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Antiinflammatory and Antipyretic Activities of Stem Extract and Fractions of *Telfairia occidentalis* in Rodents

Jude E. Okokon[1,*], Chinyelu C. Osigwe[2], Uwaeme Ugonma Florence[2], Ukeme Essien Andrew[1]
[1]Department of Pharmacology and Toxicology, Faculty of Pharmacy, University of Uyo, Uyo, Nigeria.
[2]Department of Pharmacology and Toxicology, Faculty of Pharmacy, Madonna University, Elele, Rivers State, Nigeria.

Corresponding author*
judeefiom@yahoo.com

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Abstract

Telfairia occidentalis Hook (Family-*Cucurbitaceae*) is a vegetable employed in Ibibio traditional medicine for the treatment of various diseases such as malaria and fever among others. The stem extract of *Telfairia occidentalis* was investigated for antiinflammatory and antipyretic activities in rodents using various experimental models.The stem extract (200 –600 mg/kg) of *T. occidentalis* was investigated for antiinflammatory activity against carrageenin, egg albumin and xylene – induced edema models and antipyretic activity against D-amphetamine, 2,4-dinitrophenol and yeast-induced pyrexia models. The extract caused a significant ($p<0.05$ – 0.001) dose-dependent reduction of inflammation caused by different phlogistic agents used. These effects were comparable to those of the standard drug, (ASA, 100 mg/kg) used in some cases. The extract also exerted prominent inhibition of pyrexia on amphetamine and dinitrophenol-induced pyrexia (5 h). Inhibition was significant ($p<0.05$–0.001) from 3 to 5 h post- administration of extract and in a dose-dependent fashion. However, the stem extract did not affect yeast-induced pyrexia in mice. The anti-inflammatory and antipyretic effects of this plant may in part be mediated through the chemical constituents of the plant. The findings of this work confirm the ethnomedical uses of this plant to treat inflammatory and febrile conditions.

Keywords: *Telfairia occidentalis*; anti-inflammatory; antipyretic; fever.

INTRODUCTION

Telfairia occidentalis Hook is a fluted pumpkin of the *Cucurbitaceae* family widely consumed as food in Nigeria (Okokon *et al*., 2009). It is a popular vegetable all over Nigeria, especially in the Niger-Delta region and the Eastern part of the country; varieties of meals are prepared from the leaves, stems, and seeds of the plant (Usunomena *et al.*, 2023). The various parts of the plant (seeds, leaves and stem) are are used traditionally in the treatment of various ailments and diseases. Antiplasmodial activities of the seed, leaves and roots of the plant have been previously reported (Okokon *et al.,* 2007; Okokon et al., 2009). Enin *et al.* (2023) reported on antioxidant activity and in vivo inhibitory effect on alpha amylase and alpha glucosidase of the stem extract. The anti-inflammatory effects of the leaf extract (Oluwole *et al*., 2003) and seed extract (Okokon *et al.,* 2012) have been reported. Polyunsaturated fatty acids such as hexadecanoic acid, methyl ester, 9,12-octadecadienoic acid methyl ester (linoleic acid), 9,12,15-octadecatrienoic acid, methyl ester (linoleic acid) and 9-octadecenoic acid have been found in the various fractions of the stem extract as well as alkaloid, terpenes, saponin, flavonoid and tannin in the crude extract (Enin *et al.*, 2023). The present study was designed to evaluate the effect of stem extract of *T. occidentalis* on experimentally-induced pain in rodents. The present study was designed to evaluate the antiinflammatory and antipyretic activities of the stem extract of *T. occidentalis* in rodents.

MATERIALS AND METHODS

Plant materials

Fresh stems of *Telfairia occidentalis* were collected from farms in Uyo metroplis in Uyo LGA, Akwa Ibom State, Nigeria. The leaves were identified and authenticated as *Telfairia occidentalis* by a taxonomist in the Department of Botany and Ecological studies, University of Uyo, Uyo, Nigeria and a voucher specimen was prepared and deposited at the herbarium of the Department of Pharmacognosy and Natural Medicine, Faculty of Pharmacy, University of Uyo.

