

UNIVERSITI TEKNOLOGI MARA

**FORMULATION AND OPTIMIZATION OF
SELF-EMULSIFYING NANOEMULSION OF
LONG CHAIN AND MEDIUM CHAIN FATTY
ACID OILS**

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ABSTRACT

Oil-in-water nanoemulsions are promising colloidal drug carrier system for diverse therapeutic application. The properties of nanoemulsions are of special interest for practical application. They are mainly used in pharmaceuticals field as drug delivery system. Oil-in-water (O/W) types of emulsions have been investigated years back, and have been reviewed thoroughly. Mechanical methods of nanoemulsion production are designed for dispersion using self-emulsifying agent. The study aimed on the formulation and optimization of mixture between long chain and medium chain fatty acid nanoemulsion and by using Sunflower oil, Coconut oil, Tween 80 and Span 80 as emulsifying agent and glycerol monooleate as the thickening agent in order to obtain the intended droplet size (below 500 nm) with optimum stability and spreadibility of nanoemulsion. Result of this study will provide scientific data on particle size, viscosity, stability and spreadibility of the nanoemulsion. The nanoemulsion was produced by combining the oils, surfactants and glycerol and formulations of emulsion were stirred with a Eurostar Digital IKA®-WERKE homogenizer to produce nano size particles, based on different speeds and times. With the right speed and time of the homogenizer, we will be able to optimize the formulation of self-emulsifying nanoemulsion. Based on the analysis of droplet sizes of all samples, the samples with droplet size in the range of 1-500 nm were grouped as nano-sized particles. An increase in surfactant (Tween 80) concentration will decrease the particle size of emulsions produced. The use of combination co-surfactant, Span 80 with surfactant, Tween 80 produced smaller droplets emulsion.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Emulsion is a mixture of two immiscible liquids, one being dispersed throughout the other in small droplets. It is a colloidal system in which both the dispersed phase and the dispersion medium are liquids. Emulsions are dispersions of one liquid to another immiscible liquid phase that are made using low energy requirement (Becher, 1965; Bibette et al., 1999). Emulsion usually consists of a mixture of an aqueous phase with oils. If the oil droplets are dispersed throughout the aqueous phase the emulsion is termed as oil-in-water (o/w). A system in which the water is dispersed throughout the oil is water-in-oil (w/o) emulsion (Aulton, 2002). Emulsion has globules of size ranges from 0.1 to 100 μm . Emulsion formulation is usually used for external preparation. In pharmaceuticals, the oil-in-water emulsion is used for the improvement of bioavailability and for the controlled release and targeting of moderately water-soluble drugs. So, oil-water-emulsion emulsion preferably will be used in this study.