Vol. 27 (no. 2) 85–88 30 June 2015

Biokemistri

An International Journal of the Nigerian Society for Experimental Biology

Short Communication

Antioxidant potentials of *Gongronema latifolium* (utazi) leaf extracts

Edith Adekanle* and Ugiagbe M Omozokpia,

Department of Biochemistry, Ambrose Alli University, Ekpoma, Edo State,

Correspondence: Edith Adekanle; bolarinedith@yahoo.com; Tel: +2348060610625

ABSTRACT: **This investigation was carried out to explore the antioxidant potential of *Gongronema latifolium* (utazi) leaf extracts. The homogenised sample was extracted using two different solvents: methanol and aqueous. Total phenolic compounds, reducing power and DPPH radical scavenging activity of *Gongronema latifolium* leaf extracts were determined. Results showed that total phenol content was significantly (P<0.05) higher in methanol extract (2.73mgGAE/ml) than aqueous extract (1.13mgGAE/ml). DPPH radical scavenging activity was higher in methanol extract (17.94%) than aqueous extract (15.50%). The reducing power of methanol extract (0.94 ± 0.04) was non-significantly (P<0.05) higher than that of aqueous extract (0.20 ± 0.00). Based on this result, methanol extract of *Gongronema latifolium* revealed a higher antioxidant potential compared to aqueous extract. However, the study showed that *Gongronema latifolium* leaf extract is a good source of natural antioxidant due to its high antioxidant potentials.**

KEYWORDS: ***Gongronema latifolium,*** **antioxidant, phytochemicals, spectrophotometer, herbal.**

Received: 13 June 2015: Revised 17 June 2015; Approved: 17 June 2015.

INTRODUCTION

Lipid peroxidation is a crucial step in the pathogenesis of several disease states in adult and infants. Reactive oxygen species (ROS) are generated spontaneously in cells during metabolism and are implicated in the aetiology of different degenerative diseases, such as heart diseases, stroke, rheumatoid arthritis, diabetes and cancer (Oloyede and Afolabi, 2012). These have however been terminated by antioxidants by the removal of free radical intermediates and the inhibition of other oxidative reactions. The body's internal production of antioxidants is not enough to neutralize all the free radical; this can be helped by increasing dietary intake of antioxidants in the hope of maintaining health and preventing diseases (Oloyede and Afolabi, 2012).

Consequently, there is a great deal of interest in edible plants that contain antioxidants and health-promoting phytochemicals as potential therapeutic agents. One of such plant is *Gongronema latifolium*, commonly known in the Southeast of Nigeria as "utazi", is a climbing herb that has made name as a special grade vegetable, and is widely trusted to have strong nutritional and medicinal values (Enemor *et al*., 2014). It has a very wide spread distribution as it is easily propagated. *Gongronema latifolium* is utilizable in many different ways in different places to prepare delicacies in homes. In many situations it is part of herbal prescriptions or preparations administered by herbalists for treatment and or management of certain health challenges. *Gongronema latifolium*is consumed fresh, cooked or dried and applied as powdery spice. Whichever way, it carries a moderate bitter taste that contributes tremendously to its flavour. Locally, apart from its nutritional flavour, it is believed to carry powerful medicinal qualities useful for amelioration of malaria, diabetes, and hypertension, among others (Enemor *et al*., 2014). *Gongronema latifolium* has been reported to have antimicrobial efficacy (Eleyinmi, 2007; Adeleye *et al*., 2011). In line with local beliefs that it cures hypertension, it was reported that *Gongronema latifolium* reduced glucose levels in experimental animals induced with diabetes (Nnodim *et al*., 2012). The ability of extract of *Gongronema latifolia* to decrease kidney function markers has also been reported in literature (Onuoha and Chinaka, 2013). However, this study is aimed at documenting the antioxidant potential of the locally consumed *Gongronema latifolium* (utazi).