Extraction

Fresh stems of *Telfairia occidentalis* were washed, cut into smaller pieces and dried under shade for two weeks. The stems were further pulverized to powder using an

electric grinder. The powdered stem material (2 kg) was soaked in 50% ethanol (7.5 L) at room temperature (28 ± 2 °C) for 72 hours. It was thereafter filtered and the liquid filtrate was concentrated and evaporated to dryness in *vacuo* 40 °C using a rotary evaporator (BuchiLab Switzerland). The extract was weighed and stored in a refrigerator at -4 °C, until used for the proposed experiments.

Experimental animals

Swiss albino mice and Wistar rats (male and female) that were used in the study were obtained from the University of Uyo's Animal House. They were kept in standard plastic cages in a well ventilated room and left to acclimatized for 10 days before the experiments. The mice were fed on standard pelleted diet and water *ad libitum*. The care and use of animals was conducted in accordance with the National Institute of Health Guide for the Care and Use of laboratory Animals (NIH Publication, 1996). Approval for the study was obtained from the University of Uyo's Animal Ethics Committee.

Determination of median lethal dose (LD_{50})

The median lethal dose (LD_{50}) of the extract was estimated using albino mice by intraperitoneal (i.p) route using the method of Lorke (1983). This involved oral administration of different doses of the extract (100 - 1000 mg/kg) to groups of three mice each. The animals were observed for manifestation of physical signs of toxicity such as writhing, decreased motor activity, decreased body/limb tone, decreased respiration and death. The number of deaths in each group within 24 hours was recorded. The LD_{50} was calculated as geometrical means of the maximum dose producing 0% (a) and the minimum dose producing 100% mortality (b). $LD_{50} = \sqrt{ab}$.

Anti-inflammatory studies

Evaluation of the anti-inflammatory activity of the stem extract on Carrageenin – induced mice hind paw oedema

Adult albino male mice were used after a 24-hour fast and deprived of water only during the experiment. Inflammation of the hind paw was induced by injection of 0.1 mL of freshly prepared carrageenan suspension in normal saline into the sub planar surface of the hind paw. The linear circumference of the injected paw was measured before and 0.5, 1, 2, 3, 4 and 5 hours after the administration of the phlogistic agent. The increase in paw circumference in post administration of a phlogistic agent was adopted as the parameter for measuring inflammation (Okokon *et al.*, 2010; Edem *et al*., 2023). The difference in paw circumference between the control and 0.5, 1, 2, 3, 4, and 5 hrs after the administration of phlogistic agent was used to assess the inflammation (Edem *et al*., 2023). The stem extract (200, 400, and 600 mg/kg i.p) was administered to various groups of 6 mice each, 1 h before inducing inflammation. Control mice received carrageenin while reference group received ASA (100 mg/kg). The average (mean) edema was assessed by measuring with Vernier calipers.

Egg-albumin induced inflammation

Inflammation was induced in mice by the injection of egg albumin (0.1mL, 1% in normal saline) into the sub planar tissue of the right hind paw (Okokon *et al.*, 2010; Edem *et al*., 2023). The linear circumference of the injected paw was measured before and 0.5, 1, 2, 3, 4, and 5 hrs after the administration of the phlogistic agent. The stem extract (200, 400, and 600 mg/kg i.p) and ASA (100 mg/kg orally) were administered to groups (n=6) of 24 h fasted mice 1 h before the induction of inflammation. The control group received 10 mL/kg of distilled water orally. Edema (inflammation) was assessed as the difference in paw circumference between the control and 0.5, 1, 2, 3, 4 and 5 hrs post administration of the phlogistic agent (Edem *et al*., 2023). The average (mean) edema was assessed by measuring with vernier callipers.

Xylene – induced ear oedema

Inflammation was induced in mice by topical administration of 2 drops of xylene at the inner surface of the right ear. The xylene was left to act for 15 mins. *Telfairia occidentalis* extract (200, 400, and 600 mg/kg i.p), dexamethasone (4 mg/kg) and distilled water (0.2 mL/kg) were orally administered to various groups (n=6) of mice 1 h before the induction of inflammation. The animals were sacrificed under light anaesthesia and the ears were cut off. The difference between the ear weights was taken as the oedema induced by the xylene (Okokon, *et al.,* 2010; Edem *et al*., 2023).

