International Journal for Pharmaceutical Research Scholars (IJPRS)

V-5, I-1, 2016 ISSN No: 2277 - 7873

REVIEW ARTICLE

Emulgel Formulation: Novel Approach for Topical Drug Delivery System

Habeeba Basheer, K. Krishnakumar, Dineshkumar B.*

Department of Pharmaceutics, St James College of Pharmaceutical Sciences, Chalakudy
St James Hospital Trust Pharmaceutical Research Centre (DSIR Centre), Chalakudy, India.

Manuscript No: IJPRS/V5/I1/00037, Received On: 04/03/2016, Accepted On: 13/03/2016

ABSTRACT

Topical drug delivery has been used for centuries for the treatment of local skin disorders. Drugs applied to the skin for their local action include antiseptics, antifungal agents, skin emollients, and protectants. On the other hand, topical delivery system increases the contact time and mean resident time of drug. Many advantages of gels a major limitation is in the delivery of hydrophobic drugs. So to overcome this limitation an emulsion based approach is being used. When gels and emulsions are used in combines form the dosage form is referred as emulgel. Emulgels have emerged as one of the most interesting topical delivery system as it has dual release control system i.e. gel and emulsion. When gel and emulsion are used in combined form the dosage form are referred as emulgel. The major objective behind this formulation is enhancing the topical delivery of hydrophobic drugs. This review article focused on formulation and characterization of emulgel for topical application.

KEYWORDS

Emulgel, Topical drug delivery system

INTRODUCTION

Emulgel, as the name suggest they are the combination of gel and emulsion. Both oil-in-water and water-in-oil type of emulsion used as vehicle to deliver various drugs to the skin. They also have a high ability to penetrate the skin. The presence of gelling agent in water phase converts a classical emulsion into an emulgel. Emulgel for dermatological use have several favorable properties such as being thixotropic, greaseless, easily spreadable, easily removable, emollient, non-staining, water soluble, longer shelf life, bio friendly, transparent and pleasing appearance. Number of medicated product is applied to the skin or mucous membrane that either enhances or restores a fundamental function of skin or pharmacologically alters an action in the underlined tissues.

Such products are referred as topical or dermatological products. Many widely used topical agents like ointments, Creams lotions have many disadvantages. They are sticky in nature causing uneasiness to the patient when applied, have lesser spreading coefficient so applied by rubbing and they also exhibit the problem of stability. Due to all these factors within the major group of semisolid preparations, the use of transparent gels has expanded both in cosmetics and in pharmaceutical preparations. In spite of many advantages of gels a major limitation is in the delivery of hydrophobic drugs. So to overcome this limitation an emulsion based approach is being used so that even a hydrophobic therapeutic moiety can be successfully incorporated and delivered through gels[1].

***Address for Correspondence:**
Dineshkumar B.,
Department of Pharmaceutics,
St James College of Pharmaceutical Sciences,
Chalakudy, India.
E-Mail Id: stjamespharmacyproject@gmail.com

Formulation of Emulgel

Different formulations were prepared using varying amount of gelling agent and penetration enhancer. The method only differs in the process of making gel in different formulations. The preparation of emulsion was same in all formulations. The gel base was prepared by dissolving carbopol 940 in purified water with constant stirring at a moderate speed then the pH are adjusted to 6 to 6.5 using Tri ethanol amine (TEA). The oil phase of the emulsion were prepared by dissolving Span 20 in light liquid paraffin while the aqueous phase was prepared by dissolving Tween 20 in purified water. Methyl and Propyl paraben was dissolved in propylene glycol whereas drug was dissolved in ethanol and both solutions were mixed with the aqueous phase. Both the oily and aqueous phases were separately heated to 70° to 80°C; then the oily phase were added to the aqueous phase with continuous stirring until cooled to room temperature. And add Glutaraldehyde in during of mixing of gel and emulsion in ratio 1:1 to obtain the emulgel[2].

