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Review Article

A Review on Emulgel

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A B S T R A C T

Chewable dosage forms for example tablets, delicate, pills, gums, chewable squares is long piece of drug specialist armamentarium. They are required to be break and bit in the middle of the teeth before administration. These tablets are given to the children who have difficulty in swallowing and to the adults who dislike swallowing. These tablets are intended to disintegrate smoothly in the mouth at a moderate rate either with or without actual chewing, characteristically chewable tablets have a smooth texture upon disintegration, are pleasant tasting and leave no bitter or unpleasant taste. Geriatric and pediatric patients and travelling patients who may not have ready access to water are most need of easy swallowing dosage forms like chewable tablets. The major formulation factors are flow, lubrication, disintegration, organoleptic properties, compressibility, compatibility and stability, which are common to regular (swallowed) and chewable tablets; however, organoleptic properties of the active drug substances are primary concern here. A formulator may use one or more approaches to arrive at a combination of formula and process that result in product with good organoleptic properties.

Keywords: chewable tablet, lubrication, disintegration, compressibility etc.

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INTRODUCTION

Topical drug delivery is an easy route for native and general treatment. a novel facet ofdermatological pharmacology is the direct accessibility of the the skin as a organ for identification and treatment. Topical drug delivery system has several benefits like ability todeliver drug a lot of by selection to a particular site, shunning of gastrointestinal incompatibility and metabolic degradation related to oral administration a lot of over topicaldeliveries give enhanced bio-availability byavoiding first pass metabolism by liver and consistent delivery for extended period.Major downside of topical dosage form is dissolution and diffusion of drug in the delivery of hydrophobic drugs, and permeation through stratum corneum is for hydrophilic drugs.Both oil-in-water and water-in-oil emulsions are extensively used as carriers to deliver various hydrophilic, hydrophobic drugs to the skin in emulgel formulation. They also have a high ability to dissolve drug and to penetrate skin.

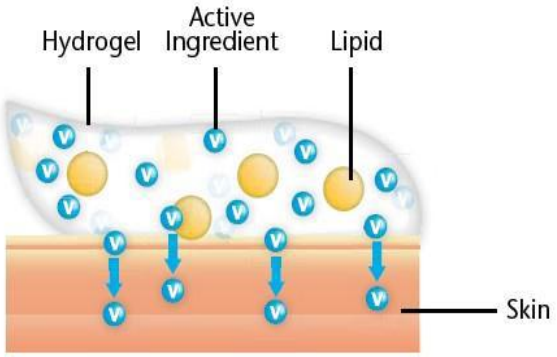

Figure 1

MATERIALS AND METHOD:

Carbopol, Xanthan gum, tween 80, span80, methyl paraben, propyl paraben, liquid paraffin, propylene glycol

Triethanolamine (TEA)is used to maintain pH of the gel to 6.5pH[1]

1. Vehicle

Uses

Deliver the drug to focus on site.

Sustain a therapeutic drug level in the target tissue for a sufficient duration to provide a pharmacological effect.

Release the drugthus it can migrate freely to the site of action. [10]

a) Aqueous material

This forms the aqueous phase of the emulsion. unremarkably used agents **e.g.** water, alcohols.

b) Oils

These agents from the oily phase. For externally applied emulsions, mineral oils, alone also combined with soft or hard paraffin's are widely used.[10]

2) Emulsifier

Emulsifying agents are used both to promote emulsification at the time of manufacture and to managestability during a shelf life. **e.g.:** Polyethylene glycol 40 stearate, Sorbitan mono-oleate[10]

3) Gelling agents

These are used to increase consistency of dosage form and provide gelled behaviour. Gelling agent are of two sorts natural and synthetic. Then get hydrated and swell. Besides its deliquescent nature, its cross-linked structure and its hydrophillic5in water makes Carbopol a potential candidate for use in controlled release drug delivery system. HPMC emulgel shows better drug release than Carbopol. [3]

Ex: carbopol-934(1%), HPMC-2910(2.5%)

4)Preservatives

Used to preserve the emulgel from the microbes.[3]

E.g.: Propyl paraben, methyl paraben.