Evaluation of antipyretic activity of the Telfairia occidentalis *stem extract on D-amphetamine-induced pyrexia*

Adult albino rats of both sexes that were used in this study were fasted for 24 hours but were allowed water *ad libitum.* They were randomized into groups of 6 rats each. Amphetamine (5 mg/kg, i.p) was administered to the animals after obtaining basal temperatures. Hyperthermia developed at 0.5 h following amphetamine administration. Different doses of stem extract (200, 400 and 600 mg/kg orally), aspirin (100 mg/kg) and distilled water (10 mL/kg, orally) were administered respectively to the treatment and control groups of animals. Rectal temperatures of the animals were obtained at an hour interval for 5 h (Edem *et al*., 2023).

Effect of *Telfairia occidentalis* stemextract on 2,4-Dinitrophenol (DNP)-induced pyrexia

Adult albino rats of both sexes fasted for 24 hours but allowed water *ad libitum* were used for the experiment. They were randomized into groups of six rats each. DNP (10 mg/kg, i.p.) was administered to the rats after

obtaining the basal rectal temperatures. Hyperthermia developed within 30 minutes of DNP administration. Different doses of the stem extract (200, 400, and 600 mg/kg i.p.), aspirin (100 mg/kg), and distilled water (10 mL/kg, orally) were administered to the treatment and control groups of animals. Rectal temperatures of the animals were obtained at 1h intervals for 5h (Edem *et al*., 2023).

Effect of Telfairia occidentalis *stem extract on yeast-induced pyrexia*

Adult albino rats of both sexes fasted for 24 hours but allowed water *ad libitum* were used for the experiment. They were randomized into groups of 6 rats each. At zero hour, the basal temperature of the rats were taken using digital clinical thermometer. Thereafter, each animal was administered subcutaneously with a 20% W/V aqueous suspension of yeast at a volume of 10 mL/kg (Okokon & Nwafor, 2010; Edem *et al*., 2023). At suitable intervals beginning one hour after yeast injection, the rectal temperatures of animals were taken, and animals with increase of 1˚C were selected and grouped for the study. The extract understudy was administered i.p. after the pyrogen at doses of 200, 400, and 600 mg/kg to respective groups of rats. The control group received distilled water (10 ml/kg) and the reference group was administered with ASA (100 mg/kg) both orally. The rectal temperatures of the groups were taken at 1 hour intervals for 5 hours.

Statistical analysis

The data collected were analyzed using one way analysis of variance (ANOVA) followed by Tukey's multiple comparison post-test (Graph pad prism software Inc. La Jolla, CA, USA). Values were expressed as mean ± SEM and significance relative to control were considered at $p<0.05$.

RESULTS

Determination of Median lethal dose (LD_{50})

Administration of stem extract of *T. occidentalis* (100 - 5000 mg/kg) orally did not cause any mortality in the animal groups administered. Moreover, no physical toxic signs of the extract were observed. The median lethal dose (LD_{50}) of stem extract of *T. occidentalis* was therefore estimated to be =5000 mg/kg.

Evaluation of antinflammatory activity of the stem extract

Carragenin-induced oedema in mice

The effect of ethanol stem extract *T. occidentalis* (200-600 mg/kg) on carragenin-induced oedema is shown in Table 13. The extract (200-600 mg/kg) exerted a significant ($p<0.05 – 0.001$) anti-inflammatory effect in a non dose–dependent manner. The effect was pronounced in the different treatment groups 30 min post-induction with carrageenan. The effect was sustained throughout the study (5 hr) but was not comparable to the standard drug, ASA, 100 mg/kg (Table 1a and 1b).

Egg albumin- induced edema

Administration of stem extract *T. occidentalis* (200-400 mg/kg) on egg albumin - induced edema in mice caused a significant ($p<0.05$-0.001) non dose-dependent anti-inflammatory effect against edema caused by egg albumin. The effect was pronounced in the different treatment groups 30 min post-induction with egg-albumin and sustained throughout the study (5 hr). The low dose (200 mg/kg) exerted the highest anti-inflammatory effect which was comparable to that of the standard drug, ASA (100 mg/kg) (Table 2a and 2b).

