UNIVERSITI TEKNOLOGI MARA

NANOEMULSION-BASED NASAL DRUG DELIVERY SYSTEM OF OLIVE OIL FOR ATTENUATION OF ALZHEIMER'S DISEASE (AD) SYMPTOMS: PREPARATION, CHARACTERIZATION AND STABILITY EVALUATION

MUFIDAH HAIKAL BINTI MAHAMUD

Dissertation submitted in the partial fulfillment of the requirement for the Bachelor of Pharmacy (Hons.)

Faculty of Pharmacy

July 2016

ACKNOWLEDGEMENT

In the name of Allah S.W.T., The Most Merciful, The Most Gracious and the beneficent the thesis has depended on many people beside me. I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations.

I would like to thank my supervisor, Professor Dato' Dr. Abu Bakar Abdul Majeed, for the patient guidance, encouragement and advice he has provided throughout my time as his student. I have been extremely lucky to have a supervisor who cared so much about my work, and who responded to my questions and queries so promptly.

I am highly indebted to Dr. Tommy Julianto Bustami Effendi for his guidance and constant supervision as well as for providing necessary information regarding the project & also for his support in completing the project.

My completion of this project could not have been accomplished without the support of my teammates. In addition, I would like to express my thanks to Dr. Atish Prakash, staffs and fellow colleagues of Cosmetics and Nutraceutics Laboratory, Faculty of Pharmacy for their kind co-operation and encouragement which help me in completion of this project.

.

TABLE OF CONTENTS

ABSTRACT

The prevalence of Alzheimer's disease (AD) is increasing and one of the factors that can lead to AD is oxidative stress. Olive oil, a strong antioxidant is expected to reverse the action of oxidative stress. Hence, NE-based nasal delivery system is believed to improve olive oil targeted to the brain. In this study, olive oil nanoemulsion was formulated by using phase inversion temperature. Characteristics of prepared nanoemulsions namely; droplet sizes, particles size distribution, zeta potential and pH value were investigated. Stability of the nanoemulsions were also assessed. Results revealed that the droplets size of both 2% and 3% nanoemulsion achieved nano droplet range of < 0.2 μm and uniformly distributed. The value of zeta potentials showed that both nanoemulsion were highly stable and the pH values were within the nasal pH range (4.5-6.5). Based on stability analysis, the nanoemulsion were unstable. In conclusion, NEs with optimal characteristics were successfully prepared, however the stability test results showed that both nanoemulsions were unstable.

CHAPTER ONE

INTRODUCTION

1.1. Background of study

Nasal drug administration could be an attractive mode of delivery for drugs targeting the central nervous system, potentially providing a high bioavailability because of avoidance of a hepatic first-pass effect and rapid onset of action. Privalova et al. (2012) stated that nasal drug delivery system is a noninvasive method that can be used for both local and systemic application. The ability of some drugs to be absorbed into the mucous layer of the nasal cavity and then transported into the brain, is the principle of nasal delivery. The drug once delivered to the nose will be absorbed via the nasal cavity into the olfactory epithelium (Wen, 2011), thus allowing therapeutic agents to diffuse into the perineural spaces, crossing the cribriform plate, ending up in the cerebral spinal fluid (CSF) (Stevens et al., 2011).