Journal of Health Science 2012, 2(2): 1-4
DOI: 10.5923/j.health.20120202.01

Antimicrobial Activities of *Telfairia occidentalis* (fluted pumpkins) Leaf Extract against Selected Intestinal Pathogens

Oyewole O. A., Abalaka M. E.

Department of Microbiology, Federal University of Technology, PMB 65, Minna, Niger State, Nigeria

Abstract The antibacterial assay of the leaf of *Telfairia occidentalis* (Fluted pumpkins) on *Salmonella typhi*, *Escherichia coli* and *Streptococcus faecalis* was determined using the agar diffusion technique to investigate its potential use as antibacterial agent. The Minimum Inhibitory Concentration (MIC), Minimum Bactericidal Concentration (MBC) and phytochemical components of the leaf were studied. The phytochemical screening of the extract indicated the presence of glycosides, saponins, flavonoids, phenolics and steroids. The extract showed a higher antibacterial activity against *E. coli* (20 ±0.58mm at 500mgmg.ml), *S. faecalis* (6 ± 1.10mm at 5.0mg) and *S. typhi* (11±0.70mm at 50mg/ml). The MIC were 0,5mg/ml, 5.0mg/ml and 500mg/ml for *E. coli, S. typhi* and *S. faecalis* respectively. The MBC for *E. coli* and *S. typhi* were 0.5mg/ml and 5.0mg/ml respectively while *S. faecalis* was resistant to the extract. The result of the study suggests that leaf extract of *T. occidentalis* can be used for the treatment of infections by the test organisms.

Keywords *Telfairia Occidentalis,* Leaf Extracts, Intestinal Pathogens, Agar Diffusion

1. Introduction

According to the World Health Organization (WHO) a medicinal plant is any plant which in one or more of its organ contains substances that can be used for the synthesis of useful drugs (World Health Organization, WHO, 1977). Medicinal plants contain biologically active chemical substances such as saponins, tannins, essential oils, flavonoids, alkaloids and other chemical compounds (Sofowora, 1996) which have curative properties. These complex chemical substances of different compositions are found as secondary plant metabolites in one or more of these plants (Kayode and Kayode 2011).

Telfairia occidentalis commonly called fluted pumpkin occurs in the forest zone of West and Central Africa, most frequently in Benin, Nigeria and Cameroon (Kayode and Kayode 2011). It is a popular vegetable all over Nigeria. It has been suggested that it originated in south-east Nigeria and was distributed by the Igbos, who have cultivated this crop since time immemorial. It is, however, equally possible that fluted pumpkin was originally wild throughout its current range, but that wild plants have been harvested to local extinction and are now replaced by cultivated forms (Badifu and Ogunsina, 1991, Kayode and Kayode 2011).

* Corresponding author:
oyewolefemi@gmail.com (Oyewole O. A.)
Published online at http://journal.sapub.org/health

The medicinal activities of *Telfairia occidentalis* has been reported by many investigators. In Nigeria, the herbal preparation of the plant has been employed in the treatment of anaemia, chronic fatigue and diabetes (Alada, 2000; Dina et al., 2006; Kayode and Kayode 2011). The leaves contain essential oils, vitamins; root contains cucubitacine, sesquiterpene, lactones (Iwu, 1983). The young leaves sliced and mixed with coconut water and salt are stored in a bottle and used for the treatment of convulsion in ethno medicine (Gbile, 1986). The leaf extract is useful in the management of cholesterolemia, liver problems and impaired defense immune systems (Eseyin *et al*., 2005). *Telfairia occidentalis* is popularly used in soup and folk medicine preparation in the management of various diseases such as diabetics, anaemia and gastrointestinal disorder (Oboh *et al*., 2006). A study has shown that the ethanol root extract of *T. occidentalis* possess antiplasmodial potential (Okokon *et al*., 2007) and inhibitory effects on some enterobacteriacae Odoemena and Onyeneke (1998) while Oluwole *et al*. (2003) reported *Telfairia occidentalis* anti-inflammatory activities (Kayode and Kayode 2011).