5) Antioxidants

To control and to preserve the emulgel from Oxidation

E.g.: Butylated Hydroxyl Toluene (BHT), Ascorbyl palmitate, Butylated hydroxy anisole (BHA), etc.

6) Humectants

to prevent loss of moisture. **E.g.** Glycerine, Propylene glycol, etc.

7) Permeation Enhancers

These are agents that partition into and interact with skin constituents to give a temporary and reversible increase in skin permeability. **E.g.:** Oleic acid, lecithin, isopropyl myristate, urea, eucalyptus oil, chenopodium oil, pyrrolidone, laurocapram, dimethyl sulphoxide, linoleic acid, menthol. [10]

Mechanism of penetration enhancers[5]

1. it disrupts highly ordered stratum corneum lipid.
2. Interaction with intercellular protein.
3. Improved partition of the drug co-enhancer or solvent into the stratum corneum
4. Most of the hydrophobic drugs cannot be incorporated directly into gel base as a result of solubility act as a barrier and drawback arises during the release of the drug.
5. Ithelp in adding hydrophobic drugs into the oil phase and then oily globules are dispersed in aqueous phase.

It will be classified into 3 types

1) Macroemulsion gel

2) Nano emulsion gel

3) Microemulsion gel

1) Macroemulsions gel [7]

These are most typical variety of emulgels where the particle size of droplets of emulsion is more than 400nm. They are visually opaque but the individual droplets can be easily determined under microscope. microemulsion are thermodynamically unstable

2) Nano emulsion gel [7]

When nano emulsion is incorporated into gel it is called as nanoemulgel. Nano emulsion are thermodynamically stable transparent (translucent) dispersions of oil and water stabilized by an interfacial film of surfactant and co surfactant molecules having a droplet size of less than 100nm. Nano emulsion formulations possess improved Transdermal and dermal delivery properties in vitro as well as in vivo. This has improved transdermal permeation of many drugs over the standard topical formulations such as emulsions and gels.

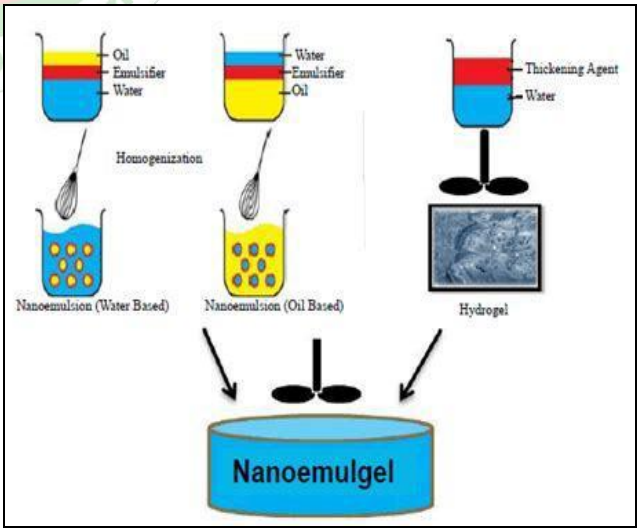

Figure 2: The steps of producing nanoemulgel

3) Microemulsion gel:[7] Microemulsions are clear and thermodynamically stable as their droplet size vary from 10 to 100nm and they do not coalesce. Microemulsions are composed of oil, co-surfactant, and water in specific proportions. The ingredients of Microemulsion could facilitate the permeation rate of the drug by reducing the diffusion barrier of the stratum corneum. However, due to

low viscosity of Microemulsion, their less retention capacity in the skin restrains its application in the pharmaceutical industry to overcome to beat this disadvantage, gelling agents like Carbopol 940, xanthan gum and carrageenan are added into the Microemulsion for forming Microemulsion based gel so as to extend its viscosity for topical application. Moreover, Microemulsion based gel prevents the absorption of drug in the blood stream and provide higher drug accumulation in the skin for efficient action.

