic disease. Acute irritant CD is typically characterized by erythema, blisters, pustules, haemorrhage, crusts, scales and erosions, and also with pruritus or even pain. Skin lesions in acute irritant CD are predominantly sharply bordered in the areas of contact (Distant spread does not occur) and usually asymmetric. On the other hand, chronic irritant CD is characterised by diffuse or localized lesions with typically poorly defined erythematous scaly patches and plaques, dryness of skin, lichenification and desquamation.[2]



Emulgel is a thermodynamically stable formulation with low interfacial tension that is made by combining a surfactant and a co-surfactant and has several properties such as increased permeability and good thermodynamic stability. There are two types of emulgels; oil in water or water in oil, andthese are gelled by the addition of a gelling agent. Both types of emulgels are widely used as a vehicle in the pharmaceutical industry to deliver various drugs to the skin.

Components of emulgel

Vehicles

In the emulgel preparation, oily and aqueous vehicles are used, and both hydrophobic and hydrophilic drugs are used. Examples of vehicles such as alcohol, water, and

other aqueous materials are used in aqueous phase emulsions.[3]

Emulsifier
Emulsifying agents are used both to promote emulsification at the time of manufacture and to control stability during a shelf life that can vary from days for extemporaneously prepared emulsions to months or years for commercial preparations. Examples of emulsifying agents are Tween 80, Span80, Tween 20, stearic acid, etc.[4]

Gelling agent
Gelling agents are used for preparing gels for any dosage form. It enhances the consistency of any formulation. Some examples of gelling agents are Carbopol 940, HPMC etc.

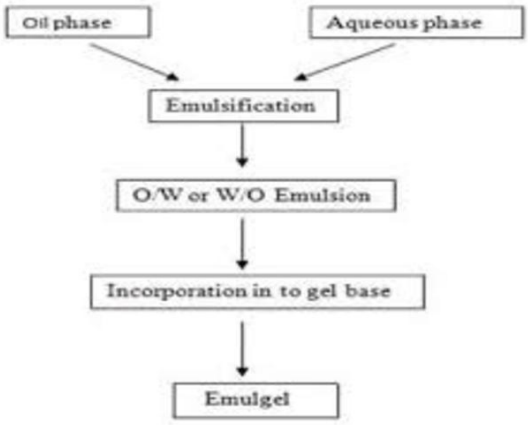
Penetration enhancers
These agents are used to enhance temporary skin permeability. They cross into and interact with the constituents of skin. Some common examples include Clove oil, olive oil, sodium lauryl sulfate, palmitate, lecithin [5%], and oleic acid [1%]. Different penetrationenhancers are used some of them are as follows; Lecithin, Oleicacid, Urea, Menthol.[5]

Advantages
- Using water/oil/water emulsions, hydrophobic drugs can be quickly implemented into the gel base.
- Improved stability and load capacity.
- Easy for production and a low-cost mechanism.
- The first metabolism is avoided.
- Avoid gastrointestinal incompatibility.
- Target drug delivery on the body.
- Improved patient compliance.
- Improved patient acceptability and suitability for self-medication.

Disadvantages
- Some medications have low permeability through the skin.
- Possibility of allergenic reactions.
- Larger-particle-size drugs are not easily incorporated into the skin.

Dexamethasone is a steroid compound, belong to corticosteroid class. It is 25 times more potent than other corticosteroids. It is used to treat various diseases including contact dermatitis. Moreover dexamethasone is also stronger than nonsteroi-dal anti-inflammatory drugs (NSAIDs) like ibuprofen and aspirin. The main anti-inflammatory effect of dexamethasone is to inhibit a pro-inflammatory gene that encodes for chemokines, cytokines, cell adhesion molecules (CAM) and the acute in-flammatory response.[6]

Preparation of emulgel



Step 1: Formulation of gel base
The gel base is formed by dissolving a known quantity of polymer like carbopol 940 in distilled water by mixing at moderate speed using a magnetic stirrer and pH is adjusted to 5-6.5 using Triethanolamine and NaOH.[7]

Step 2: Preparation of emulsion
The emulsion may be O/W or W/O.

