**REVIEW ARTICLE**

**TITLE:FORMULATION AND EVALUATION OF METFORMIN HYDROCHLORIDE MICROEMULGEL FOR TREATMENT OF MELASMA AS TOPICAL DRUG DELIVERY.**

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**INTRODUCTION**

Topical drug delivery system

Topical drug delivery products can be broadly classified as either internal or external. While the internal topicals are given to the mucous membrane orally, vaginally, or on the rectal tissues for local activity, the exterior topicals are distributed, sprayed, or otherwise dispersed over the tissue to cover the diseased area. A topical drug delivery system's main benefits include preventing first-pass metabolism, preventing gastrointestinal incompatibilities, improving patient compliance, enabling simple self-medication, and allowing for the easy termination of medications as needed. Additionally, drugs with short half-lives and narrow therapeutic indices can also be used.

Applying a dose form to treat skin conditions can be used to illustrate the topical route of drug delivery. The primary advantage of dermal application over alternative delivery routes, such as oral, sublingual, rectal, and parentral, is that it might be thought of as superior. Avoiding the first pass metabolism is the route. Many benefits come from applying medication topically, such as targeted and site-specific drug delivery. They make a substance more bioavailable.

Categorization of topical medication delivery methods

1. Solid: Plastiques, ointments, and powders (Singh RP, et al., 2014).   
2. Semi-solid: Pastes, gels, creams, and poultices   
  
3. Liquid: paints, tinctures, lotions, solutions, emulsions, suspensions, and lotions   
4. Miscellaneous: topical aerosol, rubbing alcohol, tapes and gauzes, liquid cleanser, and transdermal drug delivery systems.

Factors influencing the drug's topical absorption

**Physiological elements**1. Thickness of the skin.   
2. Skin pH 3. Lipid composition 4. Blood flow   
5. Skin hydration   
6. Hair follicle density   
7. Skin inflammation   
8. A medical condition   
9. Sweat gland density

**Physiochemical elements:**  
1. Vehicle impact   
2. Coefficient of partition   
3. Molecular mass (less than 400 daltons)   
4. Ionisation degree (only unionised medicines absorb effectively)

**MICROEMULGEL**

Microemulgel's dual mechanism of emulsion and gel makes it one of the most promising technologies among innovative drug delivery systems. Additionally, emulsion's stability was shown to be enhanced by combining it with gel.The superior solubility and skin penetration of the microemulsion technology was the deciding factor in its selection.Oils, surfactant, and co-surfactant screening is necessary for the manufacture of microemulgel.\*Because of their ability to enhance topical and systemic availability and solubilize poorly soluble drugs, micro-emulsions—optimally isotropic and thermodynamically stable systems of water, oil, surfactant, and/or co-surfactant—have been investigated as drug delivery vehicles. Its solubilization of the lipophilic drug moiety aids in its quick and effective skin entry. Therefore, it helps with topical medication administration.

Why microemulsion is converted to microemulgel?

Numerous common topical medications, such as lotions, ointments, and creams, have a number of drawbacks. They have a lower spreading coefficient when applied by rubbing, which makes them uncomfortable for the patient, and they also have stability issues. The usage of translucent gels in pharmaceutical and cosmetic preparations has increased as a result of all these aspects falling under the larger category of semisolid preparations.

Gel base can be used with the emulsion. Instead than just adding medications to a gel foundation, this could provide the medication with better stability and release.

Emulgel is a relatively new technology that has dual control release characteristics and is utilised topically. Emulgel is a combination of gel and emulsion that has both of these characteristics. They refer to this combination of emulsion and gel—which is primarily hydrophobic as well as hydrophillic—as an emulgel.

Emulgels are excellent candidates for the topical administration of lipophilic medications. Lipophilic medications are entrapped in oil with an aqueous phase, while lyophilic pharmaceuticals are loaded in an oil phase with water. Topical illnesses are treated using emulgel.

OBJECTIVE

* To increase patient compliance

 Better stability

 Controlled release of drug

 superior loading capacity

 production utility

 low preparation cost

 non irritant.

Advantages of emulgel

 Incorporation of hydrophobic drugs

 Superior loading capacity

 Better stability

 No intensive sonication

 Controlled release

 Production utility and low preparation cost

Formulation of emulgel

For the preparation of emulgel some consituents are used including drug, they are:

 **Vehicle**: Vehicle should follow the ideal characters given in the pharmacopeias. Deliver

the drug to the target site.

 **Aqueousmaterial**: The aqueous phases used are water, alcohol etc.

 **Oil**: These are used in preparation of emulsion. This medium is required for dispersing

hydrophobic drugs.

 **Emulsifying agents:** These are employed for the purpose of emulsifying aqueous and oil

medium for stability purpose. Emulsifying agent are maintain the stability while they

thermodynamically unstable.

 **Gellingagent**: Gelling agent are employed for gel formation that is intended for

dispersing in for altering thixotropy characteristics.

 **Penetrationenhancer**: These substances help in increasing permeation characteristics of

drug so that it passes across skin.

Constituents of emulgels

|  |  |
| --- | --- |
| Aqueous material | Rose water,sterile water,Alcohol. |
| Oils | Castor oil,Mineral oil,Balsam oil,linseed oil. |
| Emulsifiers | Tween 80,Tween 20,Span 20,Span 80,PEG400,600. |
| Gelliing agent | Carbomer 934,934p.940, HPMC,CMC |
| Penetration enhancer | Propylene glycol,Clove oil,isopropy myristate,olive oil,urea,oleic acid. |
| pH adjusting agent | NaoH,Triethanolamine. |