IAA Journal of Applied Sciences 7(1):24-28, 2021. ISSN: 2636-7246

Preliminary Determination of the Reducing Power Capacity of *Ehuru ofia* (*Monodora myristica*) Seeds

Eze-Steven, P.E[*1]., Ani, N.I[2]. and Eze, C. A[1].

[1]Department of Applied Biochemistry, Enugu State University of Science and Technology, Enugu State, Nigeria.

[2]Department of Pharmacology and Toxicology, Enugu State University of Science and Technology, Enugu State, Nigeria.

*Corresponding/Lead Author: pejansej@yahoo.co.uk; peter.ezesteven@esut.edu.ng

ABSTRACT

This work evaluated the reducing power capacity of African nutmeg (*Monodora myristica*). *Monodora myristica* seeds extracts were obtained through Soxhlet extraction using methanol. Equal volume of methanolic extract was subjected to different concentrations (0, 200, 400, 600, 800 and 1000 mg/ml) of *Monodora myristica* seed extract. The reducing power ability of the seed was investigated and its absorbance at 700nm varied with increasing concentration (0.310, 0.504, 0.602, 0.627 and 0.844nm) when compared to the result of butylated hydroxyl anisole (BHA) (1.716, 1.820, 1.921, 1.927 and 1.931nm) used as a standard. The extracts showed the ability to reduce Fe^{3+} to its lower valency state Fe^{2+} by donating an electron although this activity was not comparable to the standard used. *Monodora myristica* exhibited antioxidant activity and this shows that it would contribute appreciably in combating free radical damages when consumed.

Keywords: Reducing power capacity, African nutmeg, *Monodora myristica*, *Ehuru ofia*, Seeds

INTRODUCTION

Plants are valuable sources of medicine and have helped in the maintenance of human health since time immemorial [1,2]. They constitute an important source of active natural products which differ widely in terms of structure, biological properties and mechanisms of action [3,4,5]. Over the past decades the natural antioxidants of both nutritive and medicinal plants have been of significant interest to the pharmaceutical and food industries due to their roles in combating myriads of oxidative damages incurred by living cells and food products from free radical activities [6]. Free radicals engage in electron pairing with important biological macromolecules in their quest for stable configuration. Consequently, they cause damage to DNA, lipids, proteins and co-factors of enzymes resulting in a number of pathological disturbances including cancer, atherosclerosis, cardiovascular diseases, aging and inflammatory diseases [7,8].

Among other plants, spices hold good promise as potential harmless sources of obtaining natural antioxidants. The abundant locally consumed spice plants in Nigeria may therefore be potential rich reservoirs of antioxidants to be harnessed if studied and established [9]. *Monodora myristica* (family *Annonaceae)* is a common spice that finds wide usage in Nigeria cuisines. It is commonly called African nutmeg and cultivated mainly in southern parts of Nigeria. The seeds are economically and medicinally important and the kernel obtained from the seeds is a popular condiment used as a spicing agent in both African and continental cuisines in Nigeria [10].

AIM OF STUDY

The aim of this project research is to investigate the antioxidant activities of the methanolic extract of *Monodora myristica* seeds. Analysis was performed based on reducing antioxidant power assay. The seed extract of *Monodora myristica* was compared with commercially and standard antioxidant such as Butylated hydroxylanisole (BHA) commonly used by food and pharmaceutical industries.

Fig 1: Sample of *Monodora myristica* seeds used for the study

MATERIAL AND METHODS

Sample Collection and Identification

Dried samples of *Monodora myristica* seeds (African nutmeg) were bought at Eke Market Agbani town in Nkanu-West Local Government Area of Enugu State in the month of November 2020. The seeds were identifiedand authenticated by a plant taxonomist: Prof. Eze of the Department of Applied Biology and Biotechnology, Enugu State University of Science and Technology.

Sample Preparation and Extraction.

Seed coats of *Monodora myristica* were first removed and the inner kernel pulverized into fine powder using a grinder, followed by extraction using solvents; methanol and water. Twenty grams (20g) of the powder were weighed and subjected to Soxhlet extraction. The extract was used for antioxidant capacity test.

Reducing Power Assay

Antioxidant activity of the seed extract of *Monodora myristica* were determined in this assay as their Fe^{3+}reducing ability according to the method of [2]. Different concentrations (0, 200, 400, 600, 800 and 1000µg/ml) of each extract were prepared with 2.5ml of sodium phosphate buffer (0.1ml, pH 2.6) and 2.5ml of potassium fericyanide. The mixture was incubated in a water bath at 50^0C for 20 minutes. To this mixture, 2.5ml of 10% (25g) trichloroacetic acid was added before centrifugation at 1000rpm for 8 minutes. The upper layer of the solution (5ml) was mixed with 5ml of deionised water and 1ml of 0.1% ferric chloride was added. Absorbance was measured at 700nm using a spectrophotometer. BHA was used as reference standard for comparison and prepared in the same concentration as the extracts. Results were expressed as absorbance values at 700nm (increasing absorbance value indicated increasing reducingpower).