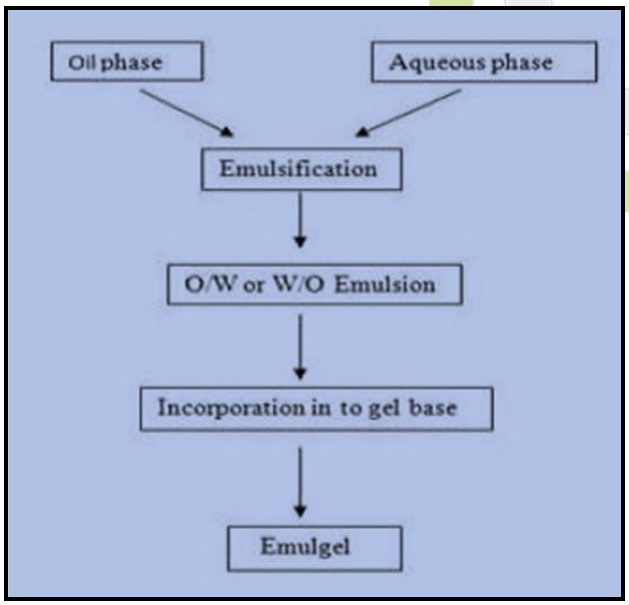

Figure 1: Formulation of Emulgel

Characterization of Emulgel

Physical Appearance

The prepared Emulsion formulations were inspected visually for their color, homogeneity, consistency, grittiness and phase separation[3].

Measurement of PH

The pH of Emulgel formulations was determined by using digital pH meter. One gram of gel was dissolved in 100 ml of distilled water and placed for two hours. The measurement of pH of each formulation was done in triplicate and average values were calculated. The pH of the Emulgel formulations was in range of 5.5 ±0.54 to 6.4 ± 0.43, which lies in the normal pH range of the skin and would not produce any skin irritation[4].

Spreadability

Spreadability is determined by apparatus suggested by Mutimer et al (1956) which is suitably modified in the laboratory and used for the study. It consists of a wooden block, which is provided by a pulley at one end. By this method, spreadability is measured on the basis of 'Slip' and 'Drag' characteristics of emulgels. A ground glass slide is fixed on this block. An excess of emulgel (about 2 gm.) under study is placed on this ground slide. The emulgel is then sandwiched between this slide and another glass slide having the dimension of fixed ground slide and provided with the hook. A 1 Kg weight is placed on the top of the two slides for 5 minutes to expel air and to provide a uniform film of the emulgel between the slides. The measured quantity of weight was placed in the pan attached to pulley with the help of hook. The time in (seconds) required by the top slide to separate from ground slide was noted. A shorter interval indicates better spreading coefficient. It is calculated by using the formula[5].

$S=M.L/T$

Where, S = spreadability,

M = Weight tied to upper slide,

L = Length of glass slides

T = Time taken to separate the slides completely from each other

Extrudability

It is a usual empirical test to measure the force required to extrude the material from 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 the present study, the method adopted for evaluating emulgel formulation for extrudability is based upon the quantity in percentage of emulgel and emulgel extruded from lacquered aluminium collapsible tube on application of weight in grams required to extrude at least 0.5 cm ribbon of emulgel in 10 seconds. More quantity extruded better is extrudability. The measurement of extrudability of each formulation is in triplicate and the average values are presented. The extrudability is than calculated by using the following formula: Extrudability = Applied weight to extrude emulgel from tube (in gm.) / Area (in cm2)[6].

Viscosity

Viscosity was determined using Brookfield viscometer at temperature 37 c.gel sample was filled in sample holder and particular spindle immersed in sample. Then it is allowed to rotate at particular speed. Viscosity measured after 2 minutes[7].

Drug Content Uniformity

Drug concentration in jellified Emulsion was measured by spectrophotometer. Drug content in Jellified Emulsion was measured by dissolving known quantity of Jellified Emulsion in solvent (chloroform) by Sonication. Absorbance was measured after suitable dilution in UV/VIS spectrophotometer (UV -1700 CE, Shimadzu Corporation, Japan)[8].

