UNIVERSITI TEKNOLOGI MARA

PHARMACOKINETIC PROFILE OF α-TOCOPHEROL IN THREE DIFFERENT NANO-EMULSION FORMULATIONS IN RATS

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ABSTRACT

This study was designed to compare the absorption profiles of nano-emulsion containing α-tocopherol formulated with three different oils, i.e. palm oil, soybean oil and VCO in Sprague-Dawley rats. The plasma concentration of α-tocopherol was determined at specific intervals up to 36 hours post administration of formulations with a dose of 30 IU/kg of tocopherol. The peak heights were obtained by direct injection of plasma samples into the High Performance Liquid Chromatography (HPLC), after being deproteinized. The total absorption of the α-tocopherol, calculated as the total area under the plasma concentration time curve ($AUC_{0-\infty}$), was markedly greatest for the palm oil, followed by soybean oil and VCO formulation. This study also showed a rapid absorption of α-tocopherol from oils containing long chain fatty acids (palm oil and soybean oil) compared to the medium chain triglyceride oil (VCO). Although apparently $AUC_{0-\infty}$ and C_{max} of nano-emulsion of α-tocopherol formulated in palm oil is higher than in soybean oil and in VCO, they were not significantly different when analysed by a one-way analysis of variance (ANOVA). From the results obtained, it can be concluded that palm oil provides better absorption of α-tocopherol when being formulated as nano-emulsion, when compared to other oils (soybean oil and VCO).

CHAPTER 1

INTRODUCTION

1.1 Introduction

Poorly water-soluble drugs are increasingly becoming a problem in terms of obtaining the satisfactory dissolution within the gastrointestinal tract that is necessary to obtain good bioavailability. Thus, for such compounds, including vitamin E, modification of the physicochemical properties, such as salt formation and particle size reduction of the compound may be one approach to improve the dissolution rate of the drug (Gursoy and Benita, 2004). In addition, other formulation strategies have been adopted including the use of cyclodextrins, nanoparticles, solid dispersions and permeation enhancers.

This study is focused on nano-emulsions-based formulations. Nano-emulsions are colloidal dispersions formed by a liquid phase dispersed in a second phase in form of droplets. Due to their small droplet size below 500 nm that causes a large reduction in gravity force, nano-emulsions may appear transparent and translucent to the naked eye (Solans *et al.* 2005) (Fig. 1.1). The Brownian motion seems to be sufficient to overcome the effect of gravity. Thus, upon storage, no sedimentation or creaming occurs offering increased stability (Tadros *et al.*, 2004).