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EFFECT OF ASTAXANTHIN ON SHORT-TERM MEMORY AND LEVELS OF LIPID PEROXIDATION AND MITOCHONDRIAL COMPLEX III IN SCOPOLAMINE-TREATED MICE

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ABSTRACT

EFFECT OF ASTAXANTHIN ON SHORT-TERM MEMORY AND LEVELS OF LIPID PEROXIDATION AND MITOCHONDRIAL COMPLEX III IN SCOPOLAMINE-TREATED MICE

Alzheimer disease (AD) is a common type of dementia that commonly occurs in the middle or late life of a patient. It is a condition of brain disorder that is related to memory loss and brain cognitive impairment. Until now, there is no treatment to completely cure the disease. Astaxanthin is a compound known as an antioxidant, anti-inflammation and helps in neurodegenerative disorder. Hence, it is believe to be able to reduce a memory deficit in AD patient. This study was performed to evaluate the effect of astaxanthin on short-term memory on levels of lipid peroxidation and mitochondrial complex III after administration of scopolamine in mice. 25 mice were divided into five groups which consist of control group, memory deficit group, and three groups of astaxanthin-treated group. Mice in control group were injected with 0.5ml/100g of 0.9% normal saline once per day for 28 days. Mice in memory deficit group were injected with 3mg/kg of scopolamine via intraperitoneal once per day at the morning for 28 days. The incremental dose of astaxanthin was 12.5mg/kg for group 1, 25mg/kg for group 2 and 50mg/kg for group 3. The behavioural test was tested on day 22 until day 28. After that, the biochemical assay and mitochondrial enzyme estimation were conducted on the next several days.

The effects of 12.5, 25 and 50mg/kg of astaxanthin on behavioural test showed no significant difference. This indicated that astaxanthin has no effect in improving memory impairment in scopolamine-induced mice. In the level of lipid peroxidation, the highest dose of astaxanthin (50mg/kg) was the most effective as it was able to decrease the level of lipid peroxidation. Lower dose of astaxanthin (12.5 and 25 mg/kg) was not really effective in lowering the level of lipid peroxidation. Mitochondrial complex III showed the highest level when treated with highest dose of astaxanthin (50mg/kg). This indicated that highest dose of astaxanthin was required to lower the level of ATP depletion and increase complex III.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Alzheimer's disease is the most common type of dementia (Association, 2013). AD is a brain disorder condition that basically occurs in the middle or late life of a patient (McKhann, Drachman, Folstein, & Katzman, 1984). It also can be defined as a brain disorder that is characterized by the memory loss and cognitive impairment (McKhann et al., 1984). This neurodegenerative disease has become a critical public health issue around the world (Korolev, 2014). In the United States of America, the prevalence of AD in women is higher than men where two-third of American women have AD (Association, 2013).

This disease was discovered by Alois Alzheimer in 1906 when he first treated his patient named Auguste Deter who recognized to have a neurofibrillary tangles and plaque in her brain tissue (Goedert Spillantini, 2006).