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ANTI-INFLAMMATORY EFFECT OF SOME COMMON NIGERIAN VEGETABLES

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Summary: Methanol extracts of four common Nigerian vegetables; *A.graveoleus, C.argentia, T. triangulare and T.occidentalis* were investigated for anti-inflammatory activity in rats using carrageenan. Carrageenan-induced oedema in the sub-plantar hind paw of vegetable extracts treated rats was significantly inhibited. This finding becomes quite relevant since these vegetables are non-steroidal compounds and from natural source.

Key Word: *Nigerian vegetables, inflammation, oedema,*

Introduction

The word vegetable is usually used to describe the tender edible shoots, leaves, fruits and roots of plants that are eaten whole or in part, raw or cooked as a supplement to starchy foods and meat (Williams, 1991). Who would have thought that there is more to be derived from the common vegetables, fruits and spices that we eat daily, that they are medicine for many minor and major diseases? (Kafaru, 1999). A common belief is that vegetables contain both vitamins and minerals necessary for the body. Also, the potential protective role of specific anti-oxidants presently found in constituents of fruits and vegetables are well documented. One of the local vegetables investigated called "ugu" in Igbo, is strongly associated with the Igbos that the crop is named "Igbo vegetable" (Akoroda, 1990). Telfairia has as much as 770ppm of iron. This level of iron seems to provide a basis for the folklore that Telfairia leaf extract is administered as a blood tonic to convalescent persons (Oyolu, 1978). This study was to evaluate the likely anti-inflammatory activity of four common tropical vegetables.

Materials and Methods

Plant Materials

The fresh vegetables (leaves and stems) were purchased between August and October 1998, from Bodija market, Ibadan, Nigeria. Identification and authentication of the plant species were carried out by Dr A.E .Ayodele of the Department of Botany and Microbiology, University of Ibadan, while voucher specimens were deposited at the herbarium.

Preparation of Extracts

The leaves and stems of the vegetables; Telfaira occidentalis (Ewuro, Ugu), Talinum triangulare (Gbure, Water leaf), Celosia argentea (Sokoyokoto, Green) and Apium graveoleus (Celery) were chopped into smaller sizes and shade-dried within the laboratory space. The fairly powdered materials were soxhlet extracted with methanol. The extracted samples were then evaporated to dryness to give percentage yield of 25.2, 20.4, 20.6, and 4.2 in the order of named vegetables above. These extracts were stored at -4^{0}C until when needed for the experiment.

Animals

The animals used in this study were adult male albino rats weighing between 150 and 180g. Twenty four rats were put into six groups of four animals per group. These animals were obtained from Pre-clinical animal house of the College of Medicine, University of Ibadan. They were fed on commercial rat pellets from Ladokun Feeds, Ibadan and maintained under standard laboratory conditions for a week before the commencement of the experiments. During this period, they were given feed and water ad libitum. They were fasted for 12h prior to the experiment. Animals in groups I to IV received the same dose (160mg/kg BW) of the test extracts of the four vegetables. Group V animals represent those serving as control, and they were given 10ml/kg BW of normal saline (0.9% Nael). The last group is VI, and was given acetylsalicylic acid at a dose of 100mg/kgBW. All four extracts and the standard drug were dissolved in normal saline,

and were administered orally using oral dosing needle an hour before carrageenan injection.

Phytochemical analysis of vegetables

Air dried leaves and stems of the four vegetables were crushed into powder form. These samples were screened for the presence or absence of various secondary metabolites that could be of therapeutic values using standard phytochemical screening procedures described by Trease and Evans, 1996.

Anti-inflammatory test

Carrageenan-induced paw oedema:

Acute inflammation in albino rats was induced by injecting 0.2ml of 0.5% carrageenan sodium salt (Sigma) subcutaneously in the sub-plantar region of the right hind paw of rats which have been fasted for 12hr according to the method described by Winter et al (1962). The diagonal diameter of the paw was measured using Micrometer screw gauge before and after the injection of carrageenan, at half-hourly intervals for 5h. The volume of paw size was derived from the formula: Volume of paw is equal to the product of 1.33, 3.14 and the cube of halve of the paw diameter. This is based on the assumption that the oedematous paw is spherical. Increase in diagonal diameter of the paw circumference is taken as a measure of oedema while inhibition of carrageenan – induced hind paw oedema was used as a measure of anti-inflammatory activity (Bamgbose and Naomesi, 1981; Mascolo et al, 1986).

Results

Table 1: Shows the effect of methanolic extract of four common Nigerian vegetables on carrageenan-induced paw oedema in rats.