Preparation of oil phase
The oil phase is prepared by dissolving emulsifier in the oil phase. The drug dexamethasone is also dissolved in it.

Preparation of aqueous phase
The aqueous phase of emulsion is prepared by dissolving emulsifier (e.g. tween 20) in purified water.[8]

Step 3: Formulation of emulgel
Add the prepared emulsion into gel base dropwise with continuous stirring using a homogenizer to get emulgel.

Evaluation of emulgel
Physical appearance
The prepared Emulsion formulations were inspected visually for their color, homogeneity and consistency.

Rheological studies
The viscosity of emulgel formulation is determined at 25 C using a Brookfield viscometer which consists of a spindle, i.e. no 96, at 1.5 rpm.[9]

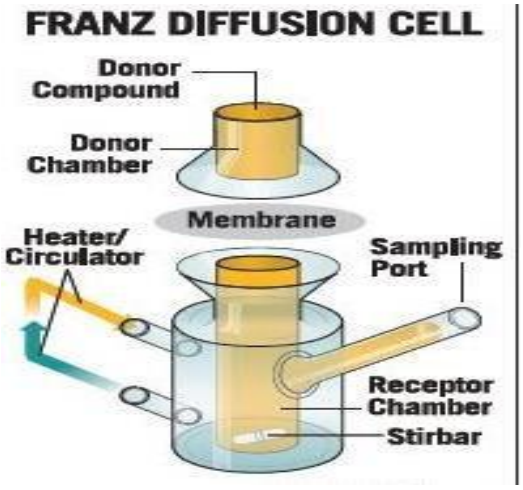
Patch test
Generally, a set of rats are chosen for this specific test. Emulgel is applied legitimately on the skin of the rat. Undesirable skin changes like alter in color and skin morphology was checked after the time period of 24 h.

Spreadability test
Spreadability is checked by “slip” and “drag” character of emulgel. To determine Spreadability, the apparatus consisting a wooden block is provided by a pulley at one end. In the block a ground glass is fixed. 2 g of emulgel is placed on it, and is covered with another glass slid as a

sandwich. One kg of weight is placed on it and the Spreadability is checked.[10]

In Vitro drug release study

Franz diffusion cell was used for the drug release studies. Prepared emulgel (200 mg) was applied onto the surface of egg membrane evenly. The egg membrane was clamped between the donor and the receptor chamber of diffusion cell. The receptor chamber was filled with freshly prepared PBS (pH 5.5) solution to solubilize the drug. The receptor chamber was stirred by magnetic stirrer. The samples (1.0 ml aliquots) were collected at suitable time interval. Samples were analyzed for drug content by UV visible spectrophotometer after appropriate dilutions.



Determination of pH

It is determined by using digital pH meter. The pH meter is dipped into the emulgel and the pH is checked.

Drug content

The drug content is determined by UV spectroscopic analysis. The equation used is,

Drug content = (Concentration × Dilution factor × Volume taken) × Conversion factor.

Accelerated stability studies

It is performed by ICH guidelines. The stability test is done in hot air oven at 37 ± 2 ºC, 45 ± 2 ºC and 60 ± 2 ºC for 3 months.

Globule Size and Its distribution in emulgels

Globule size and distribution was determined by Malvern zetasizer. A 1.0 gm sample was dissolved in purified water and agitated to get homogeneous dispersion. Sample was injected to photocell of zetasizer. Mean globule diameter and distribution was obtained.

CONCLUSION

Recently most of the new drug molecules are hydrophobic in nature. When we consider delivering these drugs in conventional dosage form as cream, ointment, lotions, emulsion the problem of stability and bioavailability rises due to their hydrophobic nature. In gel also it is almost negative result to deliver hydrophobic drugs. so the new concept of formulation emulsion in gel has shown better delivery as here the drug are incorporated in oil phase of emulsion and emulsion is better stabilize in the gel and the combination of both of the phase provide the controlled release effect, that improves the bioavailability of that drugs.

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