Canadian Open Pharmacology & Pharmacy Journal
Vol. 1, No. 1, December 2015, pp. 1-7
Available online at http://crpub.com/Journals.php

Open Access

Research article

Diuretic Activity of Methanol Leaf Extract of *Fluerya aestuans* L (Urticaceae).

Omokehinde Oseni Akinlami[1*] Olaniyi Edward Famobuwa[1] Innocent Bamidele Osho[2] and Ayodeji Augustine Agbowuro[3]

[1]Department of Chemistry, Adeyemi Federal University of Education, Ondo, Nigeria.

[2]Department of Animal Production and Health, Federal University of Technology, Akure, Nigeria.

[3] Department of Pharmaceutical Chemistry, University of Jos, Nigeria.

Corresponding Author: *Akinlami,O.O, Department of Chemistry, Adeyemi Federal University of Education, Ondo, Nigeria. Email:akehinde2015@yahoo.com

Abstract

The diuretic effect of the methanol extract of the leaves of *Fleurya aestuans*was assessed in adult wistar male rats using in-vivo Lipschitz test. Four groups of six adult male wistar rats each were used for the study. Methanol extract of *Fleurya aestuans*was administered orally to the first and second groups of rats at doses of 250 and 500mg/kg respectively. The third group was given Furosemide (10mg/kg) as a standard diuretic while the last group received normal saline (10ml/kg) was used as a control in the study. The diuretic activities were evaluated by the determination of urine volume and electrolyte concentration in male wistar rats. The rats treated with methanol extract of *Fleurya aestuans*in doses of 250 and 500 mg/kg respectively showed higher urine output when compared with the group treated with normal saline. The methanol extracts also showed a significant dose-dependent increase in the excretion of electrolytes when compared with the control group. The 500mg/kg methanol extract shows a significant increase urine output in rats when compared with 250mg/kg group of methanol extract; this shows the extract is dose-dependent in both urine output and excretion of electrolyte respectively. Thus, from the study it may be concluded that the leaves of *Fleurya aestuans* possess diuretic activities.

Keywords: Diuretic, urine concentration, *Flueurya aestuans*, Electrolyte, Furosemide.

Introduction

Fleurya aestuans L (Urticaceae) is an erect, annual herb growing up to 1.5 m high with long stinging hairs[1]. The leaves are greenish, alternate, more or less spirally arranged, and oval shaped of about 10-15 cm long and 8-12 cm wide, cordate at the base and narrowly pointed at the apex, and coarsely toothed with hairs on both sides [2]. The decoctions of *F. aestuans* roots and leaves are used as antidote for poisoning especially from snake bites [3]. The leaves have been reported to be used for the treatments of rickets in children, constipation, wound dressing, and as a postpartum tonic [4]. The Trace Elements and Majors Minerals present in the leaves of *F. aestuans* has been reported [5]. Gastro-Protective Effects of the Leaf Extract and Fractions of *Fleurya aestuans L* (Urticaceae) has been studied [6].Also, the antiulcer properties of this plant have been reported [7]. Also, phytochemical constituent and antioxidant potential of the leaf extract of *F.aestuans* has been studied [8]. In Western India, it is used to relieve rheumatic pain and as a diuretic. The aqueous leaf extract of *F.aestuans* is popular in traditional medicine practice in southern part of Nigeria as a palliative in a variety of stomach disturbances and as a diuretic. No previous pharmacological or clinical study has been carried out to test the diuretic activity of this plant. Therefore this study was designed to evaluate the diuretic effect of the methanol leaf extract of *Fleurya aestuans L (Urticaceae*) in experimental animals in order to establish a pharmacological rationale for the traditional use of this plant.

Materials and Methods

Sample collection

The leaves of *Fleurya aestuans L (Urticaceae*) *was* collected in the month of August- September from a farm land in Ondo, Ondo State. The plant was identified at the Department of Crop, Soil and Pest Management, Federal University of Technology, Akure. The voucher specimen of the leaves of the plant was deposited in the Herbarium of Federal University of Technology, Akure and the voucher number was F.A 0014 obtained.