Xylene- induced ear edema

The anti-inflammatory effect of stem extract *T. occidentalis* (200-400 mg/kg) against xylene-induced ear edema in mice is shown in Table 3. The extract exerted a dose-dependent anti-inflammatory effect which was significant ($p<0.0$-0.01). The effect of the highest dose (600 mg/kg) was not comparable to that of the standard drug, dexamethasone (4.0 mg/kg) (Table 3).

Table 1a. Effect of *Telfairia occidentalis* stem extract on carrageenan- induced oedema in rats.

Treatment/ Dose (mg/kg)	Time Intervals (hr)						
	0	**0.5**	**1**	**2**	**3**	**4**	**5**
Control	3.44± 0.10	6.63 ± 0.09	6.23± 0.15	5.98± 0.15	5.67 ± 0.14	5.41 ± 0.15	4.80 ± 0.11
Extract							
200	3.45± 0.08	6.29 ± 0.07	5.90± 0.10	5.66± 0.12	5.35 ± 0.22	5.07 ± 0.10	4.28 ± 0.12
400	3.50± 0.07	6.72± 0.05	6.02± 0.21	5.67± 0.15	5.39± 0.12	5.10± 0.10	4.69± 0.14
600	3.48± 0.06	6.48± 0.05	6.33± 0.19	5.96± 0.05	5.48± 0.16	5.12± 0.09	4.60± 0.14
ASA 100	3.41± 0.06	6.15± 0.25	5.81 ± 0.34	5.61 ± 0.27	5.18± 0.18	4.82± 0.12	4.27± 0.13

Data are expressed as mean ± SEM. Significant at $^{a}p<0.05$; $^{b}p<0.01$; $p<0.001$ when compared to control. n = 6.

Table 1b. Effect of *Telfairia occidentalis* stem extract on carrageenin induced oedema in rats.

Treatment/ Dose (mg/kg)	Average Inflammation/Oedema (mm) ± SEM					
	0.5hr	1hr	2hr	3hr	4hr	5hr
Control	3.19± 0.03	2.79± 0.01	2.54± 0.02	2.23± 0.03	1.97 ± 0.04	1.36± 0.01
Extract						
200	2.84± 0.02[a]	2.45± 0.01[c]	2.21± 0.04[c]	1.90± 0.03[c]	1.62± 0.01[c]	0.83 ± 0.01[c]
400	3.22± 0.03	2.52± 0.02[c]	2.17± 0.03[c]	1.89± 0.02[c]	1.60± 0.03[c]	1.19± 0.01[c]
600	3.00±0.15	2.85± 0.01	2.48± 0.02[c]	2.00± 0.01[c]	1.64± 0.01[c]	1.12± 0.01[c]
ASA 100	2.74±0.02[b]	2.40± 0.01[c]	2.20± 0.03[c]	1.77± 0.02[c]	1.41± 0.01[c]	0.86± 0.01[c]

Data are expressed as mean ± SEM. Significant at [a]p< 0.05;[b]p<0.01;[c]p<0.001 when compared to control. n = 6.

Table 2a. Effect of *Telfairia occidentalis* stem extract on egg- albumin induced oedema in mice.

Treatment/ Dose (mg/kg)	Time Intervals (hr)						
	0	0.5	1	2	3	4	5
Control	3.78 ± 0.11	6.81± 0.05	7.23± 0.11	7.37 ± 0.16	7.25± 0.18	7.21 ± 0.20	7.16 ± 0.20
Extract							
200	4.17± 0.14	6.06 ± 0.06	6.16 ± 0.26	5.99± 0.29	5.89 ± 0.33	5.85± 0.34	5.41 ± 0.28
400	4.06± 0.07	6.18± 0.25	6.81± 0.39	6.70± 0.29	6.62± 0.29[c]	6.57± 0.28[a]	5.94± 0.19
600	3.66± 0.11	6.01± 0.24	5.95± 0.14	5.98± 0.25	5.87± 0.27[c]	5.84± 0.27	5.26± 0.27
ASA 100	3.75± 0.08	6.27± 0.29	5.83± 0.29	6.07± 0.27	5.67± 0.33[c]	5.36± 0.26[a]	4.92± 0.22[a]

Data are expressed as mean ± SEM. Significant at [a]p<0.05; [b]p< 0.01 when compared to control. n = 6.

Table 2b. Effect of *Telfairia occidentalis* stem extract on egg- albumin induced oedema in rats.