In Vitro Drug Diffusion Studies

Franz diffusion cell (with effective diffusion area 3.14 cm 2 and 15.5 ml cell volume) was used for the drug release studies. Jellified Emulsion (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. Cumulative corrections were made to obtain the total amount of drug release at each time interval .The cumulative amount of drug released across the egg membrane was determined as a function of time[9].

Marketed Formulations of Emulgel

1. Voltaren Gel

Contents

Diclofenac - a nonsteroidal anti-inflammatory drug (NSAID). Diclofenac works by reducing substances in the body that cause pain and inflammation.

Uses

Voltaren Gel is used to treat joint pain caused by Osteoarthritis in the hands, wrists, elbows, knees, ankles, or feet. Voltaren Gel may not be effective in treating arthritis pain elsewhere in the body[10].

2. Miconaz-H

Contents

It consists of Xanthan Gum, Hydroxyl Propyl methyl cellulose, Sorbitan monolaurate, Polysorbate 20, Mineral Oil, Methyl Paraben, Propyl Paraben, Di Sodium Edetate, Citric acid, Disodium phosphate and Purified water.

Uses

It has anifungal, antibacterial and anti-inflammatory property. Miconaz H emulgel is particularly indicated for the initial stages of treatment. Once the inflammatory symptoms have disappeared treatment may be continued with Miconaz cream, if preferred. In view of Miconaz H`s antibacterial effect on gram-positive bacteria, the product may also be used for mycotic affections with bacterial superinfection[11].

REFERENCES

1. Khullar, R., Saini, S., Seth, N., & Rana, A. C. (2011). Emulgels: a surrogate approach for topically used hydrophobic drugs. *International Journal of Pharmacy and Biological Sciences*, *1*(3), 117-128.
2. Mohamed, M. I. (2004). Optimization of chlorphenesin emulgel formulation. *The AAPS Journal*, *6*(3), 81-87.
3. Yong, C. S., Sah, H., Jahng, Y., Chang, H. W., Son, J. K., Lee, S. H., ... & Choi, H. G. (2003). Physicochemical characterization of diclofenac sodium-loaded poloxamer gel as a rectal delivery system with fast absorption. *Drug Development and Industrial Pharmacy*, *29*(5), 545-553.
4. Khullar, R., Kumar, D., Seth, N., & Saini, S. (2012). Formulation and evaluation of mefenamic acid emulgel for topical delivery. *Saudi Pharmaceutical Journal*, *20*(1), 63-67.
5. Pant, S., Badola, A., Baluni, S., Pant,W. (2015). A review on emulgel novel approach for topical drug delivery system. *World Journal of Pharmacy and Pharmaceutical Sciences*, *4*(10), 1728-1743.
6. Sanjay, J. B., Padsalg, A., Patel, K., & Mokale, V. (2007). Formulation, development and evaluation of Fluconazole gel in various polymer bases. *Asian Journal of Pharm*, *1*, 63-8.
7. Singla, V., Saini, S., Joshi, B., & Rana, A. C. (2012). Emulgel: A new platform for topical drug delivery. *International Journal of Pharma and Bio Sciences*, *3*(1), 485-498.
8. Praveen, C., Amit, A., Prashant, M., Pramod, K., & Devidas, S. (2009). Development and In Vitro Evaluation of Thermorevesible Nasal Gel Formulations of Rizatriptan Benzoate. *Indian Journal of Pharmaceutical Education and Research*, *43*(1), 55-62.
9. Masmoudi, H., Piccerelle, P., Le Dréau, Y., & Kister, J. (2006). A rheological method to evaluate the physical stability of highly viscous pharmaceutical oil-in-water emulsions. *Pharmaceutical Research*, *23*(8), 1937-1947.
10. Voltaren Emulgel. 2014. http://www.drugs.com/voltaren-gel.html. Accessed on 05.02.16.
11. Miconaz-H Emulgel. 2014. http://mupeg.com/en/products/miconaz-h. Accessed on 08.02.16.

