

**UNIVERSITI TEKNOLOGI MARA**

**THE CYTOPROTECTIVE EFFECT OF PURE  
PHENOLIC COMPOUNDS ON HepG2 CELL LINES  
AGAINST *tert*-BUTYLHYDROPEROXIDE-  
INDUCED OXIDATIVE STRESS**

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## ABSTRACT

Reactive oxygen species (ROS) such as *tert*-butylhydroperoxide (t-BOOH) is a product of normal cellular metabolism and are recognized to be harmful or beneficial to living systems. Antioxidants such as superoxide dismutase (SOD) and catalase efficiently remove ROS surplus to maintain the normal cell homeostasis. When the exposure to oxidative stress becomes extended, antioxidant enzymes naturally occurring in the cells might not be able to protect the cells anymore. There are many studies regarding phenolic compounds nowadays. This is may be due to low cost in discovery and developing stage or to find an alternative to agents used in medication therapy yet producing many side effects. Cytoprotective effects of three different phenolic compounds which are resveratrol, catechin and quercetin had been studied and the outcome obtained showed that each of them affected catalase activities in the cells. HepG2 cell lines were plated and treated by different concentrations (1, 10, 100 and 1000  $\mu$ M) of pure phenolic compounds to provide the protection before the cells were exposed to 200  $\mu$ M of t-BOOH. This study showed that 1000  $\mu$ M of resveratrol, catechin and quercetin significantly increased catalase activities as compared to treat with 200  $\mu$ M t-BOOH, without phenolic compounds treatment. Resveratrol, catechin and quercetin at different concentration (1-1000  $\mu$ M) showed some tendency to increase SOD activity but the differences as compared to 0  $\mu$ M was not significant. In conclusion, resveratrol, catechin and quercetin showed protection against t-BOOH (200  $\mu$ M) in HepG2 cell lines.

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background of study

Free radical reactions, especially with participation of oxidative radicals, have been shown to be involved in many biological processes that cause damage to lipids, proteins, membranes and nucleic acids, thus giving rise to a variety of diseases. Reactive oxygen species (ROS) have been recognized as playing an important role in the initiation and/or progression of various diseases such as atherosclerosis, inflammatory injury, cancer and cardiovascular disease. Damage mediated by free radicals results in the disruption of membrane fluidity, protein denaturation, lipid peroxidation, oxidative DNA and alteration of platelet functions. The organic hydroperoxide, *tert*-butylhydroperoxide (t-BOOH), causes oxidative damage in a number of cell types. This compound of interest in this study is widely used in industrial field and research-based institutes. Apprehensive exposure to this kind of oxidative stress-induced agent may give rise to undesired effects. Antioxidant enzymes which are naturally present in cells help in protecting cells from harm induced by free radical reaction. These enzymes may no longer be able to provide cytoprotectivity to the cells when the exposure to oxidative stress is too high and persistent.