Preparation of plant extract

The fresh leaves were washed in clean tap water, air dried under shade at room temperature for 10 days and then homogenized to obtain a coarse powder, packed in paper bags and stored. The dried plant was further pulverized and 1kg of pulverized sample was extracted with 2.0L of methanol by maceration for 72h.withintermittent agitations. The methanol extract was concentrated in a rotary evaporator and thereafter preserved for further use. The percentage yield of the 1000 g powdered leaves Methanol *Fleurya aestuans* Leaves (MFAL) *L (Urticaceae*) was 7.67% from dry weight, greenish- black crude extract with a sweet smelling flavour.

Animals

Healthy, adult albino male rats of weight range120-220g were used for the study. They were obtained from the animal house of the Faculty of Pharmacy, Obafemi Awolowo University Ile-Ife, Nigeria. Before the commencement

of the studies all animals were allowed to acclimatize to the laboratory environment for one week and within this period they were watched closely and observed for any clinical signs, body weight changes, water and feed consumption. The experiments were carried out in accordance with the Guidelines for Laboratory Procedures laid down by Ethics Committee on Research of the Federal University of Technology Akure, as well as the internationally accepted principles regarding the care and use of animals for experimental techniques.

Acute oral toxicity study

The lethal doses (LD_{50}) of the plant extract were determined by [9,10] methods respectively, using 13 rats. In the first phase, rats were divided into 3 groups of 3 rats each and were treated with the methanol extract of the leaves at doses of 10, 100 and 1000 mg/kg body weight intraperitoneal. They were observed for 24 h for signs of toxicity. In the second phase 4 rats were divided into 4 groups of 1 rat each and were also treated with the methanol extract at doses of 1000, 1600, 2900 and 5000 mg/kg bodyweight (i.p). The median lethal dose (LD_{50}) was calculated using the second phase

Pharmacological evaluation for diuretic activity

The method described by [11] was employed for the assessment of diuretic activity. The methanol extract was dissolved in normal saline for oral administration. In this experiment, the animals were randomly divided into four groups of six male rats. The male albino rats (Wistar strain) weighing 120-220g were fasted 18 to 24hours prior to the experiment. After completion of the fasting period, 5ml of 0.9% sodium chloride solution per 100g body weight was given by gavage on the day of the experiment. Furosemide was used as standard drug to compare the effects of the extract on the diuretic parameters. The first and second groups were given MFAL 250 and MFAL 500mg/kg respectively of the methanol leaves extract of *F.aestuans.* The third group received Furosemide 10mg/kg and the fourth group received10ml/kg of normal saline. After treatment, the animals were kept in metabolic cages (2 per cage), specially designed to separate urine and feces. The animals were kept at room temperature of 25±0.5ºC throughout the experiment. The urine was collected in a measuring cylinder and measured at 5h and 24hrespectively after the doses were administered. During this period, no food or water was made available to animals. The total difference in the collected urine volume of the respective test groups was compared to the control group. The sodium and potassium concentrations were measured by flame photometry [12] and Chloride was estimated by titration [13] with silver nitrate solution (N/50) using three drops of 5% potassium chromate solution as indicator.

Statistical analysis

SPSS (version 17.0) statistical program was used to carry out one-way analysis of variance (ANOVA) on the data, followed by Dunnett's t-test. Values are expressed as mean ± SEM of six samples. $P < 0.01$ was considered as significant.

Result and Discussion.

After 24h of oral administration, the methanol extract of *F.aestuans* did not produce lethality or any sign of acute intoxication in the rats at a dose up to 5000 mg/kg. Therefore, $LD_{50}$was assumed greater than 5000mg/kg. Hence, one-tenth of the LD_{50},i.e.,500mg/kg was selected for the diuretic activity. This was in agreement with work carried out by [6].