The aims and objectives of this research are to identify the phytochemical components of the leaf of *Telfairia occidentalis*, to determine the antimicrobial activities of the leaf extract of *Telfairia occidentalis*, to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of *Telfairia occidentalis* on *S. typhi*, *E. coli* and *Strept. faecalis*, to compare the antibacterial activities of the leaf extract of *Telfairia occiden-*

talis-with antibiotics commonly used to treat infections of the test organisms.

2. Materials and Methods

Collection and preparation of Samples

Fresh leaves of *T. occidentalis* were purchased in Bosso market in Minna, Niger State, Nigeria and brought to the microbiology laboratory of Federal University of Technology, Minna. The leaves were air-dried at room temperature over a period of one week. The dried leaves were pulverized to dry powder using a wooden mortar. Fifty grams (50mg) of dried leaves were extracted in a succession using 250ml of 75% ethanol in a separate conical flask for 72 hours with regular agitation. The extract was evaporated to dryness using steam bath and stored in sterile universal bottle as described by Sliver et al. (1997).

Pure culture of the organisms were obtained from stock culture of microbiology laboratory, Federal University of Technology, Minna

Extraction of the extract

One hundred grams (100g) of the blended leaf was soaked in 500ml of 75% ethanol in a flask It was shaken daily for 72hours at regular intervals, after which it was filtered suing Whatman's (No II) filter paper. The filtrate was evaporated to dryness using steam water bath at 100^{o}C. The extract was then stored at 4^{o}C in a refrigerator.

Phytochemical screening of the extracts

Phytochemical screening of the extracts was carried out according to methods described by Odebiyi and Sofowora (1978) and Trease and Evans (1989). The components analyzed for were alkaloids, tannins, phenolics, glycosides, saponins, flavonoids, steroids. Phylobatanins and triterpenes.

Determination of Minimum Inhibitory Concentration (MIC)

The MIC of the plant extract was determined by serially diluting extract from 10^{1} to 10^{10}. One millilitre (1ml) of each of the dilutions representing a known concentration of the extract was introduced into 9ml of sterile nutrient broth in a test tube. The mixture was then inoculated with 0.1ml of the test organisms previously standardized at 10^{6}. It was then incubated at 37^{o}C for 24 hours. The least concentration of the plant extract in the test tube with no turbidity was taken as the MIC (Hugo and Russsel 1983).

Determination of Minimum Bactericidal Concentration (MBC)

The plant extract was serially diluted from 10 to 10^{10}. One millilitre (1ml) of each of the dilutions representing a known .concentration of the extract was introduced into 9ml of sterile nutrient broth in test tubes. The mixture was then inoculated with 0.1ml culture of the test organisms previously standardized to 10^{6}. It was then incubated at 37^{o}C for 24hours. The least concentration of plant extract in the test tube with no turbidity was taken as the MIC. Subsequently, tubes that indicated no turbidity was plated out on nutrient agar plates and absence of growth after incubation for 24hours confirms the MBC as described by Hugo and Russell (1983).

3. Results

Phytochemical Screening of extract

Table 1 shows the phytochemical components of extract of *Telfairia occidentalis*. The result indicated the presence of saponins, alkaloids, tannins, phenolics, and absence of glycosides, steroids, phylobatanins, triterpenes

Table 1. Phytochemical components of *Telfairia occidentalis*

Plant phytochemicals	Extract
alkaloides	+
Tannins	+
Phenolics	+
Glycosides	-
Saponins	+
Flavonoids	+
Steroids	-
Phylobatanins	-
triterpenes	-

Sensitivity test

The leaf extract of *T. occidentalis* showed varying antimicrobial; activities against the test organisms (Table 2). *E. coli* showed the highest activity on the extract. The zone of inhibitions were 20± 0.58 at 500mg/ml, 14± 2.52 at 50mg/ml and 10± 1.00 at 5.0mg/ml of extract followed by *S. typhi* with zones of inhibitions of 19± 2.31 at 500mg/ml and 11± 0.70 at 50mg/ml but no activity at 5.0mg/ml while *Strept. faecalis* had zones of inhibitions of 16± 0.58 at 500mg/ml, 6.0±1.10 at 5.0mg/ml but no activity at 50mg/ml.

