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DETERMINATION OF ANTIOXIDANT AND SUN PROTECTION FACTOR OF PLANT *CURCUMA XANTHORRHIZA* (TEMULAWAK)

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TABLE OF CONTENTS

	Page
TITLE PAGE	
APPROVAL FORM	
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATIONS	vii
ABSTRACT	viii
CHAPTER ONE (INTRODUCTION)	1
CHAPTER 2 (LITERATURE REVIEW)	
2.1 Free radical	5
2.2 Antioxidant	8
2.2.1 Synthetic antioxidant	9
2.2.2 Natural antioxidant	10
2.3 UV radiation	11
2.4 Effect of UV radiation	11
2.5 Sunscreen	12
2.6 *Curcuma xanthorrhiza*	13

ABSTRACT

Antioxidants are substances that can fight and destroy excess free radicals and repair oxidative damage. Incorporation of antioxidant into a sunscreen may enhance its sun protection factor and at the same time provide protection from free radicals damage. The antioxidant activities of *Curcuma xanthorrhiza* aqueous and methanolic extract had been investigated by using 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay. Determination of the sun protection factor was carried out by using diffuse transmittance measurements. CXME exhibit greater radical scavenging activity than CXAE. In the DPPH assay, CXAE require 95.50 µg/mL to achieve 50% effective concentration while CXME require 33.50 µg/mL. The SPF value of *C. xanthorrhiza* measured in four different concentration is directly proportional to its concentration. CXME exhibit higher SPF value which is 3.74 compared to CXAE whicH is 2.64 at concentration 10%. These results suggest that *C. xanthorrhiza* could be a good source of natural antioxidant but some modification may be done to improve its SPF value for cosmeceutical product.

Keywords: antioxidant; sunscreen; *Curcuma xanthorrhiza*; radical scavenging activity; DPPH; 50% effective concentration; SPF value

CHAPTER 1

INTRODUCTION

Oxidation can be defined as a chemical reaction that transfers electrons from a substance, frequently altogether with the removal of hydrogen ions. It can be accelerated by respiration, stress, cigarette smoking, alcohol, smoking and other factors. Oxidation process generates free radicals and reactive oxygen species (Halliwell *et al*., 2004).

Free radicals are chemical species, which contain one or more unpaired electrons which are highly unstable and may cause damage to other molecules by extracting their electrons in order to attain stability. Reactive oxygen species (ROS) formed in vivo, such as superoxide anion, hydroxyl radical and hydrogen peroxide, are highly reactive and potentially damaging transient chemical species. These are continuously produced in the human body, as they are essential for energy supply, detoxification, chemical signaling and immune function (Ali *et al.,* 2008). For decades, free radicals had been known as a substance that can damage our cells and lead to several dangerous diseases such as Parkinson's, Alzheimer's disease aging and many more (Lee *et al,* 2004).

Interestingly the body posses defense mechanisms against free radical-induced oxidative stress, which involve preventative mechanisms, repair mechanisms, physical defenses and antioxidant defenses. Enzymatic antioxidant defenses include