International Journal of Research in Medical Sciences
Analike RA et al. Int J Res Med Sci. 2015 Apr;3(4):891-895
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: 10.5455/2320-6012.ijrms20150413

Research Article

Effects of *Gongronema latifolium* on blood lipids, lipoproteins and glucose values in adult Nigerians

Rosemary Adamma Analike*, Joseph Eberendu Ahaneku

Department of Chemical Pathology, Faculty of medicine, Nnamdi Azikiwe University, Nnewi Campus, Nigeria

Received: 05 February 2015
Revised: 20 February 2015
Accepted: 08 March 2015

***Correspondence:**
Dr. Rosemary Adamma Analike,
E-mail: rose_analyke@yahoo.com, ra.analike@unizik.edu.ng

ABSTRACT

Background: The study evaluates the beneficial effects or otherwise of *Gongronema latifolium* (utazi) consumption on plasma lipid profile and blood glucose in healthy subjects.
Methods: The study was conducted on twenty (20) apparently healthy subjects (10 males and 10 females), within the age range of 20-55years who were randomly recruited from Nnamdi Azikiwe University Teaching Hospital (NAUTH) staff and medical students in Nnewi Campus. Twenty experimental subjects (10 males and 10 females) were fed with 5g/day of fresh *Gongronema latifolium* leaves for six weeks. Blood samples were collected at baseline and every week for six weeks and the biochemical parameters analyzed using standard laboratory methods.
Results: There were significant reductions in the levels of plasma glucose (3.85 ± 0.14 vs. 4.92 ± 0.31 mmol/l), cholesterol (3.60 ± 0.43 vs. 4.56 ± 0.67 mmol/l), triglycerides (0.73 ± 0.19 vs. 0.96 ± 0.20 mmol/l), Low Density Lipoprotein Cholesterol (LDL-C) (1.97 ± 0.48 vs. 2.70 ± 0.67 mmol/l) and LDL-C/High Density Lipoprotein Cholesterol (HDL-C) ratio (1.32 ± 0.44 vs. 2.11 ± 0.72 mmol/l) of the subjects that were fed with *Gongronema latifolium* leaves for six weeks compared with their baseline values; all $P < 0.05$.
Conclusion: The result of this study showed that *Gongronema latifolium* has hypoglycemic and hypolipidemic effect on healthy subjects and might be beneficial for the management of diabetes mellitus and cardiovascular diseases.

Keywords: Glucose, Lipids, Lipoprotein, *Gongronema latifolium*

INTRODUCTION

Gongronema latifolium (Figure 1) is an edible rainforest plant native to the South Eastern part of Nigeria. The common name for *G. latifolium* is amaranth globe leaves while the English name is Bush buck. In Ghana, the Akan-Asantes knows it as 'kurutu nsurogya'. The Serers in Senegal call it 'Gasub', while the Kissis, Mende and Temnes in Sierra leone call it 'Ndondo-polole', 'Tawa-bembe' and 'Ra-bilong' respectively.[1] In Nigeria, the Efik/Ibibio people in south-eastern Nigeria call the leaves 'Utasi', the Igbos call it 'Utazi' and the Yoruba people 'Arokeke' or 'madumaro'.[2] It has been widely used in folk medicine as spice and vegetable[3] and for maintaining normal blood glucose levels.[4]

However, not much scientific studies have been done in human model to establish the hypoglycemic and hypolipidemic effects of extracts from *G. latifolium* leaves. Plant has provided food, shelter, wealth and has helped to maintain a relatively disease Free State when properly utilized as herbal medicine.[5] They also have fewer side effects.[6]

Medicinal plants constitute an effective source of both orthodox and traditional medicine, herbal medicine has been shown to have genuine utility with about 80% of rural dwellers in developing countries depending solely on it for primary health care.[7] Herbal remedies or food supplements have increasingly become attractive alternatives to prevent or treat hyperglycemia and

hypercholesterolemia. Excellent safety profile, cost effectiveness and multiple beneficial effects aimed at improving the total quality of life of man, all contribute to the emerging trend of the increasing usage of dietary or herbal supplement around the world.[8] Previous researchers have demonstrated that some plant chemicals regarded as anti-nutrients have the potential to reduce the risk of several deadly diseases in man.[9] Further reports show that these phytochemicals reduce LDL-cholesterol involved in depositing fat in the arteries, prevent blood clotting which can reduce the risk of heart attack or stroke.[10] A great number of traditional medicinal plants are still being used to treat diabetes and cardiovascular disease. [11]

