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PENGESAHAN

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LIST OF ABBREVIATIONS

BHA	Butylated hydroxyanisole
BHT	Butylated hydroxytoluene
DMEM	Duelbecco's Modified Eagle's Medium
DPPH	1, 1-diphenyl-2-picryl-hydrazyl
GC-MS	Gas chromatography- mass spectrometry
IC ₅₀	Half maximal inhibitory concentration
MTT	3-(4,5-Dimethylthiazol-2Yl)-2,5-Diphenyltetrazolium bromide
nm	Nanometer
NaOH	Sodium hydroxide
ROS	Reactive oxygen species
RNS	Reactive nitrogen species
RSS	Reactive sulphur species
Tpc	Total phenolic content

ABSTRACT

Rice bran possesses several antioxidant and anticancer properties and can be a potential source of bioactive compounds to treat cancer and other diseases. The aims of this study were to compare different methods of drying rice bran, extraction of bioactive compounds present in rice bran, evaluation of the extracts for their antioxidant and anticancer activities and identification of compounds present in the extracts using gas chromatography-mass spectrometry (GC-MS). Rice bran was dried by oven-drying and freeze-drying. Dried rice bran was extracted by using 80 % methanol. Rice bran extract from freeze-drying method showed higher percentage of yield with 12.5 % and exhibited higher total phenolic content which 9.845 ± 1.478 mg/g. Rice bran extract from oven-drying method showed low percentage of yield with 9.0 % and exhibited lower total phenolic content with 2.2 ± 0.74 mg/g. Antioxidant activity of rice bran crude extract was evaluated using DPPH assay. Rice bran extract from freeze-drying method showed higher percentage of inhibition with 62.5 ± 0.01 % and lower IC₅₀ value of 76 μ g/ml. Rice bran extract from oven-drying method showed lower percentage of inhibition of with 52.3 ± 0.01 % and IC₅₀ value more than 500 μ g/ml. For cytotoxicity assay, rice bran crude extract from both drying method showed high toxicity against MCF 7 cell line compared to the other cell lines. Glycerin and fatty acids were the major compounds detected by GC-MS. The minor compounds detected were phenolic compounds.

ABSTRAK

Dedak padi mempunyai beberapa ciri-ciri antioksidan dan antikanser dan ia berpotensi sebagai sumber sebatian bioaktif untuk merawat kanser dan lain-lain penyakit. Tujuan kajian ini dijalankan adalah untuk membandingkan jenis-jenis pengeringan dedak padi dan ekstrak sebatian bioaktif yang terdapat dalam dedak padi. Ekstrak itu dinilai melalui aktiviti antioksidan dan antikanser, diikuti dengan mengenal pasti sebatian yang terdapat di dalam ekstrak menggunakan kromatografi gas-spektrometer jisim. Dedak padi dikeringkan menggunakan ketuhar-pengeringan dan beku-pengeringan. Dedak padi yang kering telah diekstrakkan dengan menggunakan 80% metanol. Ekstrak dedak padi daripada pengeringan beku menunjukkan peratusan hasil yang tinggi iaitu 12.5 % dan jumlah kandungan fenolik yang tinggi iaitu 9.845 ± 1.478 mg/g. Ekstrak dedak padi daripada pengeringan ketuhar menunjukkan peratusan hasil yang rendah iaitu 9.0% dan jumlah kandungan fenolik yang rendah iaitu 2.2 ± 0.74 mg/g. Aktiviti antioksidan dedak padi dinilai menggunakan asai DPPH. Ekstrak dedak padi daripada pengeringan beku menunjukkan peratusan perencatan yang tinggi iaitu 62.5 ± 0.01 % dan nilai IC_{50} yang rendah iaitu 76 μ g/ml. Ekstrak dedak padi daripada pengeringan ketuhar menunjukkan peratusan perencatan yang rendah iaitu 52.3 ± 0.01 % dan nilai IC_{50} yang tinggi melebihi 500 μ g/ml. Bagi asai sitotoksiti, ekstrak dedak padi mentah daripada kedua-dua pengeringan menunjukkan ketoksikan yang tinggi terhadap MC7 sel line berbanding sel line yang lain. Gliserin dan asid lemak adalah sebatian utama yang dikesan menggunakan kromatografi gas-spektrometer jisim. Sebatian minor yang dikesan adalah sebatian fenolik.

CHAPTER 1

INTRODUCTION

Exploitation towards natural and economical bioactive compounds is increasing due to mounting concern over the safety of synthetic antioxidants for instance butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) (Iqbal *et al.*, 2005). These synthetic antioxidants are widely used as food additive, in order to maintain food shelf life and withstand from various treatments that can harm the originality of the foods. Like natural antioxidants, their main target is to delay and prevent food oxidation from occurring (Carocho and Ferreira, 2013). However, higher consumption of synthetic antioxidants may cause adverse effects to human (Sultana *et al.*, 2007).

Natural products are proven to possess many beneficial properties without adverse effects towards animal (Ryan, 2011). There are many therapeutic uses of natural product especially in traditional and folk medicines. For instance, natural sources are used to produce anticancer drugs used in cancer chemotherapy like colchicines, taxol and flavonoids. They are responsible to alter biochemical mechanism such as inhibit proliferation, promote apoptosis and modulate pathways of signal transduction by altering the expression of key enzymes (Chen *et al.*, 2005)

Rice bran is the most abundant product from rice-milling process and about 63 to 76 million tons of rice bran is produced every year. It produced from the outer layer of brown rice and can be used as animal feed stuff. It is a good source of vitamins and

minerals. It contains many bioactive compounds since it exhibits phenolic antioxidant and anticancer properties (Butsat and Siriamornpun, 2010). Due to the abundance of this natural product, this research was conducted to find easily available source of bioactive compounds for possible applications in the pharmaceutical industry.

1.2 OBJECTIVES

- 1) To compare different methods of drying rice bran and extract bioactive compounds present in rice bran.
- 2) To conduct antioxidant and anticancer assays.
- 3) To determine bioactive compounds present in rice bran using gas chromatography-mass spectrometry (GC-MS).

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