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# Emulgel – Novel Topical Drug Delivery System A Review

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**ABSTRACT**
NSAIDs is more active antiinflammtory agent than other product and is usually well tolerated. Emulgel have more absorption power than any other topical formulation like cream, ointment etc. Enhance permeation of NSAIDs by using natural permeation enhancers and also study physibility of emulgel by using natural permeation enhancers like, Terpenes- Menthol, Camphor, Essential oil- Basil oil, Neem oil, Eucalyptus oil.Emulgel were evaluated for drug content, viscosity, and In-vitro release through the Franz diffusion cell apparatus. The physical stability were check by using stability chamber. Analytical parameter were determine by I.R, SEM, DSC, and Dissolution.

**Keywords**
NSAIDs, Basil oil, Permeation Enhancer, Topical drug delivery, Franz diffusion

## I. INTRODUCTION

Most of the non-steroidal anti-inflammatory drugs (NSAID) is extensively used for the treatment of arthritis diseases (rheumatoid and osteoarthritis). Inconvenience to oral administration leading to side effect like gastric irritation, ulcer and other systemic side effect. The main advantage of topical drug delivery system is drug reach to the site of action. Cream, gel, ointment, and paste are some of the topical semisolids in use for many years. Emulgel is recently use semisolid dosage form out of various semisolids dosage form and becoming more popular due to ease of application and better percutaneous absorption than other semisolid dosage form. When mixture of gel and emulsion are used the dosage form are referred as emulgel. To avoid drawback of various ointments and gels an emulsion based approach is being used so that even a hydrophobic therapeutic moiety can be successfully incorporated and delivered through gels. The effectiveness of topical preparations are depend upon the rate and extent of drug release from base. So study on formulation of emulgel with different natural permeation enhancers was selected as a principle objective for anti-inflammatory activity.

## II. MATERIAL AND METHOD

- Selection and Procurement of Drugs and Excipients

Table No: 1 Procurement

| Sr.No | Ingredient |
|---|---|
| 1 | Linseed oil |
| 2 | Menthol |
| 3 | Camphor |
| 4 | Eucalyptus oil |
| 5 | Turpentine oil |
| 6 | Neem oil |
| 7 | Tulsi oil |
| 8 | Methyl salicylate |
| 9 | Tween 80 |

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| | |
|---|---|
| 10 | Propylene glycol |
| 11 | Polyethylene glycol |
| 12 | Carbopol 934 |

**Method**

a) Preparation of drug loaded nanoemulsion:

The clear oil phase was obtained by mixing menthol, camphor and methyl salicylate with union of linseed oil. Exactly 0.6gm of NSAIDs was kept constant in all selected formulation and which dissolved in the oil phase of nanoemulsion formulation. The aqueous phase was prepared by dissolving tween 80, propylene glycol, PEG 400 into distilled water under magnetic stirring. Then aqueous phase was blended with oil phase using magnetic stirrer at 1000 rpm for 30 minutes and then nanosize range of NSAIDs loaded nanoemulsion were obtained.

Note**:** In order to prepare NSAIDs loaded nanoemulsion camphor is used as natural permeation enhancer in formula F1 and which is replace in formula F0, F2-F5, by other natural permeation enhancer such as Eucalyptus oil, Turpentine oil, Neem oil, Tulsi oil.

Method of Preparation of emulgel:

STEP 1: Preparation of Emulsion either O/W or W/O

STEP 2: Formulation of gel base

STEP 3: Mixing of emulsion into gel base with continuous stirring

b) Formulation of NSAIDs nanoemulsion based Emulgel

1gm of Carbopol 934 which was selected as a gelling agent in an enough quantity of distilled water. After complete dispersion, the carbopol 934 was kept in the dark for 24 hrs to swell completely. Triethanolamine was added into swollen carbopol 934 to adjust the pH value of gel matrix (7.4). NSAIDs loaded nanoemulsion formulation were taken and incorporated with gel matrix and nanoemulsion based emulgel were prepared after stirring by remi stirrer for 15 minutes at 250 rpm.

Table No: 2 Formulation Design

| **Sr.No** | **Ingredients** | **F0** | **F1** | **F2** | **F3** | **F4** | **F5** |
|---|---|---|---|---|---|---|---|
| 1 | NSAIDs | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** | **2.5** |
| 2 | Linseed oil (%v/v) | **9** | **9** | **9** | **9** | **9** | **9** |
| 3 | Menthol (%w/v) | **2** | **2** | **2** | **2** | **2** | **2** |
| 4 | Camphor (%w/v) | **—** | **2** | **—** | **—** | **—** | **—** |
| 5 | Eucalyptus oil(%v/v) | **—** | **—** | **2** | **—** | **—** | **—** |
| 6 | Turpentine oil(%v/v) | **—** | **—** | **—** | **2** | **—** | **—** |
| 7 | Neem oil(%v/v) | **—** | **—** | **—** | **—** | **2** | **—** |
| 8 | Tulsi oil(%v/v) | **—** | **—** | **—** | **—** | **—** | **2** |
| 9 | Methyl salicylate(%v/v) | **2** | **2** | **2** | **2** | **2** | **2** |
| 10 | Tween 80(%v/v) | **18** | **18** | **18** | **18** | **18** | **18** |
| 12 | Propylene glycol(%v/v) | **9** | **9** | **9** | **9** | **9** | **9** |
| 13 | Polyethylene glycol(%v/v) | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** | **0.5** |
| 14 | Carbopol 934(%w/v) | **1** | **1** | **1** | **1** | **1** | **1** |
| 15 | Distilled Water | **q.s** | **q.s** | **q.s** | **q.s** | **q.s** | **q.s** |

## III. CONCLUSION

- The emulgel of NSAIDs was prepared using various natural permeation enhancers.e.g Camphor, Tulsi oil, Neem oil, Eucalyptus oil, Turpentine oil and was found to be stable.
- Natural permeation enhancers were increase permeation of drug.
- The dermal Emulgel prepared in this study fulfills all necessary parameters required for topical use. This novel dosage form will improve both the accuracy and the positioning of a delivered dose.

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