

**UNIVERSITI TEKNOLOGI MARA**

**PHARMACOKINETIC STUDY OF  $\alpha$ -  
TOCOPHEROL IN THREE DIFFERENT OILS IN  
RATS**

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## ABSTRACT

The pharmacokinetic profile of  $\alpha$ -tocopherol from three different oil vehicles, namely palm oil, soybean oil, and virgin coconut oil (VCO) in 9 male Sprague–Dawley rats with weight  $\pm$  380 g was compared after oral administration of 30 IU/kg dose of  $\alpha$ -tocopherol. The rats' blood samples were taken at predetermined time intervals up to 36 hours and the corresponding plasma  $\alpha$ -tocopherol concentrations were quantified by direct injection of plasma samples, after deproteinization step, into High Performance Liquid Chromatography (HPLC). The total absorption of the  $\alpha$ -tocopherol, calculated as the area under the plasma concentration time curve ( $AUC_{0-\infty}$ ), was significantly higher 1.8 times for the VCO formulation, when compared with the palm oil. Moreover, this study also showed that rapid absorption of  $\alpha$ -tocopherol can be obtained from palm oil since the  $T_{max}$  of this oil was the shortest. Even though the  $\alpha$ -tocopherol  $AUC_{0-\infty}$  and  $C_{max}$  of VCO formulation was 1.4 and 1.6 higher than soybean oil formulation, they were not significantly different when analysed by ANOVA. A similar result was obtained when  $\alpha$ -tocopherol  $AUC_{0-\infty}$  and  $C_{max}$  soya bean oil were compared to palm oil formulation in which the former was 1.2 and 1.1 times higher than the latter respectively. Though, they were not significantly different when analysed by ANOVA.

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Vitamin E is a generic term for tocopherols ( $\alpha$ -,  $\beta$ -,  $\gamma$ - and  $\delta$ -) and tocotrienols (Chávez-Servín *et al.*, 2006). Tocopherols are compounds belonging to a class of phenol derivatives characterized by their high hydrophobic properties. Research has shown that among the isomeric forms of tocopherols,  $\alpha$ -tocopherol has the highest activity against lipid peroxidation induced by peroxy radical and is the most abundant tocopherol *in vivo* because it selectively binds to proteins. Thus  $\alpha$ -tocopherol has demonstrated to protect against oxidative damage based on the ability to block the propagation of radical reactions triggered by the reactive oxygen species (ROS) that are generated as a by product of normal cellular respiration (Fanali *et al.*, 2004; Mazlan *et al.*, 2006). Although there are many studies conducted to investigate the physiological functions and pharmacological actions of vitamin E, the pharmacokinetic profile of such vitamin in rat plasma is still not fully established following oral administration of  $\alpha$ -tocopherol in vegetable oils.

The analogs of vitamin E that have similar structures like  $\alpha$ - and  $\gamma$ -tocopherol are present in the normal diet and can be easily monitored in human blood and tissues. Analytical methods so far employed for the analysis of tocopherols include high