UNIVERSITI TEKNOLOGI MARA

PREPARATION AND EVALUATION OF NIFEDIPINE NANOEMULGEL

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ABSTRACT

Nanoemulsion typically is having droplet size ranging from 20 – 200nm in diameter. With these nano-scaled sized droplets, it could demonstrate high stability and assists in better permeability across membrane. Utilization of nanotechnology in nifedipine delivery topically intends for the treatment of anal fissure and wound healing. The present study aim to formulate a topical nifedipine nanoemulsion incorporated with Carbopol to produce nanoemulgel. The optimum 2% nifedipine nanoemulsion formulation was consisted of 60% avocado oil, 16% of sucrose laureate and 24% glycerol which produce nano-scaled size particles. Highest percentage of oil component was selected to ensure complete dissolution of nifedipine. Addition of Carbopol helps in enhancing the physical characterization of the formulation which includes the texture, rheology and stability. The influence of Carbopol percentage to these physical characterizations of the formulation was determined. Based on the study, nanoemulgel with 0.75% Carbopol demonstrated the best formulation which could be used in optimizing topical formulation of nifedipine to meet patient compliance.

CHAPTER ONE

INTRODUCTION

1.1 Background of study

Emulsion consists of immiscible components of water, oil and amphiphile that form one solution of optically isotropic and thermodynamically unchanging system (Lawrence & Rees, 2000). The success in combining two immiscible phase into one system makes it an effective drug carrier especially for encapsulating lipophilic drugs(K. Ahmed, Li, McClements, & Xiao, 2012).Lipophilic drugs which naturally possess low aqueous solubility property utilize oil in water (O/W) emulsion as an alternative way to obtain better pharmacokinetic properties (Kan, Chen, Kung, Lee, & Chu, 1999). In fact, as compared to liposomes, the O/W emulsion provides longer shelf life as well as good biocompatibility (Kan et al., 1999). Despite of the benefits it offers, O/W or W/O emulsion with droplet size larger than 1μm causes the droplets to be susceptible to gravity forces leading to instability of the formulation (Fernandez, André, Rieger, & Kühnle, 2004). This is against the requirement for a good emulsion which is supposed to be stable with long shelf-life, no coalescence and Ostwald repining (Taylor, 1998).

Nanoemulsion has been used extensively in polymer synthesis, food industry, cosmetics, pharmaceutical industry and agriculture (Ševčíková, Kašpárková, Vltavská, & Krejčí, 2012). Nanoemulsion is an improved formulation of emulsion