Treatment/ Dose (mg/kg)	Average Inflammation/Oedema (mm) ± SEM					
	0.5hr	1hr	2hr	3hr	4hr	5hr
Control	3.03± 0.02	3.45± 0.01	3.59± 0.01	3.47± 0.01	3.43 ± 0.02	3.38± 0.02
Extract						
200	1.89±0.01[c]	1.99± 0.02[c]	1.82± 0.05[c]	1.72± 0.01[c]	1.68± 0.02[c]	1.24± 0.01[c]
400	2.12±0.03[c]	2.75± 0.02[c]	2.64± 0.03[c]	2.56± 0.03[c]	2.51± 0.01[c]	1.88± 0.02[c]
600	2.35±0.02[c]	2.29± 0.02[c]	2.32± 0.01[c]	2.21± 0.02[c]	2.18± 0.02[c]	1.60± 0.01[c]
ASA 100	2.52±0.01[c]	2.08± 0.12[c]	2.32± 0.13[c]	1.92± 0.13[c]	1.61± 0.01[c]	1.17± 0.01[c]

Data are expressed as mean ± SEM. Significant at [a]p< 0.01;[b]p< 0.01, [c]p< 0.001 when compared to control. n = 6.

Table 3. Effect of *Telfairia occidentalis* stem extract on xylene-induced ear oedema in mice.

Treatment/Dose (mg/kg)	Weight of right ear (g)	Weight of left ear (g)	Increase in ear weight (g)	% inhibition
Control (normal saline) 0.2 mL	0.047 ± 0.004	0.085 ± 0.006	(80.85) 0.038 ± 0.002	
Extract				
200	0.042 ± 0.004	0.065± 0.006	(54.76) 0.023 ± 0.005[a]	39.47
400	0.040 ± 0.004	0.057 ± 0.004	(42.5) 0.017 ± 0.001[b]	55.26
600	0.045± 0.002	0.057± 0.004	(26.66) 0.012 ± 0.01[c]	68.42
Dexamethasone 4.0	0.035 ± 0.004	0.045 ± 0.004	(28.57) 0.010 ± 0.001[c]	73.68

Figures in parenthesis indicate % increase in ear weight, *significant at ap<0.05, bp < 0.01, cp < 0.001 when compared with control. n = 6.

Evaluation of antipyretic activity of the extract

Effect of ethanol stem extract of Telfairia occidentalis on D-amphetamine induced pyrexia

The antipyretic effect of the stem extract on amphetamine- induced pyrexia is shown in Table 4. The stem extract (200-600 mg/kg), in the presence of the pyrogen, caused significant (p<0.05 – 0.001) reductions in the temperatures of the extract- treated rats when compared with the control. These effects were pronounced and sustained from 2- 5 h post treatment with the extract. The antipyretic effects of the extract were not comparable with that of the standard drug, ASA,100 mg/kg (Table 4).

Effect of ethanol stem extract of Telfairia occidentalis on 2,4-dinitronitrophenol (DNP)-induced pyrexia in rats

The stem extract of *Telfairia occidentalis* (200-600 mg/kg) exerted significant ($p<0.05–0.001$) dose-dependent lowering of temperature in DNP-induced pyretic rats. The antipyretic effect was, however, pronounced ($p<0.05–0.001$) and sustained from 4 - 5 h in all the extract-treated groups. The effect of the highest dose (600 mg/kg) was comparable to that of the standard drug, ASA, 100 mg/kg (Table 5).

Effect of stem extract of Telfairia occidentalis on yeast-induced pyrexia in rats

Administration of stem extract of *Telfairia occidentalis* (200-600 mg/kg) did not cause any significant ($p>0.05$) reduction of body temperature of rats elevated by the administration of yeast. The standard drug, ASA,100 mg/kg, reduced the temperature significantly($p<0.05$) when compared to the control group (Table 6).

Table 4. Antipyretic effect of *Telfairia occidentalis* stem extract on D-amphetamine-induced pyrexia.