Table 2. Mean diameter of zone of inhibition (mm)

Concentration of extract (mg/ml)	*E.coli*	*S.typhi*	*Strept. faecalis*
500	20 ±0.58	19±2.31	16±0.58
50	14 ±2.52	11±0.70	-
5	10±1.00	-	6±1.10

Minimum inhibitory concentration and minimum bactericidal concentration of *T. occidentalis*

Table 3 shows the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of extract of *T. occidentalis*. The MIC and MBC of *T. occidentalis* on *E.coli* and *S. typhi* were 0.5mg/ml and 5.0 mg/ml respectively. The MIC of *T. occidentalis* on *Strept. faecalis* was 500mg/ml while *T. occidentalis* had no MBC activity against *Strept. faecalis.*

Table 3. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC)

Test organisms	MIC	MBC
E. coli	0.5	0.5
S. typhi	5.0	5.0
Strept. faecalis	500	-

Susceptibility testing using standard antibiotics

Table 4 shows the susceptibility testing using standard antibiotics (positive control). *S typhi* was susceptible to the

entire tested antibiotic except Norfloxacin (NB), *E.coli* was only susceptible to CPX- Ciproflox, GN –Gentamycin and LC-Lincocin while *Strept. faecalis* was susceptible to all the tested antibiotic except CPX- Ciproflox and LC-Lincocin.

Table 4. Susceptibility testing using standard antibiotics (positive control)

Antibiotic disc	*S. typhi*	*E. coli*	*Strept. faecalis*
CPX	18±2.56	10±1.90	-
NB	-	-	14±2.10
GN	15±2.60	18±2.11	3±2.81
LC	5±3.05	10±2.00	-
S	19±2.08	-	15±4.72
RD	19±4.04	-	8±1.00
FLX	20±1.53	-	10±2.00
E	12±1.59	-	8±1.90
CH	16±2.08	18±3.01	-
AMP	-	20±1.53	-

KEY: CPX- Ciproflox 10µg, NB- Norfloxacin 30µg, GN –Gentamycin 10µg, LC-Lincocin 30µg, S- Streptomycin 10µg, RD – Rifampin 30µg, FIX-Floxapein 30µg, E- Erythromycin 30µg, CH- Chloranphenicol 20µg, - no inhibition

4. Discussion

The preliminary phytochemical analysis showed that the leaf of *T. occidentalis* contains tannins, saponins, alkaloids and flavonoids. These compounds have been found to inhibit bacterial growth and are capable of protecting certain plant against bacterial infections (Clark, 1981; Gonzales and Mather, 1982).

At concentrations of 500mg/ml, 50mg/ml and 5.0mg/ml, *E. coli* had the highest zones of inhibitions (20±0.58mm) whereas, at concentrations of 50mg/ml, *Strept. faecalis* was tolerant to the extract of *T. ocicidentalis* and at 5.0mg/ml *S. typhi* was also tolerant (Table 2). This indicated that *E.coli* was the most susceptible to the leaf extract of *T. occidentalis* at the various concentrations used. At concentration of 500mg/ml, all the test microorganisms had higher zones of inhibition when compared to the commonly used antibiotic (Table 4 and Table 5).

The minimum inhibition concentration of the test organisms were 0.5mg/ml for *E. coli*, 5.0mg/ml for *S.typhi* and 500mg/ml for *Strept. faecalis* (Table 3). This is similar to the finding of Oboh *et al. (*2006) who reported inhibitory effects of ethanolic extract of *T. occidentalis* on *Escherichia coli*, *Pseudomonas aeruginosa* and *Proteus* sp. but no inhibitory effect on *Salmonella typhi.* The minimum bactericidal concentration (MBC) of 0.5mg/ml and 50mg/ml appeared to be bactericidal on *S. typhi* and *E. coli* respectively but *Strept. faecalis* had no bactericidal activity on extracts of *T. occidentalis* at 500mg/ml, 50mg/ml and 5.0mg/ml. This could be due to its ability to develop resistance to the extracts of *T. occidentalis* at concentrations considered and also because of the presence of peptodoglycan cell wall component.

5. Conclusions

The results of the study indicates that the ethanolic extract of *T. occidentalis* has an antibacterial activity on *S. typhi, E. coli* and *Strept. faecalis. E.coli* was most susceptible (MIC and MBC values of 0.5mg/ml) followed by *S.typhi (*MIC and MBC values of 5.0mgml) while *S. faecalis* was the least susceptible.