G. latifolium is edible plant widely consumed in south eastern Nigeria. The south-eastern inhabitants of Nigeria are known for their high consumption of vegetables and some of these vegetables form part of foods consumed on special conditions, including ill health and times of convalescence.[12] This stresses the role of plants in the life of man from past till date. As an old companion of man, it has provided food, shelter, wealth and has helped to maintain a relatively disease free state when properly utilized as herbal medicine.[5] Although, modern medicine may be available in developing countries but the use of herbs for treatment of diseases has often maintained popularity for historical and cultural reasons.[13]

There have been speculations that these plant products after consumption have effect on blood glucose and lipid profile but there is no scientific evidence documented for human model. The incidence of diseases associated with hypercholesterolemia and hyperglycemia are on the increase in Nigerian population and the economic status of most of the affected individuals pose great hindrance in procuring the effective but expensive drugs. However, adverse effects associated with these therapeutic drugs[14] call for the evaluation of other alternative sources for managing these diseases. In recent times, food supplements have increasingly become attractive alternatives to prevent or treat various types of diseases[15] and the current shift away from the use of synthetic chemicals in food processing necessitate a further evaluation of this widely available but underutilized tropical medicinal plants.[16] This research work is therefore aimed at exploring the potential effects of *Gongronema latifolium* (Utazi) on blood glucose and lipid profile in human subjects.

METHODS

Subjects

A total of twenty (20) apparently healthy subjects (10 males and 10 females) who are staff of Nnamdi Azikiwe University teaching hospital and medical students in Nnewi campus within the age range of 20-55 years were randomly recruited for the study. They were neither diabetic nor hypertensive nor on any medication at the time of the study. The subjects were permitted to continue on their normal diet during the study.

Collection and preparation of G. latifolium leaves

Fresh leaves of *G. latifolium* were plucked from the farm in Nnewichi village of Nnewi town and a sample was authenticated by a certified Botanist in Nnamdi Azikiwe University, Awka. The leaves were washed and allowed to drain completely, 5 g/day was weighed and served to each subject. In an attempt to maximize its medicinal value and to minimize delayed absorption, each subject consumed their portion of the leaves raw between 8am and 10am (before breakfast) each day for a period of six weeks. It was believed that six weeks would be enough for the leaves to exert its full medicinal effect on the subjects.

Figure 1: *Gongronema latifolium* leaves.

Sample collection

Initial baseline collection of 6 ml of fasting Blood samples were obtained from all the participants between 8am and 10am before the consumption of *G. latifolium* leaves and dispensed into fluoride oxalate containers (2 ml) and EDTA containers (4 ml). Following consumption of the *G. latifolium* leaves, fasting blood samples were similarly collected from the subjects between 8am and 10am on Monday of every week till the end of the six weeks period. The plasma and serum samples were respectively used for glucose estimation and total cholesterol, Triglycerides, High Density lipoprotein cholesterol (HDL-C) and Low Density Lipoprotein cholesterol (LDL-C) measurements.

Analytical procedures

All the parameters were analyzed using colorimetric assay kits from Randox Laboratories LTD. United Kingdom.

Statistical method of analysis

Results of parameters analyzed were expressed as mean ± SD. The mean differences were assessed using Analysis of variance and Paired Student-t test and Post hoc. The data were analyzed using Statistical Package for Social Sciences (SPSS) Version 19. Confidence limit was chosen at 95% (P <0.05). P <0.05 = significant while P >0.05 = Insignificant.

RESULTS

Plasma glucose, total cholesterol, LDL-C/HDL-C of the subjects that consumed *G. latifolium* were significantly reduced at week four, five and six compared with the baseline, all at P <0.05. The baseline value of triglyceride declined significantly after six weeks of *G. latifolium consumption*, (P<0.05).

