UNIVERSITI TEKNOLOGI MARA

IBUPROFEN NANOEMULSION: *IN VITRO* PHARMACOKINETIC EVALUATION AND ITS ENHANCING MECHANISM

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ABSTRACT

The study was done to improve the absorption of poorly soluble drugs by developing nanoemulsion loaded with ibuprofen, via *in vitro* diffusion chamber method. D-phase emulsification technique were used for the preparation of ibuprofen-loaded nanoemulsion. Three different type of surfactant was used; sucrose ester laurate, sucrose ester oleate and sucrose ester palmitate in the formulations. Sucrose ester laurate as surfactant will produced ibuprofen-loaded nanoemulsion, while sucrose ester oleate and sucrose ester palmitate will produced ibuprofen-loaded macroemulsion. All three formulations were loaded with ibuprofen as drug model at three different percentages; 1.5% (w/w), 3.0% (w/w) and 6.0% (w/w). The results showed that 3.0% (w/w) ibuprofen-loaded nanoemulsion exhibited better drug absorption compared to macroemulsions and oil solution (control). Nanoemulsion loaded with 1.5%, 3.0% and 6.0% (w/w) ibuprofen, showed Papp values of 6.2, 10.6 and 6.6 times higher, respectively than controls values. Moreover, 3.0% (w/w) ibuprofen-loaded nanoemulsion showed lowest TEER value, indicating that it might enhance the ibuprofen tansport in ileum by opening the tight junction. We can conclude that nanoemulsion formulations gave higher rate of absorption compared to macroemulsion and oil-based formulations.

CHAPTER ONE: INTRODUCTION

1.1 Background of Study

Nanoemulsion is defined as a system that has uniform and extremely small droplet size, 20-200nm (Solans et al., 2008). They are heterogeneous systems which made of oil-in-water droplets dispersed in aqueous media and stabilized by surfactant molecule (Chen et al., 2010). There are several types of nanoemulsion formulation, which either involves oil droplets dispersed in aqueous medium oil-in-water (O/W) or the reverse, water-in-oil (W/O) (Sadurni et al., 2005). Based on the structure of the method of preparation, the structure of nanoemulsion can be manipulated to give different types of product such as water-like fluids or gels (Simmonet et al., 2004).

Due to the nanometer-sized droplet, nanoemulsions are kinetically stable without any flocculation or coalescence during the long term storage (Singh & Vingkar, 2008). Its low viscosity, high kinetic stability and optical transparency make them very attractive systems for many industrial applications (Taha et al., 2004). Their nature of non-toxic and non-irritant makes them ideal therapeutic agents as they do not damage human and animal cells (Aboofazeli, 2010). They can be used as novel formulation in areas of pharmaceutics, cosmetic science and food technology (Sonneville-Aubert et al 2004; Acosta, 2009; Sosnik et al., 2010).