MATERIALS AND METHODS

Plant Material/Preparation of Extract

Utazi (*Gongronemalatifolium*) samples were bought from a local market at Ekpoma, Edo State. The sample was identified in Botany department of Ambrose Alli University, Ekpoma. Samples of *Gongronema latifolium* were sun dried for three days and were ground using an electric blender (Philips NL 9206AD-4 Drachten) and then kept in an air-tight container. About 5g each of the milled sample was weighed into a conical flask and soaked with 100ml of methanol (80% v/v) and aqueous respectively for 24 hours. It was filtered using a mash cloth and stored for the investigation.

Determination of Reducing Power

The method of Dehpour *et al*. (2009) was adopted in determining the reducing power of *Gongronema latifolium* leaf extracts. 1ml of extract (aqueous and methanol respectively) was mixed with 2.5 ml of phosphate buffer (0.2M, pH 6.6) and potassium ferricyanide [$K_3Fe(CN)_6$] (2.5ml, 1%v/v). The mixtures were incubated at 50°C for 20minutes. Then, trichloroacetic acid (10%, 2.5ml) was added to the mixture to terminate the reaction then, the mixture was centrifuged (Hettich, roosilennta III) at 3000rpm for 10minutes. Finally, the supernatant (2.5ml) was mixed with distilled water (10ml) and $FeCl_3$ (0.5ml; 0.1%w/v). The absorbance of the solution was measured at 700nm in spectrophotometer (Jenway, 6715UV/VIS spectrophotometer) against a blank. Ascorbic acid solution, 1mg/ml, similarly treated as above was used as positive control. Absorbance of the mixture indicated the reducing power.

DPPH Radical Scavenging Activity

The free radical scavenging activity of *Gongronema latifolium* leaf extract was determined using 1,1-diphenyl-2-picryl-hydrazil (DPPH) as described by Chang *et al*. (2001) with slight modification. In details, 2ml of 0.1mM ethanol DPPH solution was added to 2ml of extract solutions and the contents were stirred vigorously for 15 seconds. The solutions were allowed to stand at dark place at room temperature for 30minutes for reaction to occur (that is, a colour change from purple to yellow). The mixture was allowed to stand at room temperature for 30 minutes before reading the absorbance at 517nm from a spectrophotometer (Jenway, 6715UV/VIS spectrophotometer) against a blank. The DPPH radical scavenging was calculated from the equation below:

$$\text{DPPH scavenging effect (\%)} = \left(\frac{A_0 - A_1}{A_0} \right) x\ 100$$

A_1 = absorbance of the reaction mixture/standard. Ascorbic acid was used as the standard

A_0 = absorbance of the control (containing all the reagents except the extract)

Table 1: Antioxidant Potential of *Gongronema latifolium* Leaf Extracts

Parameters	Extracts		
	Methanol	Aqueous	Standard (vitamin C)
Total Phenol Content (mgGAE/g)	2.73 ± 0.10[a]	1.13 ± 0.05[b]	-
DPPH Scavenging Activity (%)	17.94 ± 0.91[b]	15.50 ± 4.14[b]	89.87 ± 1.21[a]
Reducing Power	0.94 ± 0.04[a]	0.20 ± 0.00[a]	-

Values are presented in mean ± standard deviation (SD) of triplicate determinations. Values with the same superscript letter across rows are not significantly different (P>0.05). GAE denotes gallic acid equivalent.

Total Phenolic Content

Total soluble phenolic content in the *Gongronema latifolium* (Utazi) leaf extract was determined with Folin-Ciocalteu reagent according to the method described by Wolfe *et al*. (2003) using Gallic acid as a standard with slight modifications. Briefly, 0.5 ml of each extract (methanol and aqueous) was measured into a volumetric flask. About 5ml of Folin-Ciocalteu reagent was added and the content in the volumetric flask was mixed thoroughly. After 3 minutes, 4 ml of Na_2CO_3 (75g/L) was added, allowed to stand for 30 minutes with intermittent shaking and the absorbance was read against a blank at 760 nm from a spectrophotometer (Jenway, 6715UV/VIS spectrophotometer).

Statistical Analysis

The data obtained in this study were subjected to student t-test analysis using GraphPadInStat tm (V2.04a). Results were recorded as mean ± standard error of mean. The difference was considered statistically significant when P<0.05.

