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ANTIOXIDANT ACTIVITY OF MELON FRUIT PEEL EXTRACTS

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Abstract

The present study was conducted to evaluate the antioxidant activity of peel extract from three types of melon, *Cucumis melo var cantalupensis*, *Cucumis melo var inodorus* and *Citrullus lanatus* in family Curcurbitaceae. The extract was prepared with methanol respectively. 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay were used to study their antioxidant activity. The extracts were compared with commercial antioxidant, butylated hydroxytoluene (BHT). The highest scavenging effect from peel extract was presented by *Cucumis melo var inodorus* with the value of 52.7 ± 9.1µg/ml (IC_{50} = 4.61). BHT showed the lowest IC_{50} value 1.71 with the scavenging activity 90.0 ± 1.7µg/ml. Low IC_{50} value will indicates the strong ability of the extracts to act as DPPH scavenger.

Keywords: *antioxidant, DPPH, melon peel extracts*

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Introduction

Reactive oxygen species (ROS) is free radicals consisting oxygen which is released within human body that happens during the consumption of oxygen. The small quantity of reactive oxygen species is good for growth and signal transduction, but sometimes it will cause certain disease conditions such as cancer, ageing, cardiovascular and neurogenerative diseases when their amount exceed more than the body required (Moo-Huchin *et al.,* 2015). This consequence of overproduction of reactive oxygen species as well as lack of the antioxidant as defend mechanisms is known as oxidative stress (Wu *et al.,* 2013). Thus, in order to avoid the oxidative stress, reactive oxygen species need to be balanced by maintaining certain antioxidants at a sufficient quantity (Moo-Huchin *et al.,* 2015).

Antioxidant can be classified as the substances that prevent oxidation from occurring. It is capable to block the radical initiated reactions by neutralizing free radicals before they can damage the cells and also reverse the effect on specific cells that have been damaged (Kokila *et al*., 2016). There are several attentions among researchers in the past years until now have been focused toward the benefits of antioxidant in nutrition because they are able to avoid some diseases and enhance the health conditions (Skotti *et al*., 2014)

Literature Review

Antioxidant play role as agent that protect the human body (Tanamatayarat, 2016). This substance inhibits oxidation by protecting cells from damaging effects of reactive oxygen species. It is able to neutralize free radicals before they are able to damage and undo certain effects that have occurred

in specific cells (Kokila *et al.,* 2016). This statement is also supported by De Marino *et al,* 2009 in which the free radicals are converted into molecules with harmless properties by and radical-chained reactions are inhibited by antioxidant action. Its capability to scavenge free radicals has grabbed much interest (Baba & Malik, 2015).

Nowadays, the research on the bio waste such as fruit peels has become a common thing in order to determine an effective method to extract the bioactive compounds that antioxidant characteristic from fruit peels which can improve health conditions. In addition, these fruit peels are source for antioxidant that are low cost, eco-friendly, always available and natural (Kokila *et al*, 2016).

There are several species of Cucurbitaceae family are investigated for their antioxidant activity since they were used as cure for diabetic disease. (Chekroun *et al.,* 2015) According to Hong *et al.* (2015) *Citrullus lanatus* effective role in oxidative stress reduction via the phytochemical lycopene has been well-informed. Besides that, it also composed of natural compound such as ascorbic acid (Kim *et al.,* 2014). As for *Cucumis melo var. inodorus* and *Cucumis melo var. cantalupensis,* they contain a lot of pro-vitamin A and vitamin C and great origin of nutrients (Laur & Tian, 2011).

Methods

Preparation of melon peel extracts

Each fruit were peeled from their flesh and dried in oven at 60°C for three days. Then, 10g sample of powder were weighed and separately extracted using 100 ml methanol for 30 minutes. The suspension was filtered by using Whatman filter paper and was evaporated by using rotary evaporator. The extracts were kept at 4°C.

DPPH free radical scavenging assay

The antioxidant activity of the melon peel extracts was determided by DPPH free radical scavenging assay as describes by Wakid *et al.,* (2014) with some modifications. 25 µl of 8 mg/ml DPPH solution was added into each sample that has different concentration making the total volume of the mixture equal to 1 ml. The reaction mixture was incubated at room temperature and allowed to react for 30 minutes. The optical density was measured at 520nm using UV-Vis spectrophotometer. BHT was used as a positive control. DPPH was expressed in terms of ascorbic acid equivalent antioxidant capacity which was calculated based on its concentration of extract required to reduce DPPH radicals by 50%. The capability of melon peel extracts to scavenge the DPPH radical was calculated by using equation : Scavenging activity (%) = 1 – [Absorbance of sample at 520nm / Absorbance of control at 520nm] x 100. IC_{50} value was determined from the plotted graph of scavenging activity versus the concentration of melon peel extracts, which is defined as the amount of antioxidant necessary to decrease the initial DPPH radical concentration by 50%. Triplicate measurements were carried out and their activity was calculated by the percentage of DPPH scavenged.