Significant decrease was observed with the mean blood glucose value at weeks three, four five and six (P <0.05) compared with the mean baseline blood glucose. Similarly, the mean plasma cholesterol at weeks four, five and six were significantly reduced compared with the baseline plasma cholesterol value (P <0.05). The mean plasma triglyceride showed a significant reduction at week six (P <0.05). The mean plasma LDL-C value reduced significantly from weeks five and six compared with baseline plasma LDL-C value (P <0.05). The mean plasma LDL-C/HDL-C ratio significantly reduced from weeks four, five and six compared with the baseline value (P <0.05) (Table 1).

Table 1: Comparison of the mean ± SD of the plasma glucose, lipid parameter values of subjects that were fed with *G. latifolium* leaves.

Parameters	Baseline (n=20)	Week one (n=20)	Week two (n=20)	Week three (n=19)	Week four (n=19)	Week five (n=17)	Week six (n=17)
Glucose (mmol/L)	4.92 ± 0.31	4.73 ± 0.30	4.70 ± 0.30	4.15 ± 0.16*	4.05 ± 0.10*	3.95 ± 0.11*	3.85 ± 0.14*
Tot. chol. (mmol/l)	4.56 ± 0.67	4.43 ± 0.61	4.23 ± 0.59	4.09 ± 0.58	3.95 ± 0.52*	3.81 ± 0.50*	3.60 ± 0.43*
Trigly. (mmol/l)	0.96 ± 0.20	0.90 ± 0.22	0.92 ± 0.31	0.81 ± 0.19	0.80 ± 0.18	0.79 ± 0.18	0.73 ± 0.19*
HDL-C (mmol/l)	1.35 ± 0.27	1.41 ± 0.28	1.42 ± 0.27	1.48 ± 0.26	1.53 ± 0.25	1.51 ± 0.28	1.55 ± 0.282
LDL-C (mmol/l)	2.70 ± 0.67	2.60 ± 0.66	2.42 ± 0.63	2.28 ± 0.62	2.17 ± 0.60	2.10 ± 0.48*	1.97 ± 0.48*
LDL-C / HDL-C	2.11 ± 0.72	1.95 ± 0.72	1.79 ± 0.65	1.62 ± 0.61	1.47 ± 0.51*	1.46 ± 0.48*	1.32 ± 0.44*

All values are expressed as mean ± SD; *Significantly lower than baseline, P<0.05

DISCUSSION

The findings in this study showed that after consumption of *G. latifolium* leaves, there was significant reduction in the mean values of plasma glucose, total cholesterol, triglycerides, Low Density Lipoprotein cholesterol (LDL-C) and LDL-C/High Density Lipoprotein Cholesterol (HDL-C) ratio compared with their baseline values.

The finding of reduced plasma glucose and lipid parameters recorded in the subjects suggest that *G. latifolium* leaves may possess hypoglycemic and hypolipidemic properties and this is consistent with previous studies that reported that aqueous and ethanolic *G. latifolium* extracts had hypoglycemic, hypolipidemic and antioxidative properties in animal model.[17] This observed hypoglycemic potency of *G. latifolium* has been suggested to be mediated through the activation of hexokinase, phosphofructokinase, glucose-6-phosphate dehydrogenase and inhibition of glucokinase in the liver.[18] When these enzymes are activated, glycolysis and glycogenesis proceed faster resulting in lowering of blood glucose.

Several authors have shown that *Gongronema latifolium* leaves contain essential oils, fibers, phytochemicals (Saponins, alkaloids, flavonoids, phenols and glycosides) and pregnanes among others.[3,18-21] Essential oils are important constituents of some higher plants and have been recognized to possess antimicrobial activities,[22] and phytochemicals are natural plant based chemicals that have been identified as active compounds in the prevention of degenerative diseases like diabetes mellitus and hypertension.

In this study, the plant significantly reduced the cholesterol, triglyceride, LDL-C level and LDL-C levels and LDL-C/HDL-C ratio. The decrease in serum triacylglycerol coupled with an increase in HDL-C suggests that *G. latifolium* based diet may offer

protection to cardiovascular risk. The reduction in LDL-C level observed is consistent with the work of previous researchers[23] which showed that phytochemicals reduce LDL-C involved in depositing fat in the arteries, prevent blood clotting which can reduce the risk of heart attack or stroke.