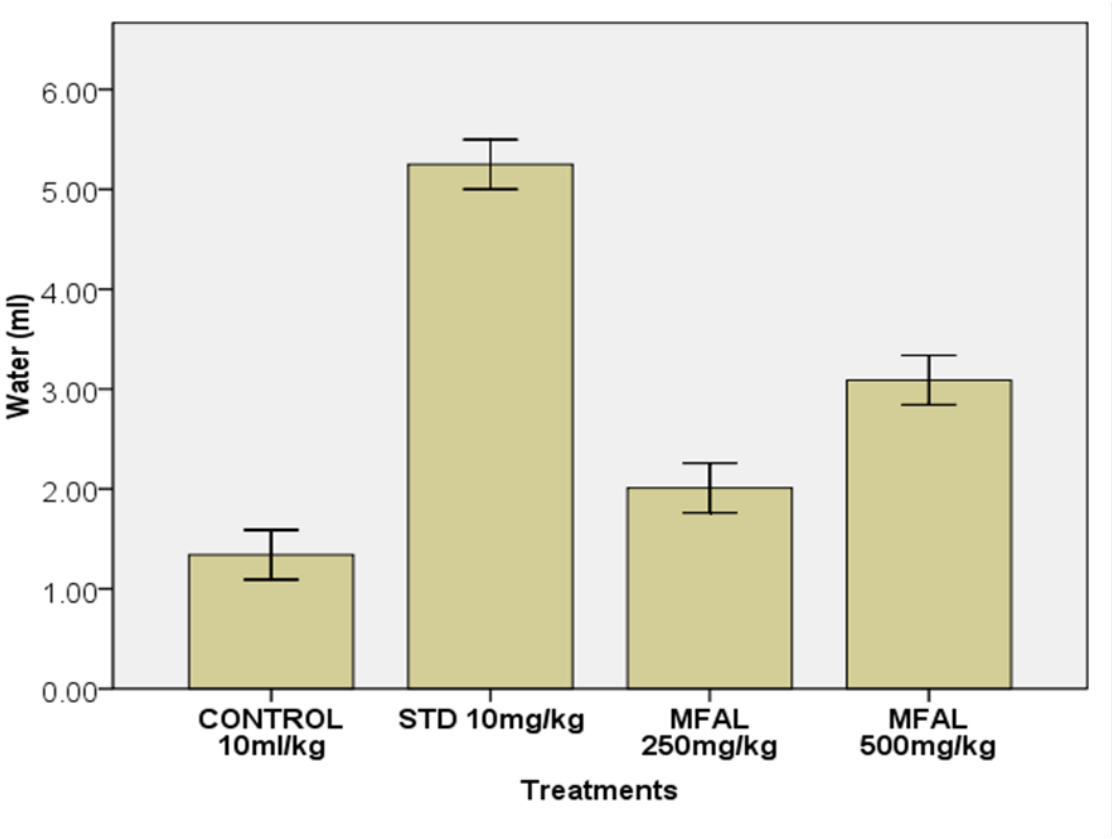

Figure 1.0: Effect of Oral administration of the methanol extracts of *F.aestuans* on urinary volume excretion.

The diuretic effect of the methanol extract of the leaves of *F. aestuans* was assessed in adult wistar male rats using in-vivo Lipschitz test. The rats treated with methanol (figure 1.0) extract of *F. aestuans* in doses of 250 and 500 mg/kg respectively showed higher urine output when compared with the control group treated with normal saline. The methanol extracts of *F.aestuans* compete favourable with the furosemide which was used as a standard drug.

