ANTIOXIDANT ACTIVITIES OF FLOURS FROM FIVE NIGERIAN RICE CULTIVARS

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Introduction

Rice is a major cereal crop cultivated in most parts of the world which serve as a staple food for half of the world population. There is renewed interest in the consumption of local varieties of rice in Nigeria due to their low starch content and higher bioactive properties [1]. [2, 3] reported the physicochemical and functional properties of flours from five Nigerian rice cultivars. The authors found that the rice flours have promising physicochemical and functional properties that could be utilized in food applications. However, there is paucity of information on the antioxidant properties of flours from the five Nigerian rice cultivars. There is scientific evidence that dietary antioxidants play a critical role in the maintenance of human health [4]. The objective of the study was to determine the antioxidant activities of flours from five Nigerian rice cultivars.

Materials and Methods

Five Nigerian rice cultivars (*Bisalachi, Ebagichi, Lamiyatu, Majalisa* and *Waluea*) were procured from the rice breeding Laboratory of National Cereal Research Institute Badeggi, Bida Niger State, Nigeria during 2014 and 2015 harvest season. The rice cultivars were cultivated under lowland ecology with recommended agronomic practices for rice production in Nigeria. Rice flour was prepared from the milled rice grains [2] and stored in airtight plastic containers covered with lids prior to antioxidant analysis. An extract was prepared for the determination of antioxidant activities of rice flours. A 0.2 g of rice flour from each cultivar was extracted twice with 4 ml of 80 % methanol. Each time, the mixture was shaken on a shaker (Jubalo Model TW22, Germany) for 2 h at room temperature. The mixture was centrifuged at 2000 × g for 10 min. The supernatants were collected and mixed together. The residues were discarded and the supernatants labeled as the stock solutions. Total phenolic content, 1,1-diphenyl-2-picryl-hydrazil (DPPH) radical inhibition, ferric reducing antioxidant power and total flavonoid content was determined using standard methods.

Results and Discussion

The antioxidant activities of rice flours are presented in Table 1. Total phenolic content (TPC) and DPPH value of rice flours ranged from 2.21 to 2.78 mg GAE/g, and 148.85 to 167.33 µmol TE/100 g, respectively. *Walue* rice flour had the lowest TPC and DPPH value while *Majalisa* had the lowest. The DPPH value of flour from *Majalisa* and *Lamiyatu* was higher than the value (159 µmol TE/100 g) for white rice flour [5] but in close range with *Ebagichi, Bisalachi* and *Waluea*. Ferric reducing antioxidant power of rice flours ranged from 1.38 µmol TE/g (*Lamiyatu*) to 1.55 µmol TE/g (*Majalisa*) while total flavonoid content varied between 133.36 mg RE/100 g (*Majalisa*) to 141.23 mg RE/100 g (*Walue*) The FRAP content of the flours were higher than the value (1.01 to 1.14) reported for three local rice varieties (*Jamila, Jeep* and *Kwandala*) from Nigeria [1]. The variations in antioxidant activities of the flours could be attributed to variations in total phenolic content of the flours. Phenolic compounds are most important contributors to the antioxidant capacity of cereal grains, and play an essential role in the prevention and control of degenerative diseases [4].

Conclusion

The antioxidant activities of rice cultivars were in the order: *Majalisa* > *Lamiyatu* > *Ebagichi* > *Bisalachi* >*Waluea*. The result of the antioxidant properties could indicate that the rice flours have potential health properties and their increased consumption is advocated.

Table 1: Antioxidant activities of flours from five Nigerian rice cultivars

Cultivar	Total phenolic content (mg/ GAE/g)	DPPH radical scavenging activity TE/100 g)	Ferric reducing antioxidant power (μmol TE/g)	Total flavonoid (mg RE/100 g)
Bisalachi	2.26±0.02^{b}	150.17±0.05^{a}	1.38±0.23^{a}	134.55±0.60^{d}
Ebagichi	2.64±0.11^{a}	155.48±0.11^{a}	1.47±0.19^{a}	138.82±0.91^{c}
Lamiyatu	2.75±0.03^{a}	164.05±0.17^{a}	1.29±0.35^{a}	140.06±0.49^{a}
Majalisa	2.78±0.00^{a}	167.33±0.86^{a}	1.55±0.60^{a}	141.23±0.76^{b}
Waluea	2.21±0.10^{b}	148.85±0.29^{a}	1.40±0.12^{a}	133.36±0.87^{e}

Mean and standard deviation of three determinations. Mean value with different superscript in a column are significantly ($P \leq 0.05$) different from each other.

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