Method of preparation

It consists of 3 steps [10]

Step-1: formulation of emulsioneither o/w or w/o

preparation of oil phase: oil phase of the emulsion is prepared by dissolving emulsifier. **Preparation of aqueous phase:** aqueous phase is prepared by dissolving emulsifier

Step-2 formulation of gel base: prepared by dispersing polymer in purified water with constant stirring at a moderate speed using mechanical shaker, then the pH was adjusted to 6-6.5 using tri ethanolamine (TEA).

Step-3 incorporation of emulsion into gel base: Add glutaraldehyde in during mixing of gel and emulsion in ratio of 1:1 to obtain emulgel.

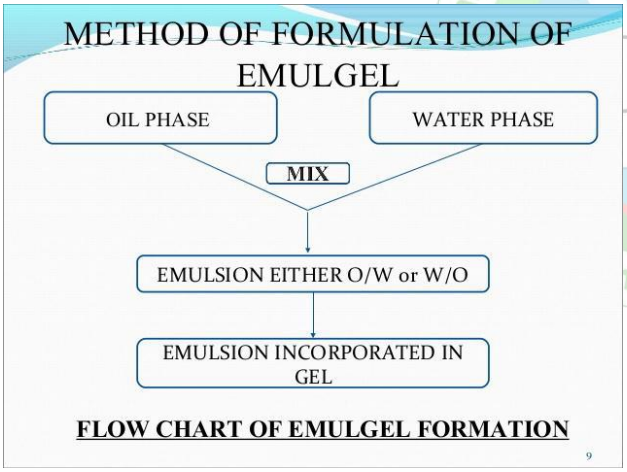

Figure 3: Flow chart of Emulgel Formulation

Advantages of emulgels[3]

- higher loading capacity,
- Controlled release
- No intensive sonication
- Avoid first pass metabolism
- Avoid GI incompatibility
- More selective for site specific
- Incorporation of hydrophobic drugs
- Improved patient compliance
- Convenient and simple

Disadvantages of emulgels [3]

- Skin irritation on contact dermatitis
- The chanceof allergenic reactions
- The poor permeability of some drugs
- Drugs of large particle size are not simple to absorb through the skin
- The incidenceof the bubble during formulation of emulgel

Evaluation Parameters[10]

PH Evaluation: pH analysis is the vitalcriteria particularly for the topical formulation. The pH of emulgel ought to be between 5.8 – 6 to mimic the skin condition. If the pH of the prepared emulgel is acidic or basic, irritation caused to the patient. PH of the prepared emulgel was measured using digital pH meter by dipping the glass electrode into an emulgel. The measurement of pH of each formulation was done in triplicate and average values were calculated.

Extrudability Study [tube test]:[7] It is calculated by the force extrude the emulgel from the tube. The method applied for determination of applied shear in the region of the rheogram corresponding to a shear rate exceeding the yield value and exhibiting consequent plug flow. In this study emulgel extruded from lacquered aluminium collapsible tube on application of weight in grams required to extrude at least 0.5cm ribbon of emulgel in 10 seconds. For better extrudability, more quantity is extruded. For the measurement of extrudability, it is done in triplicate and the average values are calculated. The extrudability is then calculated by using the following formula.

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

Bio adhesive strength measurement [10]

The changed techniquewas used for the activityof bio adhesive strength. The apparatus consists of two arm balance, both the ends are tied to glass plates using strings. One side contains single glass plate for keeping weight. The right and left pans were balanced by adding extra weight on the left-hand pan. The balance was kept in this position for 5 mints.

Procedure: Accurately weighed 1g of emulgel was placed between these two slides containing hair less fresh rat skin pieces, extra weight from the left pan was removed to sandwich the two pieces of glass and some pressure was applied to remove the presence of air. The balance was kept in the position for 5 min. weight was added slowly at 200mg/min to the left-hand pan until the two glass slides got detached from each other's. The weight required to detach the emulgel from the glass surface gives the measure of bio adhesive strength by using a formula,

Bio adhesive strength=weight required (in g)/area (cm2)

Skin Irritation Test (Patch Test): For this study emulgel is applied on the shaven skin of rat and its adverse effect like change in colour, change in skin morphology are evaluated up to 24 hours. About 8 rats can be used for the study. Test passes if no irritation shown. If it fails the test is repeated with another 2 rats.[3]

