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A REVIEW ON EMULGEL A NOVELPROMISING TOPICALFORMULATION FOR ANTIFUNGAL AND ANTIBACTERIAL AGENTS

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ABSTRACT

In this review an attempt was made to study vitality of Emulgel as a novel pharmaceutical formulation containing Antifungal and Antibacterial agents by explaining its different dimensions like types, formulation ingredients, formulation methods ,advantages ,disadvantages, evaluation methods .The purpose behind this review is to emphasize different attributes of this novel formulation along with different feasible methods for the formulation of Emulgel that could be used as a drug delivery system for Antifungal and Antibacterial agents.

KEYWORDS: Emulgel, Antifungal Agents, Evaluation, Formulation.

INTRODUCTION

Topical drug delivery systems are simple and easy route of administration of local drug delivery in the body through skin, rectal, ophthalmic, and vaginal. That is applied for the dermatology and cosmetic preparation for diseased and healthy skin. In this system different type of formulations are available like solid through semisolid to liquid. This drug delivery defined as the skin with the approach to increase its bioavailability and reduce their side effects. Topical drug local application of the formulation in the body through rectal, ophthalmic, vaginal, nasal, and delivery is referred when other system have some limitation and generally used for the skin fungal infection.

TOPICAL PRODUCTS ARE FOUND IN TWO TYPES

EXTERNALTOPICALS

These are applied to the tissue for covering the infected area.

INTERNAL TOPICALS

It is applied for topical effect into the membrane (generally mucous membrane) in oral cavity and also rectal tissues or vagina[1].

Most of the pharmaceutical preparations are applied to the skin to provide prolong local contact with the minimal systemic drug absorption. Formulation containing Drugs are applied on the skin for the local action like antifungal agent, antiseptics and protectants[2].

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Topical formulation allows for optimal penetration of the drug into the skin. Tissue have the pH of the formulation may change following application to the skin.[6]

EMULGEL

Emulgel has a hydrophobic therapeutic moiety which provides the unique properties into the gels. Emulgels are the one in which combine gels and emulsions together. The water phase contains a gelling agent which converts an emulsion into an emulgel. Oil in water (o/w) & water in oil (w/o) both types of emulsions are used as vehicles of various drugs to the skin.[8]

Emulgels has some properties such as greaseless, thixo tropic, long shelf life, non-staining, transparent and pleasing appearance.[9]Molecules penetrate into skin by three types of different routes such asstratum corneum, sweat ducts &sebaceous follicle.

Emulsion possesses certain degree of elegance and gets easily washed off. Emulsions have a high ability to penetrate the skin.

ADVANTAGES OF EMULGEL

- Bioavailability improvement & the low doses can be effective with other semi solid preparation.
- Stable formulation by decreasing surface interfacial tension resulting in increasing in viscosity of aqueous phase.
- Hydrophobic drug combine with emulsion as the carrier and it is dispersed in to the gel to from emulgel.
- Drug loading capacity is good as compared to liposomes, and niosomes
- Easily prepare and also low cost preparation.
- Increased patient acceptability.
- It is Provide targeted drug delivery.

DISADVANTAGES OF EMULGEL

- Absorption of macromolecule is poor.
- During the formulation entrapment of bubble is occurs.
- Only hydrophobic drugs are the use dchoice for this delivery system[5].

INGREDIENTS USED IN THE FORMULATION OF EMULGEL[8, 9,11]

AQUEOUS PHASE

Make the aqueous phase in emulsion for the swelling purpose of gelling agent. Water and alcohol are used for the aqueous material.

OIL PHASE

They are used for the optimizing its effect on the permeability, viscosity, drug release and emulsification, stability of the prepared oil phase of the emulsion it is used for the solubility of the hydrophobic drugs. Oils are used in oral preparations. Oils are frequently used and it is non-biodegradable mineral and castor oil. It provides a local laxative effect. Fish-liver oil, fixed oil (vegetable origin) like cottonseed, arachis, and maiz (nutritional supplements).

EMULSIFIERS

Agents that are used for the promote emulsification and stability of the product by decreasing the interfacial tension. Selection is done by proper hydrophilic and lipophilic balance (HLB). The surfactant with HLB value greater than 8 is used in oil in water emulsion where as the surfactant with HLB value less than 8 are used in water in oil emulsion. Tween are applicable for the water phase and spans are applicable for oil phase for emulsification. Mixture of tween and spans provide better stability than single. eg Polyethylene glycol, sorbitanmonooleate (spans80), polyoxyehtylenesorbitanmonooleate (tween 80), stearic acide, sodium stearate etc.

GELLING AGENTS

Gelling agent are the thickening agent these gelling agent has a property to enhance the

dosage form. These gelling agents are two type natural and synthetic. Natural gelling agent are tragacanth, carrageen, pectin, agar, xantham gum, HPMC-2910 and starch; synthetic gelling agents are: cellulose derivatives areCarbopol-934,940 1%methylcellulose, hydroxyethyl cellulose, carboxyvinyl polymers, magnesium aluminium silicatesetc.