Results and Discussion

There is a considerable interest in the food industry as well as pharmaceutical industy for the development of antioxidants from natural sources such as melon peel extracts which was previously a waste and not used properly to benefit from it. In this study, we found that the all three types of melon

peel extracts contain antioxidant properties. Therefore, this waste can be a source of food that contributes to human health.

DPPH free radical scavenging assay

DPPH antioxidant assay is extensively used for antioxidant acticity study due to its easy and speedy properties (Tanamatayarat, 2016). DPPH is identified as a free radical that is stable in which electron, or hydrogen radical are accepted by DPPH to form a firm diamagnetic molecule. An antioxidant compound that is capable to give hydrogen react with DPPH and get reduced (Kokila *et al*., 2016). These methods demonstrated the capability of antioxidant agents (Tanamatayarat, 2016).

The DPPH free radical scavenging activity and IC_{50} value listed in Table 1.

Table 1 Scavenging activity (%) and IC_{50} value of melon peel extracts, ascorbic acid and BHT

Samples	Scavening activity (%)	IC_{50} Value (µg/ml)
Cucumis melo var. cantalupensis	42.4 ± 11.3	5.31
Cucumis melo var. inodorus	52.7 ± 9.1	4.61
Citrullus lanatus	50.1 ± 9.6	4.93
Ascorbic acid	75.6 ± 3.0	1.90
Butylated hydroxytoluene (BHT)	90.0 ± 1.7	1.71

In DPPH assay as presented in the **Table 1** and **Figure 1**, it can be concluded that the scavenging activity of each extracts were moderately good. The highest percentage of DPPH inhibition of the extracts were recorded at their highest concentration that was at 5 mg/ml concentration with *Cucumis melo var. cantalupensis* (42.4 ± 11.3µg/ml), *Cucumis melo var. inodorus* (52.7 ± 9.1µg/ml) and *Citrullus lanatus* (50.1 ± 9.6µg/ml) respectively. Meanwhile, the DPPH inhibition presented by ascorbic acid (standard reference) and butylated hydroxytoluene (positive control) were 75.6 ± 3.0 µg/ml and 90.0 ± 1.7 µg/ml respectively. Among the three melon peel extracts, *Cucumis melo var. inodorus* was remarkably as the most excellent in scavenging the free radicals. The comparison of the mean concentration for 50% free radical scavenging activity (IC_{50}) of melon peel extracts, ascorbic acid and BHT also shown in Table 1. The IC_{50} of *Cucumis melo var. inodorus* is 4.61 µg/ml. Low IC_{50} value indicates strong ability of the extracts to act as DPPH scavenger.

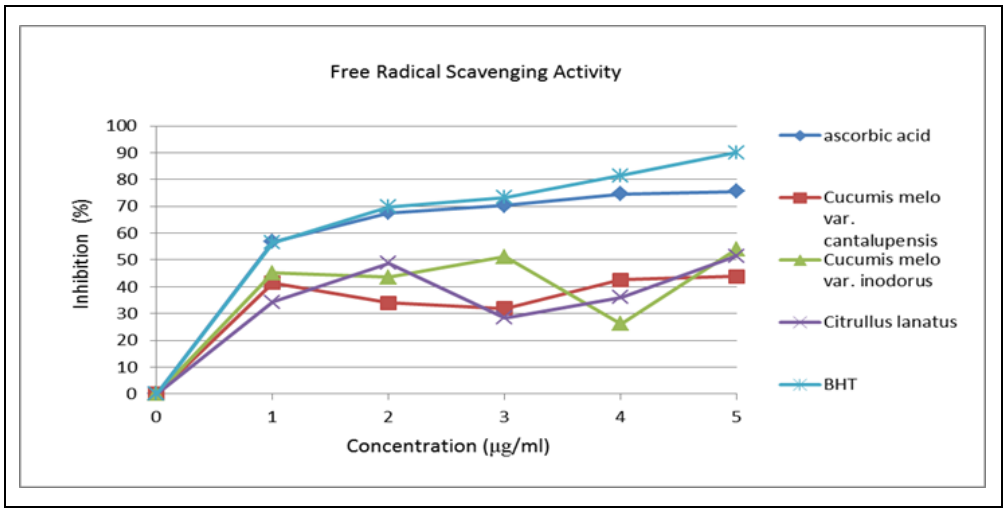

Fig 1 The free radical scavenging activity of melon peel extracts, ascorbic acid and BHT

Conclusion

The results in the present study showed that the peel extracts of species of family Cucurbitacea that include *Cucumis melo var. cantalupensis*, *Cucumis melo var.* inodorus and *Citrullus lanatus* showed scavenging effect towards DPPH free radical. More research is needed to establish the nutritional value of melon peel extracts especially in the fields of biochemical analysis that can contribute to human health.

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