The ratio of LDL-C to HDL-C referred to as atherogenic index has also been used as indicator of cardiovascular diseases.[24] Therefore, the decrease in the computed atherogenic index of the subjects fed with *G. latifolium* will reduce the risk of cardiovascular disease.

There was a trend towards increased level of HDL-C in the subjects that were fed with *G. latifolium*; it is possible that this trend may become significant if the period of feeding is further increased. In this regard, it may protect against cardiovascular risk. Previous researcher[25] reported that HDL-C constitutes a protective factor against cardiovascular diseases. It is essential in the transport of cholesterol from cells and arteries to the liver where it is catabolized[26] and is also considered to have anti-atherogenic properties given that there is a negative correlation between HDL-C and risk of cardiovascular disease. Thus, the hypoglycemic and hypolipidemic effects of *G. latifolium* could be beneficial in preventing diabetes and cardiovascular disease.

There are few limitations to this study. First, the study subjects were not restricted from eating other plant leaves during the study. Other plant leaves might also have latent hypoglycaemic or hypolipidaemic properties yet undiscovered. Secondly, there were no control subjects (those that did not consume the *G. latifolium* leaves) to compare their glucose and lipid parameters with the experimental group. Nevertheless, the present study is a preliminary study that warrants further investigation in a case-control study design.

Therefore, we conclude that since the consumption of *G. latifolium* leaves reduced plasma glucose, cholesterol, triglyceride, LDL-C levels and LDL-C/HDL-C ratio, it may be of benefit in the control and management of diabetes mellitus, and subsequently prevention of coronary heart disease and their associated complications if the leaves are routinely included in the subjects' diets/foods.

ACKNOWLEDGEMENTS

I extend my appreciation to the staff of Department of Chemical Pathology, Nnamdi Azikiwe University, Nnewi Campus, Department of Chemical Pathology, Nnamdi Azikiwe University Teaching Hospital, Nnewi and Pathology Laboratory of Nnamdi Azikiwe University, Nnewi Campus for using their facilities during the course of this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the ethics committee of Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Nigeria

REFERENCES

1. Ugochukwu NH, Babady NE. Antioxidant effects of *Gongronema latifolium* in hepatocytes of rat models of non-insulin dependent diabetes mellitus. Fitoterapia. 2002;73(7-8):612-8.
2. Dalziel JM. *Gongronema latifolium*. In: Dalziel JM, eds. The Useful plants of Tropical West Africa. 1st ed. London: Crown Overseas Agents Colonies; 1937: 461.
3. Morebise O, Fafunso MA, Makinde JM, Olajide OA, Awe EO. Anti-inflammatory property of the leaves of *Gongronema latifolium*; Phytother Res. 2002;16:S75-7.
4. Okafor JC. Tropical plants in health care delivery in Nigeria: contributions of some members of Compositae (Asteraceae). J Coll Med. 2002;7(2):129-31.
5. Nwangwu SCO, Nwangwu UC, Josiah SJ, Ezenduka C. Hepatoprotective and hypolipidemic potentials of aqueous and ethanolic leaf extracts of *Gongronema latifolium* on normal male rats. J Sci Eng Technol. 2010;17:9572-83.
6. Asia K, Muhammad NS, Saba M, Saba S. Pharmacology and phytochemistry of Pakistani herbs and herbal drugs used for treatment of diabetes. Int J Pharmacol. 2011;7:419-39.
7. Akinyemi, KO, Oladapo O, Okwara CE, Ibe CC, Fasure KA. Screening of crude extracts of six medicinal plants used in South-West Nigerian unorthodox medicine for anti-methicillin resistant Staphylococcus aureus activity. BMC Complement Alternat Med. 2005;5:6-10.
8. Trifiro G. Drug-drug interactions and statin therapy. South Med J. 2006;99(12):1325-6.
9. Williamson G, Dupont NS, Heaney RK, Roger G, Rhodes MJ. Induction of glutathione S transferase activity in hepG2 cell by extracts of fruits and vegetables. Food Chem. 1997;2:157-60.
10. Anderson GD. Phytochemicals review. Dynamic Chiropractic. 2004;2(01):1-5.
11. Mohamed E, Debprasad C, Vincenzo DF, William CC. Medicinal plants in the prevention and treatment of chronic diseases 2013. Evidence-Based Complement Alternat Med. 2014;2014:180981.
12. Nwangwu SCO, Josiah JS, Abubakar ET, Ajeigbe OK, Osakwe OE, Akintola AA. Comparative effects of aqueous and ethanolic leaf extracts of *Gongronema latifoliumon* serum kidney and liver biomarkers of normal male rats. Asian J Biol Sci. 2011;4:540-7.
13. Nwangwu SC, Ike F, Olley M, Oke JM, Uhunmwangho E, Amegor OF, et al. Effects of ethanolic and aqueous leaf extracts of *Landolphia*