Treatment	Dose (mg/kgBw)	Rat's paw diameter after 3h. (cm)	Percentage inhibition (%)
Control(Saline;10ml/kgBW)	-	4.20±0.07	-
A . graveoleus	160	2.60±0.06*	82.35
C . argentea	160	2.60±0.02*	76.47
T . triangulare	160	2.75±0.02*	79.41
T . occidentalis	160	2.80±0.07*	79.41
Acetylsalicyclic acid	100	2.80±0.09*	100.00

n = 4 * P<0.05 compared with the control. Mean ± S.E.M

Table 2: Shows the phytochemical anaylsis of four common Nigerian vegetables

Vegetable	Alkaloids	Anthraquinones	Cardiac glycosides	Saponin glycosides	Tannins
Apium graveoleus	+	+	-	-	-
Celosia argentea	+	++	++	+	+
Talium triangulare	-	-	-	-	+
Telferia occidentalis	++	++	+	+	-

- = negative (absent) + = slightly present ++ = abundantly present

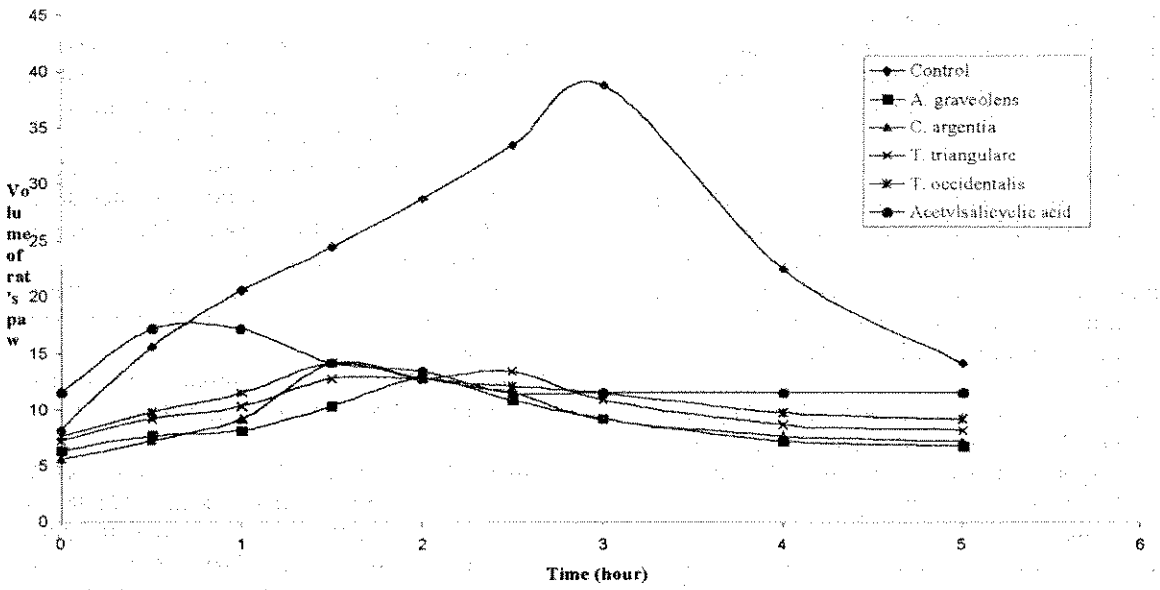

Figure 1: Changes in rat's paw volume with time given different methanolic extracts of vegetables

In figure 1 above, all the four vegetables have their curves merging between the hours of 1.5 and 3.0. Also, paw volume decreased gradually after 3hr while increases in volume were observed to be slight shortly after injection of carrageenan. This is however not so with acetylsalicylic acid (ASA) (positive control) and the Control group. For ASA group, paw volume was observed to peak at 0.5hr followed closely with a fairly steady decline. In the control group administered with normal saline paw volume kept increasing with time until its peaks at 3hr. At the peak point, the increase was more than 400times the initial volume. From these curves, the times at which each of the vegetable extracts and the drugs attain peak paw volume thus follow the order; Control (ns) > A.graveoleus >T. triangulare >C. argentia > T. occidentalis > ASA.

When compared with the control (ns), the standard drug (ASA) at 3hr showed 100% inhibitory or anti-inflammatory activity (Table 1). All the vegetables had high inhibitory effect on carrageenan-induced oedema at 3hr. However, C. argentia with 76.47% anti-inhibitory effect showed the lowest.

Discussion

The results of the present study show that methanol extract of four common vegetables used possesses anti-inflammatory properties (Table 1) The presence of phytochemical compounds in varying quantities in these vegetables indicates great medicinal importance. They should be responsible for the stabilization of the body against foreign microbes and prevention of certain ailments. In most cases, these disease situations are often associated with acute or chronic inflammation of tissues.The significant anti-inflammatory activity exhibited by these vegetables can be linked with the presence of compounds like alkaloids and anthraquinones in most of them except T. triangulare

Carrageenan rat paw oedema is a suitable and useful test in detecting orally active anti-inflammatory agents more importantly those from natural products (Dirosa et al, 1971). The anthraquinones and related glycosides are stimulant cathartics and exert their action by increasing the tone of the smooth muscle in the wall of the large intestine (Tyler et al, 1981). Increased vascular permeability that is associated with local/acute inflammation partly caused by nitric oxide from the endothelial cell lining and prostaglandins of the I_2, D_2, E_2, and F_2 may be overwhelmed by increase vascular smooth muscle tone due to anthraquinones

All the vegetables were found to be non-steroidal making the present finding very significant. This is so, because non-steroidal compounds are preferred as anti-inflammatory agents since they exhibit less side effects like their steroidal counterparts which are known to cause

contraindications like atherosclerosis, hypertension and osteoporosis among many others. These anti-inflammatory vegetables are non-toxic when ingested orally as is commonly the case in soup preparation in Nigeria.

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