ANTIOXIDATIVE PROPERTIES OF EDIBLE BIRD'S NEST MINCROPARTICULATES INCORPORATED INTO RED DATES DRINK

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Introduction

Edible bird nest (EBN) is a dried glutinous secretion from the salivary glands of several different swiftlet species. It is widely consumed as a health food due to its high beneficial effects to human health and has been considered to be one of the most precious food items by the Chinese for thousands of years. Normally, people consumed EBN products nests for health, power and prestige. As a rich source of amino acids, carbohydrates and mineral salts, bird nests have also been used for hundreds of years as an important health supplement in traditional Chinese medicines. Besides that, EBN consists of high valued glycoprotein rich with amino acids, carbohydrate, calcium, sodium and potassium [1].

Red dates, known as *hongzao*, are labeled by the Chinese as 'the king of nuts' for their super nutritional value. Dried Chinese red dates are soft and moist with a sweet smell. Heralded as a super food, red dates are often present in traditional Chinese medicine (TCM) prescriptions and brewed herbal tonics. Red dates also contain loads of Vitamin A, B1, B2, protein, calcium, phosphorous, iron and magnesium. This makes them great for people suffering and recovering from serious health conditions. In particular, red dates can help to stimulate the production of white blood cells, which improves immunity and protects the liver. It is believed that they also suppress cancer-causing cells and reduce cholesterol.

Materials and method

Preparation of bird's nest

Bird nests (clean) were ground to get three different sizes of 710µm, 300µm and 38µm using Buchi Mixer Homogenizer (B-400, Switzerland). Concentration of nests in the formula is prescribed by the pre-antioxidants test conducted to determine the $EC_{50,}$ the concentration required to reduce the original concentration of DPPH to 50%.

DPPH Radical Scavenging Assay

DPPH radical scavenging activity was determined according to assay, describe by [2] with slightly modification by reading the absorbance, measured at 517 nm using spectrophotometer (UV spectrophotometer, UV-1800).

ABTS Radical Scavenging Assay

ABTS radical scavenging activity was determined according to assay, describe by [3] with slightly modification by reading the absorbance, measured at 734 nm using spectrophotometer (UV spectrophotometer, UV-1800).

Ferric Reducing Antioxidant Power (FRAP) assay

FRAP activity was determined according to assay, describe by [4] with slightly modification by reading the absorbance, measured at 593 nm using spectrophotometer (UV spectrophotometer, UV-1800).

Statistical Analysis

The experiment was replicated and all data were analyzed using SAS version 9.1, whereas one-way Analysis of Variance (ANOVA) test was used to recognize the significant different of the samples.

Results and Discussion

Effective concentration (EC_{50})

Figure 1 showed the percentage of DPPH inhibition for EBN samples with different sizes in comparison with BHA, BHT and BHA+BHT. For EBN samples, 300 µm give the best EC_{50} value with lowest concentration (4343.41ppm) compared to 710 µm and 38 µm.

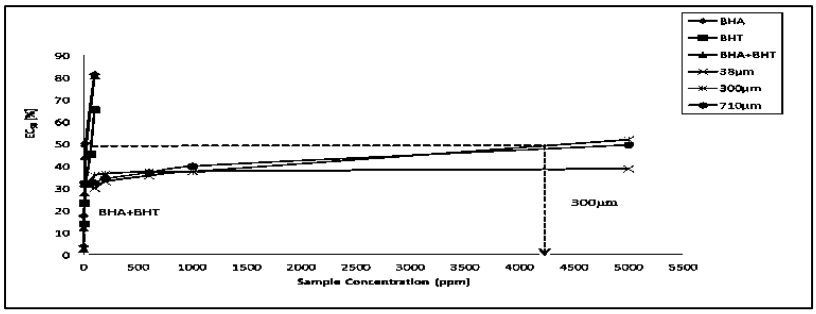

Figure 1. EC_{50} for EBN samples with different sizes in comparison with BHA, BHT and BHA+BHT using DPPH radical scavenging

BHA and BHT are synthetic antioxidants used as food additive to prevent deterioration. Although these synthetic antioxidants show stronger antioxidant activities than those of natural antioxidants, such as α- tocopherol and ascorbic acid, the use of these chemical compounds is restricted because of their induction of DNA damage and their toxicity [5]. EBN has potential antioxidant properties due to high protein content. Figure 1 showed the percentage of DPPH inhibition in three different sizes of EBN (38µm, 300µm and 710µm) and also in comparison with BHA, BHT and mixture of BHA and BHT samples. The higher the antioxidant activity, the lower is the value of EC_{50} [6]. For EBN samples, the EC_{50} value for EBN size which was 300µm was the highest compared to 710µm and 38µm. It means that, to get the 50% effective concentration of EBN, about 4343.14ppm of EBN sample should be added to the food products.

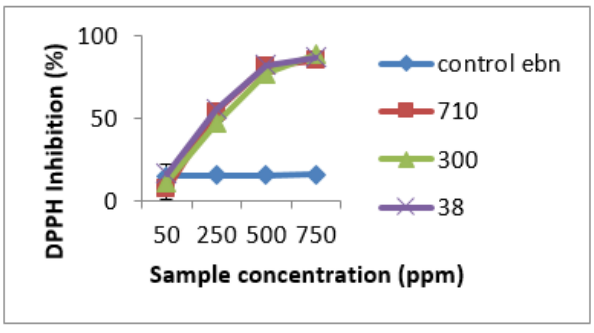

Figure 2. The percentage inhibition of DPPH free radical in drink using different particle size of EBN's powder

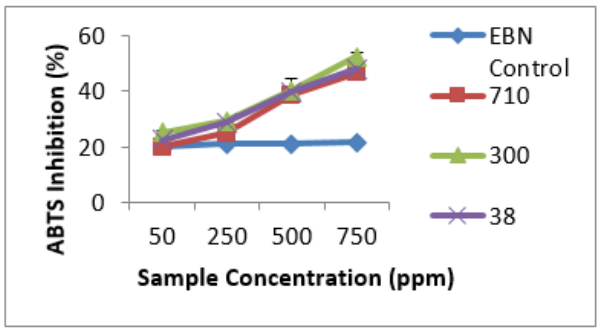

Figure 3. The percentage inhibition of ABTS free radical in drink using different particle size of EBN's powder

Based on Figure 2, after EBN powders were added in the drink, the inhibition percentage increase significantly ($P<0.05$) compared to control with 300 µm size showed the highest value (88.32%). ABTS radical scavenging also showed the same result which is 300µm size (52.2095±1.5). According to Gião [7] antioxidant capacity increased with increasing extraction time and reduces the particle size. When surface area increased, it contributed to the greater mass transfer between phases during the aqueous or alcohol extraction. Therefore, extraction time should be extended to access the antioxidant capacity of EBN with large particle size. Moreover, increase in particle size reduction extraction would enhance antioxidant activity [8].

Conclusion

EBN powders added in the drink increase the inhibition percentage compared to control with the highest at 300µm size (88.32±0.46). With increase in concentration of EBN-red dates drink, the percentage of inhibition also increased. Hence, particle size reduction may be utilized to enhance the physicochemical activity and anti-oxidative capacity of EBN-red dates drink, thus improving its quality.

Acknowledgements

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