owariensis on the serum lipid profile of rats. Afr J Biochem Res. 2009;3:136-9.
14. Kiortsis DN, Filippatos TD, Mikhailidis DP, Elisaf MS, Liberopoulos EN. Statin-associated adverse effects beyond muscle and liver toxicity. Atherosclerosis. 2007;195(1):7-16.
15. Deng R. A review of the hypoglycemic effects of five commonly used herbal food supplements. Recent Patents Food Nutr Agricul. 2012;4(1):50-60.
16. Eleyinmi AF. Chemical composition and antibacterial activity of *Gongronema latifolium*. J Zhejiang Univ Sci B. 2007;8(5):352-8.
17. Ugochukwu NH, Babady NE, Cobourne M, Gasset SR. The effect of *Gongronema latifolium* extracts on serum lipid profile and oxidative stress in hepatocytes of diabetic rats. J Biosci. 2003;28:1-5.
18. Ugochukwu NH, Babady NE. Antihyperglycemic effect of aqueous and ethanolic extracts of *Gongronema latifolium* leaves on glucose and glycogen metabolism in livers of normal and streptozotocin-induced diabetic rats. Life Sci. 2003;73(15):1925-38.
19. Schneider C, Rotscheidt K, Breitmaier E. 4 new pregnane glycosides from *Gongronema latifolium* (Asckepiadaceae). Liebigs Annalen Der Chemie. 1993;10:1057-62.
20. Morebise O, Fafunso MA. Antimicrobial and phytotoxic activities of saponin extracts from two Nigerian edible medicinal plants. Biokemistri. 1998;8(2):69-77.
21. Adeleye IA, Omadime ME, Daniels FV. Antimicrobial activity of essential oil and extracts of *Gongronema latifolium Decne* on bacterial isolates from blood stream of HIV infected patients. J Pharmacol Toxicol. 2011;6:312-20.
22. Del-Vechio G, Orlando VS, Celia HV, Maria ACK. Chemical composition and antimicrobial activity of the essential oils of *Ageratum fastigiatum*. Record Nat Prod. 2009;3:52-7.
23. Anderson GD. Phytochemicals review. Dynamic Chiropractic. 2004;2(01):1-5.
24. Panagiotakos B, Pitsavos C, Skoumas J, Chrysohoou C, Toutouza M, Stefanadis CI, et al. Importance of LDL/HDL ratio as a predicator for coronary heart disease events in patients with heterozygous familial hypercholesterolemia: a 15 year follow-up (1987-2002). Curr Med Res Opin. 2003;19(2):89-94.
25. Leudeu BCT, Tchiengang C, Barbe F, Nicolas B, Gueant JL. *Ricinodendron heutelotii* (Bail.) or *Tetracarpidium conophorum* Mull. oils feed to male rats lower blood lipids. Nutr Res. 2009;29(7):503-9.
26. Lacko AG, Barter P, Ehnholm C, Tol A. An international Symposium on basic aspects of HDL metabolism and disease prevention. J Lipid Res. 2000;41:1695-9.

DOI: 10.5455/2320-6012.ijrms20150413
Cite this article as: Analike RA, Ahaneku JE. Effects of *Gongronema latifolium* on blood lipids, lipoproteins and glucose values in adult Nigerians. Int J Res Med Sci 2015;3:891-5.