UNIVERSITI TEKNOLOGI MARA

SKIN PERMEATION STUDY OF IBUPROFEN EMULSIONS BY USING FRANZ DIFFUSION CELL

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TABLE OF CONTENTS

ABSTRACT

The topical delivery of non-steroidal anti-inflammatory drugs (NSAIDS) such as Ibuprofen is a potential method of avoiding the first pass effects and the gastric irritation, which may occur when used orally. Ibuprofen is formulated into many topical preparations to reduce the adverse effects and simultaneously avoid the hepatic first-pass metabolism as well. However, it is difficult to obtain an effective concentration through topical delivery of Ibuprofen due to its low skin permeability. The aim of this study was to develop ibuprofen into nanoemulsions and microemulsion formulations and focused on the improving the permeation of these formulations with the help of propylene glycol as chemical enhancer. The effectiveness of propylene glycol as chemical enhancer was evaluated by comparing the cumulative amount and flux of each sample collected from synthetic and rat membrane by *in vitro* study using Franz diffusion cells. Results demonstrated that addition of propylene glycol into each formulation increased the particle size and uniformity in microemulsion but reduced the uniformity in nanoemulsion. Nanoemulsion formulations did enhanced ibuprofen permeation with the significant different ($P<0.05$) in both synthetic and rat membrane. Propylene glycol action on synthetic and rat membrane as chemical enhancer was insignificant ($P>0.05$) as the ibuprofen permeation was too minute.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Skin is the largest organ in the body and has three distinct layers. The layers are the subcutaneous containing hypodermis, the appendages rich dermis and the keratinized epidermis (Winfield *et al.*, 2009).

Topical drug delivery is a type of dosage form that provide drug penetration across the skin (Hadgraft, 2006). There are few reasons why topical drug delivery is a preferable method to deliver drugs. It is because we can eliminate variables which influence drug absorption if being given orally, avoid the first pass metabolism of drugs thus increasing the patient compliance with a non invasive drug delivery system (Barry, 2007).

The diffusion of drug involves no active transport so it is a passive process. The keratinized layer of stratum corneum (SC) only allows low molecular weight drugs to penetrate. On the other hand, the lipid bilayers of the intercellular route provide the main pathway for lipophilic drugs. The route for polar drugs route such as electrolytes is through the appendages in the dermis layer (Barry, 2007).

Absorption through the skin is varies and the rate of the drug release can be optimized through modifications of some physicochemical properties of drug (Winfield *et al.*, 2009).