

UNIVERSITI TEKNOLOGI MARA

**DETERMINATION OF THE ANTIOXIDANT
ACTIVITY OF *KAEMPFERIA GALANGA* (CEKUR)
IN AN FE-INDUCED LIPID PEROXIDATION
SYSTEM**

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ABSTRACT

Antioxidants play a major role in terminating the lipid peroxidation process and in scavenging free radicals. Phenolic compounds, which can be easily found in the plant kingdom, have been proven by many researchers to be potent antioxidants. A popular Malay herb, *Kaempferia galanga* or locally known as cekur, was reported to contain quite a lot of phenolic compounds. This study thus was carried out with the aim of determining the antioxidant activity of *Kaempferia galanga* using the Fe^{2+} /NADPH-induced lipid peroxidation microsomal system. The ethyl acetate extract of *Kaempferia galanga* was prepared prior to this study by a Msc. candidate. For the induction of lipid peroxidation in microsomes, iron was utilized as the free radical generator in the presence of NADPH. In this study, the optimum concentration of iron for induction of lipid peroxidation was determined. The results showed that the optimal iron concentration to initiate lipid peroxidation was 15 μM . The antioxidant activity of *Kaempferia galanga* ethyl acetate extract was measured using this established Fe^{2+} /NADPH system. Lipid peroxidation was monitored by the thiobarbituric acid reactive substance (TBARS) method. Trolox and quercetin were used as positive control as both compounds are potent antioxidants. The results showed that *Kaempferia galanga* ethyl acetate extract possess antioxidant activity although not as potent as the controls (trolox and quercetin). The concentration which inhibits lipid peroxidation by 50% (inhibiting concentration; IC_{50}) for the rhizome extract of *Kaempferia galanga* was 0.03 mg/ml while for leaf extract, it was 0.014 mg/ml. The IC_{50} for trolox was 0.003 mg/ml. The IC_{50} for quercetin could not be determined as it has very potent antioxidant activity even at very low concentrations in this system. In summary, the results obtained showed that the ethyl acetate extract of *Kaempferia galanga* (both rhizome and leaf) possessed antioxidant *in vitro* activity as both produced inhibition of lipid peroxidation although their magnitude of activity as not high as trolox and quercetin. Potency was half that of trolox for the leaf extract and a magnitude lower for the rhizome extract based upon a comparison of the IC_{50} values.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Antioxidants represent a first line body defense against oxidative stress produced by the generation of free radicals and reactive oxygen species (ROS) (Perry et al, 1980). They act to terminate the free radical chain reactions and suppress the formation of ROS. Under normal circumstances, the ROS generated are detoxified by antioxidants that are present in the body leading to establishment of equilibrium between the ROS generation and antioxidants capacity. However, overproduction of ROS or inadequate antioxidant defense may tip this equilibrium to favor a deleterious condition known as oxidative stress (Marks & Liebermann, 2005).

The formation of ROS is enhanced in the presence of iron (Fe) and other transient metals that participate in the Fenton reaction leading to the formation of highly reactive hydroxyl radicals. These and other ROS may initiate lipid peroxidation directly or via oxygen-anion complex formation and various other Fe redox states (Tien et al., 1981). Increased levels of ROS can initiate lipid peroxidation (LP), damage proteins and deoxyribonucleic acid (DNA), thereby causing acute tissue damage or the development of various diseases (Ozgova et al., 2003).