Treatment/ Dose(mg/kg)	Time Intervals (hrs)							
	Basal Temp	**0**	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**
Control	34.45±0.12	36.10±0.13	36.26±0.22	36.44±0.65	36.91±0.66	37.09±0.22	37.28±0.33	37.10±0.18
Extract 200	34.57±0.10	35.76±0.38	35.46±0.17	35.23±0.16	35.53±0.21[a]	35.53±0.61[b]	35.63±0.20[a]	34.22±0.39[a]
Extract 400	35.10±0.24	36.54±0.15	35.50±0.20	35.96±0.35	35.80±0.23[a]	35.56±0.42[a]	35.00±0.23[b]	34.20±0.15[b]
Extract 600	34.85±0.08	36.23±0.08	35.43±0.33	35.53±0.14	34.43±0.52[a]	34.64±0.24[b]	35.17±0.12[b]	35.75±0.21[c]
ASA 100	34.95±0.36	35.30±0.29	35.20±0.20	35.01±0.25	34.87±0.14[a]	34.25±0.10[c]	33.97±0.14[c]	33.51±0.11[c]

Values are expressed as mean ± SEM. Significance relative to control. [a]$p<0.05$; [b]$p<0.01$; [c]$p<0.001$. n = 6.

Table 5. Antipyretic effect of *Telfairia occidentalis* stem extract on Dinitrophenol-induced pyrexia.

Treatment/ Dose(mg/kg)	Time Intervals (hrs)							
	Basal Temp	**0**	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**
Control	34.92±0.34	36.55±0.40	36.07±0.49	36.55±0.67	36.27±0.51	36.57±0.23	36.07±0.41	36.17±0.41
Extract 200	34.40±0.14	36.72±0.41	36.90±0.81	36.70±0.58	36.20±0.56	35.37±0.42	34.15±0.15[a]	33.55±0.25[b]
Extract 400	34.95±0.13	36.90±0.22	36.75±0.56	36.00±0.45	35.93±0.24	35.00±0.33	34.22±0.14[a]	33.43±0.30[b]
Extract 600	35.00±0.20	36.27±0.14	35.97±0.41	36.72±0.56	35.32±0.49	35.32±0.18	33.15±0.18[c]	33.34±0.33[c]
ASA 100	34.52±0.13	36.07±0.37	35.82±0.35	35.50±0.12	34.97±0.18	34.57±0.07	33.30±0.17[c]	32.80±0.20[c]

Values are expressed as mean ± SEM. Significance relative to control. [a]$p<0.05$; b$p<0.01$; c$p<0.001$. n = 6.

Table 6. Antipyretic effect of *Telfairia occidentalis* stem extract on yeast-induced pyrexia.

Treatment/ Dose(mg/kg)	Time Intervals (hrs)							
	Basal Temp	**0**	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**
Control	36.30±0.26	37.13±0.34	37.56±0.12	37.80±0.20	38.00±0.35	38.77±0.17	38.70±0.08	38.30±0.40
Extract 200	36.10±0.32	37.33±0.14	36.91±0.24	37.40±0.36	38.52±0.27	37.83±0.26	38.0±0.53	39.0±0.28
Extract 400	35.50±0.17	37.62±0.17	36.55±0.56	37.0±0.38	38.36±0.60	38.54±0.50	38.86±0.15	39.0±0.43
Extract 600	36.1±0.68	37.41±0.06	36.34±0.64	37.0±0.33	37.60±0.08	37.88±0.11	38.20±0.21	38.70±0.26
ASA 100	35.56±0.23	37.40±0.17	36.91±0.46	36.91±0.46	37.22±0.31[c]	36.83±0.11[c]	36.34±0.12[c]	35.77±0.16[c]

Values are expressed as mean ± SEM. Significance relative to control. [a]$p<0.05$; [b]$p<0.01$; [c]$p<0.001$. n = 6.

DISCUSSION

In this study, the stem extract was evaluated for anti-inflammatory activities using various experimental models. In carragenin-induced oedema, the extract (200 - 600 mg/kg) was observed to have exerted a strong effect at the early stage of inflammation (1-2 hour) indicating strong effect probably on histamine, serotonin and kinnins that are involved in the early stage of carragenin-induced oedema (Vane & Booting, 1987). The extract further caused a prominent reduction of the later stage of the oedema suggesting its ability to inhibit prostaglandin which is known to mediate the second phase of carragenin induced inflammation (Vane & Booting, 1987). However, ASA (100 mg/kg) a prototype NSAID, a cyclooxygenase inhibitor whose mechanism of action involves inhibition of prostaglandin, produced a considerable inhibition of the paw swelling induced by carragenin injection.