RESULTS AND DISCUSSION

The results of the determination of the antioxidant capacity of extracts of *Gongronema latifolium* leaf are presented in Table 1. Methanol extract had a significantly (P<0.05) higher total phenolic content than aqueous extract. The data from the DPPH scavenging activity of different extracts of *Gongronema latifolium* revealed no significant difference (P > 0.05) between the methanolic extract and aqueous extract but were significantly (P < 0.05) lower than observed in the standard (vitamin C).Data from the accessed reducing potentials of different extracts of *Gongronema latifolium* shows that methanol extract recorded a higher reducing power compared to aqueous extracts. However, there was no significant difference between the two extracts analysed.

Due to the high rate of consumption of utazi (*Gongronema latifolium*) in the country (Nigeria); considering the medicinal importance and the health implications of its consumption, this work is aimed at evaluating the antioxidant potentials of two different extracts (methanolic and aqueous) of the plant. From the result, total phenolic content was highest (2.73 ± 0.10mgGAE/ml) in methanol extract than in aqueous extract (1.13 ± 0.05mgGAE/ml). Although studies on the total phenol content of *Gongronem alatifolium* have not been documented, Anokwuru *et al*. (2011) reported a total phenol content in aqueous and methanol *Acalypha wilkesiana* leaf extracts as 10.80 ± 0.4mgGAE/ml and 13.77 ± 0.01 mgGAE/ml respectively which was higher than observed in the result of this study. However, mean comparison showed that there is a significant (P<0.05) different between methanol and aqueous *Gongronema latifolium* extracts. Phenolic compounds in plants have the capacities to quench lipid peroxidation, prevent DNA oxidative damage and scavenging of reactive oxygen species (ROS), such as superoxide, hydrogen peroxide and hydroxyl radicals (Yoo *et al.,* 2008). According to Kaushik *et al.* (2010), phenolic components are potential antioxidants, free radical terminators. These compounds are the main agents that can donate hydrogen to free radicals and thus break the chain reaction of lipid oxidation at the first initiation step. Thus, methanol extract would be a better opinion to terminate free radicals than aqueous extract.

DPPH radical scavenging ability is widely used as an index to evaluate the antioxidant potentials of medicinal plants (Kumbhare *et al*., 2012). Usually, higher total phenolic content leads to better DPPH radical scavenging activity (Ebrahimzadeh *et al*., 2010). As earlier reported, this situation was observed in this study. Leaf extract with high phenolic contents recorded high DPPH scavenging effect but were not comparable to the DPPH activity of vitamin C (standard). The results suggest that the presence of these components

present in the extracts synergises their actions responsible for the DPPH activity.

Among the examined extracts, methanol extracts had the highest (0.94 ± 0.04) reducing power than aqueous (0.20 ± 0.00). This was lower than observed in *Habiscus cannabinus* as reported by James *et al*. (2013). According to them, *Habiscus cannabinus* recorded a reducing potential of 0.51 ± 0.001. In reducing power assay, the presence of antioxidants in the samples would result in the reduction of Fe^{3+} to Fe^{2+} by donating an electron (Ebrahimzadeh *et al*., 2010); the higher the reducing power, the greater the antioxidant activity (Pakade *et al*., 2013). Thus, methanol extract, which had the highest phenolic content, had a higher reducing potential compared to aqueous extract.

Conclusion

The study has shown that leaf extracts of *Gongronema latifolium* plant contained low phenolic. The extracts also showed poor antioxidant capacities as depicted by their free radical scavenging activity and reducing power compared to the standard. In spite of this observation, extracts with high phenolic contents showed higher antioxidant capacities. Therefore, all the extracts possess good phytochemical and antioxidant capacities which make the plant potent in managing disease conditions such as inflammations, tumours, ulcers, etc.

REFERENCES

Adeleye, I.A., Omadime, M.E. and Daniels, F.V. (2011). Antimicrobial Activity of Essential Oil and Extracts of *Gongronemalatifolium* on Bacterial Isolates from Blood Stream of HIV Infected Patients. *Journal of Pharmacology and Toxicology*, **10**: 392–405.