PENETRATION ENHANCERS

These enhancer interact with skin constituents and increase skin permeability. Enhance delivery into skin. E.g. clove oil 8%, menthol 5%, Urea, lecithine, isopropyl myristate etc.

METHODS OF PREPARATION

- **STEP 1:** Preparation of oil in water and water in oil emulsion.
- **STEP 2**: In this step prepare the gel base.
- **STEP 3:** In this step prepared emulsion are incorporate in to the formulated gel base with continuously stirring to from emulgel[2].

EVALUATION OF EMULGEL[8- 11]

PHYSICALAPPEARANCE

In this physical appearance color, homogeneity and consistency were visually inspected.

DETERMINATION OF PH

As pH isalways an important parameter to evaluate preparations we topically applied. The pH was checked using pH meter.

SPREADABILITY

In this emulgel (1gm) emulgel was placed between the two slide and load (500gm) applied for 5min. by this load air is expel out and give an uniform flim between the slides a hook is attached to the upper slide from one end and a pulley is attached holding the pan having different weight on the other end . The time required to fall off the slides was measured. Spread ability is good when the time is in use for separation of two slides is lesser. Sepread ability was calculated using formula S= M.L/T.

Where,

M = wt. tied to upper slide

L = length of glass slides

T = time taken to separate the slides.

VISCOSITY

Viscosity is determined by using a cone and plate type of Brookfield viscometer by using T shape spindle. The maximum shear rate at which the viscosity can be determine between 100rpmand 20 rpm.

SWELLING INDEX

Formulation with maximum swelling index shows its propensity to absorb extrudates from wound.

Calculation of swelling index: taken 1 g of emulgel on porous aluminum foil and it set in petridish containing 10 ml 0.1N sodium hydroxide solution. Then sample where removed from dish at different time intervals then reweighed. Now put it on dry place for some time. Swelling index was calculated by using formula.

$$\textbf{(SW)\%} = [(W_t - W_O)/W_O] \times 100$$

Where,

(SW)% = Equilibrium percent swelling

$\mathbf{W_t}$**=** weight of swollen emulgel after time **t**

$\mathbf{W_o}$ **=** original weight of emulgel at zero time.

DILUTION TEST

Emulgel is diluted at 50 to 100 times by adding continuous phase, to observe the signs of phase separation visually.

DRUG CONTENT

With the help of standard, plot put up the value of absorbance in the standard equation. 1g of emulgel is mixed with favorable solvent, and the nsonicated. After sonication, solution is filtered with the help of what man filter paper (41 no.) clear solution is obtained. Make the dilutions to determine the Drug entrapped in to the formulation .The concentration of entrapped drug is determined with the help Ultra Violet (UV) spectrophotometer. Standard plot of drug is prepared in the same solvent. Concentration and drug content can be determined.

IN VITRO DRUG RELEASE

A diffusion cell is used for the study of in vitro drug release known as FRANZE DIFFUSION CELL. Franze diffusion cell has 3.15cm^2 diffusion area and 15ml of cell vol^m. Emulgel (300mg) was applied onto the surface of cellophane membrane evenly. The membrane is clamped between the donor and receptor chamber of diffusion cell. The receptor chamber is filled with5.8 pH buffer solutions to solublize the drug. The receptor chamber is stirred by magnetic stirrer at 50 rpm and maintained the temperature at 37^{o}C. The samples are collected at suitable time interval. Then samples are analyzed for drug content by UV visible spectrophotometer after appropriate dilutions. Cumulative amount of drug released across the membrane is determined as the function of time.

GLOBULE SIZE AND THERE DISTRIBUTION IN EMULGELS

Globule size and there distribution is determined by an equipment known as Malvern zeta sizer. Taken 1gm of sample is dissolved in purified water and then agitated. As results homogeneous dispersion were obtained. Now sample is injected to the photocell of Malvern zeta sizer. Globule diameter and distribution mean is obtained.

SKIN IRRITATION TEST

The emulgel is applied topically on the shaven skin of rats; it gives adverse effects like change in morphology of skin such as change in colour. It should be checked up to 24 hours. The six numbers of rats (a set) was used of the study. If no irritation occurs the taste is passed. If the irritation symptoms occur in more than two rats the study should be repeated.

ZETA POTENTIAL

The zeta potential of emulsions is determined by equipment known as ZETATRAC. It is measured the response of charge particles to an electric field. In a constant electric field particles drift at a constant velocity. Through the velocity, the charge and zeta potential is determined.

CONCLUSION

Emulgel is a promising and more efficient formulation in order to entrapped both water soluble and oil soluble drug .This formulation require least excipient to formulate formulation even the release rate of the drug would be easily modified as per its desirability .The ease of formulation, evaluation and capacity to incorporate wide spectrum of drug made this formulation as promising formulation for agents like Antifungal and Antibacterial agents since it possess better retention property as compare to conventional gel formulation .

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