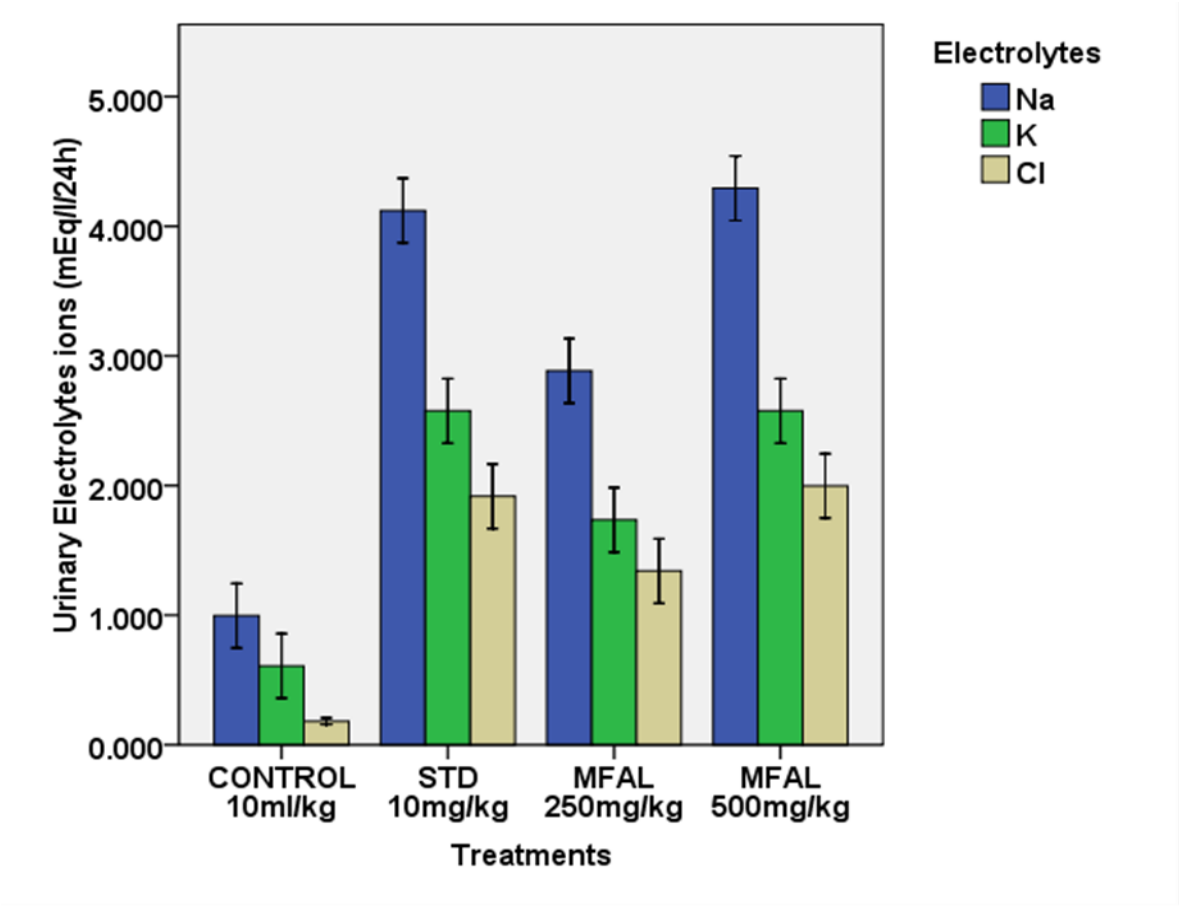

Figure 1.2: Effect of Oral administration of the methanol extracts of *F.aestuans* on urinary electrolytes excretion

Figure 1.2reveals the effect of Oral administration of the methanol extracts of *F. aestuans* on urinary electrolytes excretion of male rats. The methanol extracts also showed a significant dose-dependent increase in the excretion of electrolytes when compared with the control group. The 500mg/kg methanol extract shows a significant increase urine output in rats when compared with 250mg/kg group of methanol extract; this shows the extract is dose-dependent in both urine and excretion of electrolyte respectively.

The term diuresis has two separate connotations: One refers to the increase in urine volume while the other to the net loss of solute (electrolyte) and water [14]. These parameters are involved in the suppression of renal tubular reabsorption of electrolytes. The evidence of a diuretic response was observed in the rats treated with furosemide, and methanol leaves extract of *F.aestuans*. Furosemide inhibits electrolyte reabsorption in the thick ascending limb of loop of Henle. Micropuncture experiment has demonstrated a greatly enhanced excretion of Na^+ and Cl^-[15]. Studies have shown that the high ceiling diuretics enhance increase in Na^+ excretion and cause a greater depletion of K^+ [16]. Some of these were observed in this study. The control of plasma potassium is required to maintain proper function of cardiac and skeletal muscles. The regulation of sodium, potassium balance is also intimately related to renal control of acid-base balance. The Potassium loss that occurs with many diuretics may leads to hypokalemia.