RESULTS

Table 1: Serial Dilution of Methanolic Extracts of *Monodora myristica*.

S/N.	1	2	3	4	5	6
Concentration (µg/ml)	0	200	400	600	800	1000
Vol. of extract (ml)	0	0.5	1.0	1.5	2.0	2.5
Vol. of methanol (ml)	2.5	2.0	1.5	1.0	0.5	0
Total vol. (ml)	2.5	2.5	2.5	2.5	2.5	2.5

Table 2: Methanolic Extracts of *Monodora myristica* and its Absorbance at 700nm.

S/N	Concentration (mg/ml)	Absorbance (nm)
1.	0	0
2.	200	0.310
3.	400	0.504
4.	600	0.602
5.	800	0.627
6.	1000	0.844

Table 3: Various concentrations of Butylated hydroxyl anisole (BHA) and its Absorbance at 700nm

S/N	Conc.(mg/ml)	Absorbance (Nm)
1.	0	0
2.	200	1.716
3.	400	1.820
4.	600	1.921
5.	800	1.927
6.	1000	1.931

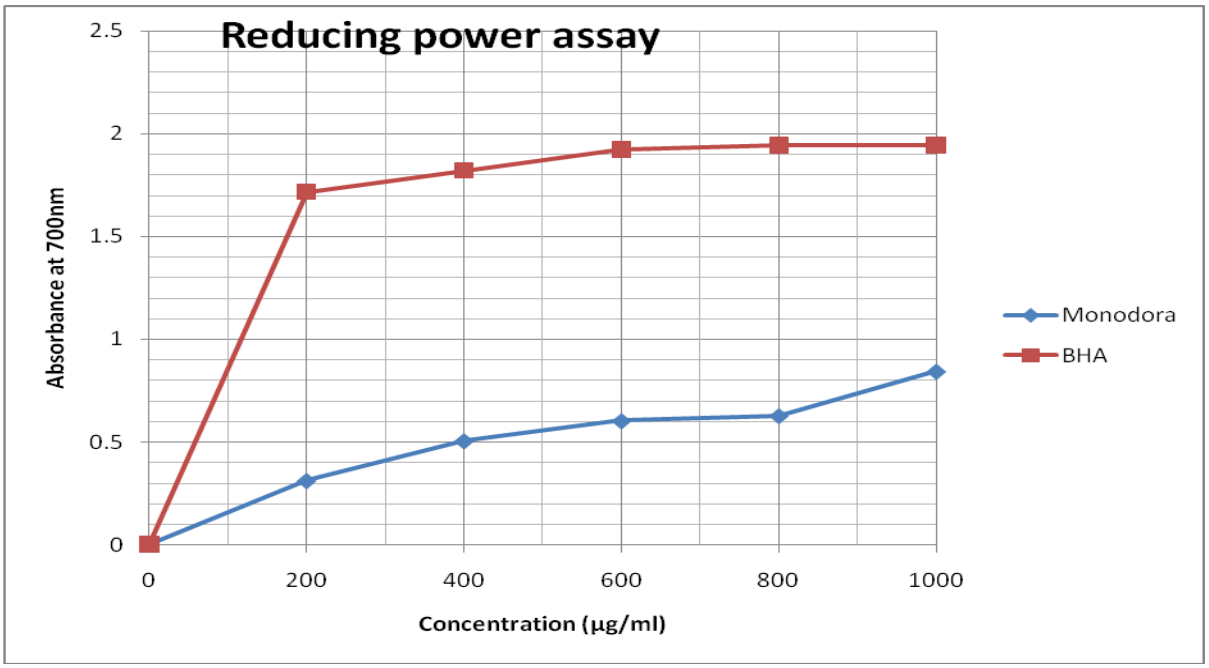

Fig 2: Graph Showing the Reducing Power Capacity of *Monodora myristica*

DISCUSSION

The utility of plants (*Monodora myristica*) as natural antioxidants is due to the wide range of active natural products inherent in them, prominent among which are the phenols and flavonoids. In the reducing power assay of *Monodora myristica,* the presence of antioxidants would result in the reduction of Fe^{3+} to its lower valence state Fe^{2+}, by donating an electron. Amount of Fe^{2+} complex can be monitored by measuring the formation of absorbance at 700nm. Increasing absorbance at 700nm indicates an increase in reduction ability [11,12,13]. The reducing properties are generally associated with the presence of reductones which have been shown to exert antioxidant action by breaking the free radical chain through electron donation [14,15,16,17]. The absorbance values obtained with the *Monodora myristica* seed extracts studied though not comparable to reference compounds

that is BHA, confirm that Fe^{3+} - Fe^{2+} transformation occurred in the presence of the extracts thereby confirming their antioxidant potentials.