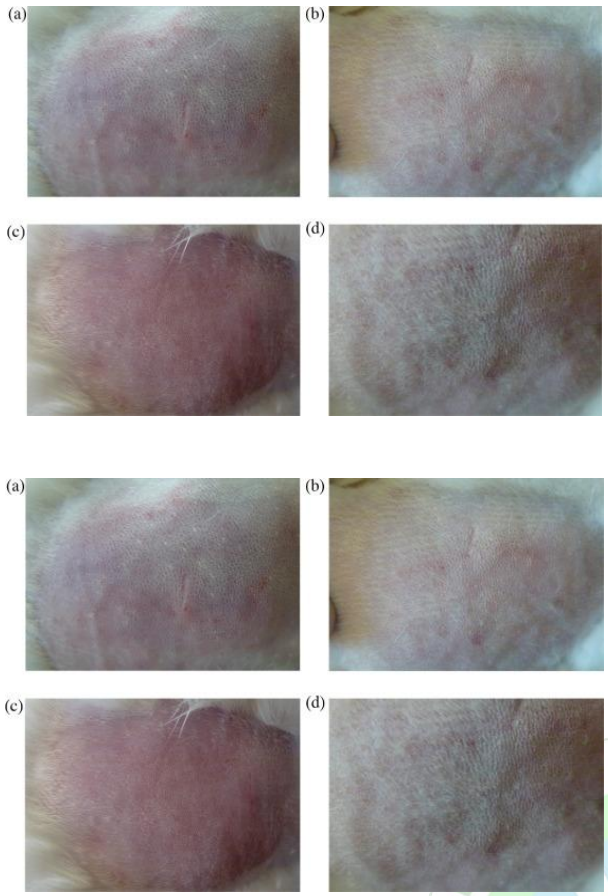

Figure 4:

Microbiological assay:[6] Microbiological assay was performed by using ditch plate technique. Previously prepared Sabouraud's agar dried plates were used. 3 grams of the gellified emulsion are placed in a ditch cut in plate. Freshly prepared culture loops are streaked across agar at an angle from the edge of the plate. After incubation for 18-24hrs at 25◦c, the fungal growth was observed and the percentage inhibition was measured as follows

% inhibition = L2 /L1× 100

In-vitro Release Studies: The in vitro drug release studies were carried out using a modified Franz diffusion (FD) cell the formulation was applied on dialysis membrane which was placed between donor and receptor compartment of the FD cell. Phosphate buffer PH 7.4 was used as a donor and receptor compartment of the cell was maintained at 37c by circulating water jacket. This whole assembly was kept on a magnetic stirrer and the solution was stirred continuously using a magnetic bead. A similar bank set was run simultaneously as a control. sample (5 ml) was withdrawn at suitable time intervals and replaced with equal amount of fresh dissolution media. Samples were analysed spectrophotometricallyand cumulative %drug release was calculated.[10]

Spreadability: Spreadability of emulgel is measured in terms of diameter of emulgel circle produced when emulgel is placed between two glass plates of definite weight. A weighed amount (350 mg) of emulgel is taken on one glass plate and another glass plate is dropped from a distance of 5 cm. The diameter of the circle of spread emulgel is measured.

It is calculated by using the formula: [9]

S=M.L/T

Where,

S= spredability

M= weight tied to upper slide.

L= length of glass slide.

T= time taken to separate the slides completely.

Physical appearance:[6] The prepared Emulgel is checked visually for their colour, homogeneity, consistency and phase separation.

Result and Discussion:

The topical drug delivery systems are used extensively due to better patient compliance. Since emulgel possesses an edge in terms of spreadibilty, adhesion, viscosity and extrusion, they'll become a popular drug delivery system. Moreover, they'llbecome a solution for loading hydrophobic drugs in a water-soluble gel basis.severalof drugs that have utility within the treatment of skin disorders are hydrophobic in nature. Such drugs can be delivered in the form of emulgel where they can be incorporated in the oil phase of the emulsion and combined with gel. Drugs which are stillundiscovered in this area are Retinoic acid, Adapalene, Tolnaftate, Betamethasone, Dexamethasone, etc.

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