For this reason, generally potassium-sparing diuretics are recommended[17].The diuretic activity of the leaf extract of *F.aestuans* may be due to the individual or combined action of bioactive constituents present in it[8].

CONCLUSION

The present results provide a quantitative basis explaining the traditional folk medicine use of *F . aestuans* leaves as a diuretic agent. The fact that the medicinal plant extract provided diuretic effects comparable to the standard drug, suggested that the traditional folk medicine infusions need not be replaced by more costly chemically processed product. However, fractionation of the crude methanol extract are on-going in order to isolate and characterize the active constituents that may responsible for the activity and to understand the precise mechanism of diuresis exhibited by methanol leaves extract of *F.aestuans* L (Urticaceae) .

References

[1]Hutchinson, J & Dalziel, J.M.Flora of West Tropical Africa. II. Millbank, London Crown agents for oversea Government and Administration 4, 1963, 221-221.

[2]Akobundu, I.O., Agyakwa, C.W. A handbook of West African Weeds, International Institute of Tropical Agriculture, 1987, 398.

[3]Kowaro, J.O. Medicinal Plants of East Africa, East Africa Literature Bureau Kampala, Nairobi, Dares Salaam; Kenya, 1976, 217.

[4]Iwu, M.M. Handbook of African Medicinal Plants, CRC press Boca Raton Ann Arbor London, 1993, 68.

[5]Akinlami O., Lajide, L., Oloyede, H and Ojo, B.Trace Elements and Majors Minerals Evaluation in *Fluerya aestuans* Linn. (Urticaceae).*International Journal of Pharma Sciences*, 3(5): 2013, 333-337.

[6]Akah,P.A., Onyirioha, C.A and Ndu, O.O. Gastro-Protective Effects of the Leaf Extract and Fractions of *Fleurya aestuans L* (Urticaceae). *International Journal of Health Research*, 2(1): 2009, 65-73.

[7]Ukwe, C.V and Nwafor, S.V.Antiulcer Properties of the Aerial Parts of *Fleurya Mooreana* in Experimental Animal. *Plant Product Research Journal*, Vol.10; 2003, 26-29.

[8]Akinlami, O.O., Lajide, L., Owolabi, B.J., Osho, I.B. Phytochemical Constituent and Antioxidant Potential of the Leaf Extract of *Fluerya aestuans* L (Urticaceae).*Global Advanced Research Journal of Medicine and Medical Science* Vol. 3(10), 2014, 331-334.

[9]Lorke, D.A new approach to practical acute toxicity testing. *Arch. Toxicol*.; 54: 1983, 275-287.

[10]Sandow, J. Toxicological evaluation of drugs affecting the hypothalamic-pituitary system. *Pharmacy Theory*; 5: 1979, 297-303.

[11]Lipschitz, W.L., Hadidian, Z., Kerpear, A. Bioassay of Diuretics. *Journal of Pharmacol Experimental Theory*; 1943,79:110.

[12]Godkar, P.B.Clinical Biochemistry-Principles and Practice. Mumbai: Bhalani Publishing House; 1994, 245-9.

[13]Murugesan, T., Manikandan, L., Suresh, K. B., Pal, M. and Saha. B. P. Evaluation of Diuretic potential of *Jussiaeasuffruticosa* Linn. Extract in rats, *Indian Journal. Pharmaceutical. Science*, 62(2), 2000, 150-151.

[14]Irwin, M.W. Diuretics and other agents employed in the metabolism of Edema fluid. In: Goodman and Gilman. The Pharmacological Basis of Therapeutics 8th ed. Pergamonpress.NewYork. 1990,713-718.

[15]Greger, R. and Wangemann, P. Loop diuretics. Renal Physiology. 10: 1987, 174-183.

[16]Sutton, R.A.L. Diuretic and Calcium Metabolism.*American Journal of Kidney Diseases*. 5:1985, 4-9.

[17]Kayimani, S., Ilango, R.,Thangadurai, J.G.,Jayakar, B.,Majumdar, U.K., Gupta,M.Diuretic activity of aqueous extract of *Orthosiphonthymiflorus* in rats.*Indian Journal.Pharmaceutical. Science*,1997, 59:96.