CONCLUSION

The results of this project research reveal that *Monodora myristica* seeds contained secondary metabolites with antioxidant activity which appeared to be significant in the reduction of free radicals in various concentrations. Its reducing power capacity could be a plausible explanation for the antioxidant activities exhibited by this plant.Therefore, its consumption could possibly boost the antioxidant defense system, thereby reducing the free radical status in human.

REFERENCES

1. Akah, P.A., Njoku, U.O. and Okonkwo, C.C. (2012). Antioxidant activity of seed extracts of *Monodora myristica* (Annonaceae). *Int J Basic Applied Sci*. **12,** 80-87.
2. Barros, L., Bapiista, P. and Ferrreira, I.,C.F.R. (2007). Effect of Lactarius piperatus fruiting body maturity stage in antioxidant activity measured by several Biochemical assay. J *Food and Chem Toxicol*. **45,** 1731-1737.
3. Bello, M.O., Yusuf, T.A., Adekunle, A.S. and Oyekunle, J.A.O. (2014). Evaluation of the fixed oil of two commonly consumed spices, *Monodora myristica*and*Myristica fragrans,* as adjunct in food formulations. *Acad J Sci Res and Essay*. **9(13),** 607-610.
4. Bonner, J. and Varner, J.E. (2010). Phytochemicals in Plant Biochemistry. *J Bio Sci*. **6**, 252-703.
5. Cowan, M.M. (2010). Plant products as microbial agents. *J Clin Microbial Reviews*. **12,** 564-582.
6. Duh, P.D., Tu, Y.Y. and Yen, G.C. (2010). Antioxidant Activity of the aqueous extract of Harnjyur (chrysanthemum morifolium Ramat), Lebensmittel-wissenschaft and Technologies. *Int J Pharmacog*. **32,** 269-277.
7. Ekeanyanwu, C.R., Nwachukwu, P.U. and Ogu, G.I. (2010). Biochemical characteristics of African Nutmeg, *Monodora myristica*, *J Agric Sci*. **5(5),** 303-308.
8. Evans, R.W. (2012). Pharmacognosy**13 ed**Baillere Tindall, London. 527-665.
9. Hala, R.W. (2011). Comparative antioxidant activity study of some edible plants used spices in Egypt. *J Amer Sci.***7(1),** 1118-1122.
10. Iwu, M.M. (2010). Evaluation of the antihepatotoxic activity of the biflavonoids of Garciana kola seeds. *J Ethnopham.* **21,** 14-19.
11. Kigigha, L.T. and Enebi, J.C. (2012). Effect of pepper soup cooking on the antibacterial activity of *Monodora myristica. Conti. J Food Sci and Tech.***6(1),** 8-11.
12. Knight, J.A. (2012). Free radicals: their history and current status in aging and disease. J Annals of clin and lab sci. **28(6),** 331-346.
13. Nickavar, B., Kamalinelad, M. and Izadpanah, H. (2011). In Vitro Free Radical Scavenging Activity of five salvia species. *Parkis J Pharm Sci.***20(4),** 291-294.
14. Ozgen, U., Mavi, A., Terzi, Z., Yildrim, M.and Houghton, P.J. (2012). Antioxidant properties of some medicinal laminaceae species. *J Pharm Biol*. **44(2),** 107-112.
15. Rao, K.N.V., Aradhana, R., Banjii, D., Chaitanya, R.S.N. and Anilkumar, A. (2011). In vitro Antioxidant and free radical scavenging activity of various extracts of Tectona grandis Linn leaves. *J Pharm Res.* **4(2),** 440-442.
16. Tangkankul, P., Authariboonkul, P., Niyomwit, B., Charoenthamawat, P.,

Lowvitoon, N.and Trakoontivakorm, G. (2012). Antioxidant capacity, Total phenolics content and Nutritional composition of Asian Foods after thermal processing. *J Int Food Res.***16,** 571-580.

17. Uyoh, E.A., Chukwurah, P.N., David, I.A. and Bassey, A.C. (2013). Evaluation of antioxidant capacity of ocimum species consumed locally as spices in Nigeria as a Justification for increased Domestication**.** *Amer J Plant Sci.* **4(2),** 222-230.