Anokwuru, C.P., Anyasor, G.N., Ajibaye, O., Fakoya, O. and Okebugwu, P. (2011).Effect of Extraction Solvents on Phenolic, Flavonoid and Antioxidant Activities of Three Nigerian Medicinal Plants. *Nature and Science*, **9**(7): 53–57.

Chang, S.T., Wu, J.H., Wang, S.Y., Kang, P.L., Yang, N.S. and Shyur, L.F. (2001). Antioxidant Activity of Extracts from Acacia confuse Bark and Heartwood. *Journal of Agricultural and Food Chemistry*, **49**: 3420–3424.

Dehpour, A.A., Ebrahimzadeh, M.A., Nabavi, S.F. and Nabavi, S.M. (2009).Antioxidant Activity of Methanol Extract of *Ferula asafoetida* and its Essential Oil Composition. *Grasasaceites*, **60**(4): 405–412.

Ebrahimzadeh, M.A., Nabavi, S.M., Nabavi, S.F., Bahramian, F. and Bekhradnia, A.R. (2010).Antioxidant and Free Radical Scavenging Activity of *H. officinalis L. Var. angustifolius*, *V. odorata*, *B. hyrcana*and *C. speciosum. Pakistan Journal of Pharmaceutical Science*,**23**(1): 29 – 34.

Eleyinmi, A.F. (2007). Chemical Composition and Antimicrobial Activity of *Gongronem alatifolium*. *Zhejiang University Science*, **8**: 352–358.

Enemor, V.H.A., Nnaemeka, O.J. and Okonkwo, C.J. (2014). Minerals, Vitamins and Phytochemical Profile of Gongronemalatifolium: Indices for Assessment of its Free Radical Scavenging, Nutritional and, Antinutritional Qualities. *International Research of Biological Sciences*, **3**(1): 17–21.

James, S.A., Ladan, M.J. and Goje, D.J. (2013). Antioxidant Potential of *Habiscus cannabinus* methanolic extract. *Science World Journal*, **8**(1): 1–12.

Kaushik, R., Narayanan, P., Vasudevan, V., Muthukumaran, G. and Antony, U. (2010). Nutrient Composition of Cultivated Stevia Leaves and the Influence of Polyphenols and Plant Pigments on Sensory and Antioxidant Properties of Leaf Extracts. *Journal of Food Science and Technology*, **47**: 27–33.

Kumbhare, M.R., Guleha, V. and Sivakumar, T. (2012).Estimation of Total Phenolic Content, Cytotoxicity and *in-vitro* Antioxidant Activity of Bark of *Moringa oleifera*. *Asian Pacific Journal of Tropical Diseases*,**2**(2):144 – 150.

Nnodim, J., Emejulu, A., Ihim, A. and Udujih, H.I. (2012). Influence of *Gongronema latifolium* on Some Biochemical Parameters in Alloxan Induced Diabetes. *International Journal of Positive Behavioural Support*, **1**(1): 13–17.

Oloyede, O.I. and Afolabi, A.M. (2012).Antioxidant Potential of *Garciniakola*. *Academic Research International*, **2**(2): 29–53.

Onuoha, S.C. and Chinaka, N.C. (2013).Carbontetrachloride Induced Renal Toxicity and the Effect of Aqueous Extract of *Gongronema latifolium* in Wistar Rat. *DrugDiscovery*, **4**(11): 15–16.

Pakade, V.E., Cukrowska, E. and Chimuka, L. (2013).Metal and Flavonol Contents of *Moringa oleifera* grown in South Africa. *South African Journal of Sciences*,**109**(3): 835 – 837.

Wolfe, K., Wu, X. and Liu, R.H. (2003). Antioxidant activity of apple peels. *Journal of Agriculture and Food Chemistry* **51**:609–614.

Yoo, K.M., Lee, H.C., Lee, H., Moon, B. and Lee, .Y.C. (2008).Relative Antioxidant and Cytoprotective Activities of Common Herbs. *Food Chemistry*,**106**:929 – 936.