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NANOEMULSION-BASED NASAL DRUG DELIVERY SYSTEM OF COCONUT OIL FOR ALLEVIATION OF ALZHEIMER'S DISEASE SYMPTOMS: PREPARATION, CHARACTERIZATION AND STABILITY EVALUATION

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ABSTRACT

In recent decade, the uses of coconut oil in treating the symptoms of Alzheimer's disease has become more popular. However, benefits of coconut oil was still lacking in scientific evidence. Hence, the preparation of coconut oil nanoemulsion for delivery through the nasal route to the brain was thought to be beneficial in treating Alzheimer's disease. The aim of this study was to prepare nanoemulsions using coconut oil for nasal drug delivery. Besides that, this study also aims to characterize the nanoemulsions made and to determine the stability of the nanoemulsions. In order to formulate coconut oil nanoemulsion, nanophase gel was developed from mixing different ratio of virgin coconut oil, glycerol and lauryl sucrose monoester. The nanophase gels produced were subjected to particle size analysis and formulation with the smallest particle size was chosen to be formulated into nanoemulsion. The 2%, 3% and 4% w/v virgin coconut oil nanoemulsions were produced from nanophase gel with the ratio of 50:20:30 by mixing the nanophase gel with sodium chloride, hydroxyl propyl methyl cellulose and distilled water. The formulated nanoemulsions were then subjected to droplet size, polydispersity index, zeta potential, pH and stability analysis. The best nanoemulsion formulated was obtained from the 3% w/v virgin coconut oil nanoemulsion. Apart from the pH, the droplet size, polydispersity index and zeta potential value of the nanoemulsion produced fit all of the characteristics of a good and stable NE. However, the stability analysis results showed that the nanoemulsions produced undergoes phase separation. Finally, nanoemulsions prepared using virgin coconut oil possessed good emulsion characteristics but did not have a good stability upon long-term storage. The stability of the nanoemulsions can be improved by modifying the formulation in further studies.

CHAPTER 1

INTRODUCTION

1.1 Background

Alzheimer's disease (AD) is a disease that slowly affects cognitive function including communication disorder, inability to perform function and inability to interpret and recognize things. Neurofibrillary tangles (NFT) and neuritic plaques formation can be observed in the brain of individuals with AD (Blennow, De Leon, & Zetterberg, 2006). Treatment of AD is focused on treating the symptoms of cognitive and behavioural disturbances as there is no available treatment to cure AD (Alzheimer's Association, 2015).

Coconut oil is said to have many benefits towards health and this includes preventing or treating AD. Coconut oil is rich with medium chain triacylglycerol (MCT) which can be used as an alternative fuel source for the brain. The brain of individuals with AD has impaired glucose metabolism that leads to depletion of energy supply in the