REFERENCES

[1] Alada, A.R.A. (2000). The haematological effects of *Telfairia occidentalis* diet preparation. *Afr. J. Biomed. Res*., 3: 185-186.

[2] Badifu, G.I.O. and Ogunsina, A.O. (1991). Chemical Composition of kernels from some species of cucurbitaceae grown in Nigeria. *Plant Foods Human Nutr*., 41: 35-44.

[3] Clark, M.S. (1981). Antimicrobial activities of phenolic constitutents of *Manolia gradiflora*. *Journal of pharmaceutical science* 10: 951-952

[4] Dina, O.A., Adedapo, A.A., Oyinloye, O.P. and Saba, A.B. (2006). Effect of *Telfairia occidentalis extract* on experimentally induced anaemia in domestic. *Afr. J. Biomed. Res*., 3: 181-183.

[5] Eseyin, O.A., Igboasoiyi, A.C., Oforah, E., Mbagwu, H., Umoh E. and Ekpe, J.F. (2005). Studies of the effects of alcohol extract of Telfairia occidentalis on alloxan-induced diabetic rats. Global Journal of Pure Applied Sci., 11: 85-87.

[6] Gbile, Z.O. (1986). Ethnobotany, Taxonomy and Conservation of Medicinal Plants. In: The State of Medicinal Plants Research in Nigeria, Sofowora, A. (Ed.). University of Ibadan Press, Ibadan, Nigeria.

[7] Gonazala, L. and Matler, S.B. (1982). Identifiaction of terpenoid from leaves of Piptocarpha perctora and their biological activities. *Journal of natural products*, 44: 475-476.

[8] Hugo, S.B. and Rusell, A.D. (1983). *Pharmaceutical Microbiology* 3rd Edition. Blackwell Scientific Publication, London pp. 105-125

[9] Kayode, A.A.A. and Kayode, O.T. (2011). Some Medicinal Values of *Telfairia occidentalis*: A Review. *American Journal of Biochemistry and Molecular Biology*, 1: 30-38.

[10] World Health Organization (WHO), 1977). Resolution-promotion and development of training and research in traditional medicine, WHO Document No., 30: 49-49.

[11] Sofowora, A. (1996). *Medicinal Plant and Traditional Medicine in Africa*. 2nd Edn., Spectrum Books, Ibadan, Nigeria, pp: 112.

[12] Iwu, M.W. (1983). *Traditional Igbo Medicine*. Institute of African Studies University of Nigeria, Nsukka.

[13] Oboh, G. (2004). Prevention of garlic induced hemolytic anaemic by some tropical green leaves vegetable, Biomed. Res. 15: 134-137.

[14] Oboh, G. Nwanna, E.E. and Elusiyan, C.A. (2006). Antioxidant and Antimicrobial Properties of *Telfairia occidentalis* (Fluted pumpkin) Leaf Extracts. *Journal of Pharmacology and Toxicology*, 1: 167-175.

[15] Odebiyi, A. and Sofowora, A.E. (1978). *Phytochemical screening of Nigeria medicinal plant part* III Lioydia 4: 234-246.

[16] Odoemena, C.S. and Onyeneke, E.C. (1998). *Lipids of fluted pumpkin (Telfairia occidentalis) seeds*. Proceedings of the 1st African Conference on Biochemistry of Lipids, (ACBL'98), Ambik Press, Benin City, Nigeria, pp: 147-151.

[17] Okokon, J.E., Ekpo, A.J. and Eseyin, O.A. (2007). Antiplasmodial activity of ethanolic root extract of Telfairia occidentalis. *Res. J. Parasitol.,* 2: 94-98.

[18] Oluwole, F.S., Falode, A.O. and Ogundipe, O.O. (2003). Anti inflammatory effect of some common Nigeria vegetables. *Nig. J. Physiol. Sci*., 18: 35-38.

[19] Silver, O.A., Cabrita, T., Pimentel, M., Diniz, A. and Gomes, E. (1997). Antimicrobial activity of Guinea Bissau traditional remedies. *Journal of Ethnopharmacology*, 50: 55-59.

[20] Trease, G.E. and Evans, W.C. (1989). *A textbook of pharmagnosy* 13th edition. Baluiere, Tindali, London pp. 100-101