The extract also inhibited egg albumin-induced oedema demonstrating that it can inhibit inflammation by blocking the release of histamine and 5-HT, two mediators that are released by egg albumin (Nwafor *et al.,* 2007). However, ASA, a cyclooxygenase inhibitor

reduced significantly oedema produced by egg albumin. The extract exerted a significant ($p<0.01$) inhibition of xylene -induced ear oedema at higher doses of the extract, suggesting the inhibition of phospholipase A_2 (PLA_2) which is involved in the pathophysiology of inflammation due to xylene (Lin *et al.,* 1992). However, dexamethasone, a steroid antiinflammatory agent produced significant reduction in the mean right ear weight of positive control rats indicating an inhibition of phospholipase A_2.

Anti-inflammatory activities of plants have been linked to antioxidant potentials (Sokeng *et al.,* 2013). The plant extract which has been reported to possess strong antioxidant potential (Enin *et al.,* 2024), have been revealed by GCMS analysis to contain phenolic like compounds with antioxidant potentials such as PUFA (Kumar *et al.,* 2010). Also, polyunsaturated fatty acids such as 9-octadecenoic acid (Z)-, 2- hydroxyethyl ester, hexadecanoic acid, ethyl ester and hexadecanoic acid, methyl ester found in this extract have been implicated in the anti-inflammatory activity of plants (Kumar, 2010). Flavonoids are known anti-inflammatory compounds acting through inhibition of the cyclo-oxygenase pathway (Liang *et al.,* 1999). Some flavonoids are reported to block both the cyclooxygenase and lipoxygenase pathways of the arachidonate cascade at relatively high concentrations, while at lower concentrations they only block the lipoxygenase pathway (Carlo *et al*., 1999). Some flavonoids exert their antinociception via opioid receptor activation activity (Rajendran *et al*., 2000; Otuki *et al*., 2005). Flavonoids also exhibit inhibitory effects against phospholipase A_2 and phospholipase C (Middleton *et al.,* 2000), and cyclooxygenase and/or lipoxygenase pathways (Robak *et al.,* 1998). The presence of these phytochemicals could have contributed to the observed activity which maybe acting through antioxidant action and other mechanisms. The antiinflammatory activity of the stem extract corroborates that earlier reported on the leaf and seed extracts (Oluwole *et al*., 2003; Okokon *et al.,* 2012).

On antipyretic activity, the extract significantly inhibited amphetamine, and dinitrophenol-induced pyrexia but did not affect yeast-induced pyrexia. Amphetamine acts on the brain causing the release of biogenic amines from their storage sites in nerve terminals resulting in increased level of cAMP and subsequent synthesis of prostaglandins from arachidonic acids produced in neurons by receptor-mediated hydrolysis of phospholipids (Westfall & Westfall, 2006). This leads to hyperthermia. Dinitrophenol induces hyperthermia by uncoupling oxidative phosphorylation causing release of calcium from mitochondrial stores and also prevent calcium reuptake. This results in an increased level of intracellular calcium, muscle contraction, and hyperthermia (Kumar *et al*., 2002). Yeast induces pyrexia by increasing the synthesis of prostaglandins (Al-Ghamdi, 2001), in the hypothalamus which the extract could not prevent. The extract may have reduced pyrexia by reducing brain concentration of prostaglandin E_2 especially in the hypothalamus through its action on COX-2 or by enhancement of the production of the body's antipyretic substances such as vasopressin and arginine (Chandrasekharan, 2002). The hypothermic activity of the extract could have also been mediated by vasodilatation of superficial blood vessels leading to increased dissipation of heat following resetting of hypothalamic temperature control center (Rang *et al*., 2007). This action may be due to the phytochemical compounds in this plant. Therefore, the temperature lowering activity of the extract may not be unconnected with the inhibition of one or combination of the above-mentioned mechanisms. The phytochemical compounds in this plant may in part be responsible for the observed antipyretic activities of the stem extract.

CONCLUSION

The results of this study show that the stem extract of *Telfairia occidentalis* possesses antiinflammatory and antipyretic activities which are due to the activities of its phytochemical constituents.

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