



Abortifacient properties of alligator pepper (*Aframomum melegueta*) seeds.

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Abstract

Alligator pepper (*Aframomum melegueta*) is used in the Surinam cuisine to flavour dishes such as vegetables (okra and tomatoes recipes), soups (lentil and chicken) and fish recipes. It has a wide use and the eating does not exclude pregnant women who actually use it to terminate unwanted pregnancy. A large percentage of maternal deaths in Nigeria is related to unsafe abortions. Abortifacient drugs are not generally available in the country which has restrictive abortion laws. To investigate possible abortifacient effect of *Aframomum melegueta* seeds, three groups of pregnant female Wistar albino rats were used. Group one, served as control, received no alligator pepper. Groups two and three were given aqueous extract of and the granulated alligator pepper respectively. Every group was fed normal rat chow while tap water was allowed *ad libitum* for the period of gestation. The results showed that the number and mean weight of litters were not significant between control and aqueous recipient groups suggesting that the extract had no deleterious effect on fertility. However group three that received granulated alligator pepper in doses above 4.0mg/kg body weight did not litter. While not advocating abortion the dose if worked out in humans could be utilized in fertility clinics, as a safe abortifacient if the mother's life is seriously endangered by the pregnancy.

Keywords: Abortifacient; Alligator pepper; *Aframomum melegueta*; Seeds

Introduction

Alligator pepper is also known as mbono spice, hepper pepper corresponds to the seeds of *Aframomum danielli*, *Aframomum citratum* or *Aframomum exscapum*. The West Africa variety of Zingiberaceae family and species *Aframomum melegueta* (Botanical name supplied by Prof. Akueshi, personal communications) is a tropical herbaceous perennial. The seed has an exotic tropical scent and flavour and is

used for the production of beer, wine, spirits and the flavouring of vinegar. It is a common ingredient in West African cuisine where it imparts "heat", "pungency" and a spicy aroma to classic West Africa "Soups" (stews) (Celtnet spice guide, 2007, Gernot Katzer's spice dictionary, 2007). The seed of *Aframomum melegueta* has been reported to be a galactagogue, anthelmintic and haemostatic. It is used to calm indigestion, heartburn and possesses anti-inflammatory

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activity with a favourable gastric tolerability profile (Tropilab.com 2007).

Moreover, alligator pepper Zingiberaceae *Aframomum melegueta* has been widely used by many cultures; for entertainment often served with kola nuts, for religious rites by diviners for invoking spirits by priests of the Iyayi society of Nigeria where it is served along with kola nuts as communion. Recent tests of *Aframomum melegueta* in our laboratories indicate that the seed could be ambivalent in fertility clinics. It could be developed as a fertility drug (Inegbenebor et al. 2009a; 2009b) or as an abortifacient in “essential abortion”. The need to develop and possibly apply the herb in infertility clinics is the objective of investigating the different biological activities of the seed in Wistar albino rat model systems presently.

Experimental

Animals. Nine (9) adult male and eighteen (18) female Wistar rats of weight range 120-130g, inbred in the animal house of College of Medicine, Ambrose Alli University Ekpoma were kept in two cages according to their sexes. Rat chow and tap water were allowed *ad libitum* to the animals for two weeks for acclimatization. Subsequently the eighteen (18) females were randomly distributed, two per cage, to cohabit with a male counterpart for three days in order to mate in groups A, B, C, D, E, F, G, H, and I. After the three days the males were withdrawn from the females and placed in separate cages labeled MA, MB, MC, MD, ME, MF, MG, MH and MJ based on the group each male rate mated with. The female rats were also separated into different cages so that each occupied a separate maternity cage thus; A₁, A₂, B₁, B₂, C₁, C₂, D₁, D₂, E₁, E₂, F₁, F₂, G₁, G₂, H₁, H₂, and I₁, I₂ respectively, and observed for 18 to 25 days.

Fertile males were selected because either they successfully impregnated both

their partners or their partners delivered a higher number of litters than others. In the second experiment following the above a male rat was left with a female for three days to allow for matting. The males were then withdrawn while each female rat was left in its maternity cage. They were then labeled two subgroups (A and B). To the subgroups each of which comprised five controls and twenty experiments alligator pepper obtained from local market in Ekpoma was administered in two different forms; aqueous phase and in granulated form.

Preparation of aqueous extract of alligator pepper. Twenty milligrams (20mg) of the granulated pepper was mixed with 20ml of distilled water and allowed to stand for 2 hours. The mixture was filtered through a filter paper into a clean beaker. One milligram of granulated alligator pepper was taken to be equivalent to 1ml of its extract. The control (Ac) of subgroup A received only rat chow and tap water *ad libitum*. To experimental subgroup A (Ae) the preparation was administered intraperitoneally. Rat chow was fed the rats and clean tap water allowed *ad libitum* for the duration of the experiment (18-25 days). The controls of subgroup B were treated as per their counterparts in subgroup A. the experimental subgroup B however were starved for three hours one day after separation from their male partners. Thereafter they were each served 20g of rat chow mixed with 10mg/kg body weight and then increments of 10mg/kg to 40mg/kg bwt of alligator pepper; but not extra rat chow the day they ingested the pepper. Tap water was allowed *ad libitum*. From the next day to the end of the experiment the animals had normal rat chow and clean water *ad libitum*. The rats were observed in separate maternity cages for 18 to 25 days.

Data analysis was done using Student t-test.

Results

The activity profiles of the two different preparations are summarized in Tables 1 and 11. There was a significant difference ($P < 0.05$) in mean weight gain in pregnancy in the aqueous extract recipients and ($P < 0.001$) in the granulated group beneficiaries respectively when compared with controls. The weight gain in the latter group was corporeal and not due to gestation. The experimental animals, however that received aqueous alligator pepper gained

weight due to pregnancy, which ran its course as in the control group, but there was in fact no gestation period in the animals fed granulated pepper beyond 20mg/kg bwt. Both the number and average weight of litters in the aqueous group did not differ significantly from the control. This shows that the extract does not enhance or depress fertility. The rats on granulated alligator pepper had copious vaginal discharge which resulted in spontaneous abortion.

Table 1: Effect of aqueous extract of *Aframomum melegueta* on pregnancy outcome in rats.

Groups	Dose of aqueous of extract (mg/kg)	Mean weight gain in pregnancy (g)	Mean gestation period (days)	Average no of litter	Average weight of litters (g)
<u>Control</u>					
(1) n = 3	Nil	200±5.0	24±0	9	5.56
(2) n = 2	Nil	175±4.0	25±0	9	5.50
<u>Experimental</u>					
(1) (n=5)	5mg	175±5.0	23±1.0	6	5.50
(2) (n=5)	10mg	150±2.0*	24±0	7	5.40
(3) (n=5)	15mg	175±2.5	25±0	9	5.30
(4) (n=5)	20mg	150±1.0*	24±0	11	4.55

Table 2: Effect of Granulated Alligator Pepper on Pregnancy Outcome in Rats

Groups	Dose of aqueous of extract (mg/kg)	Mean weight gain in pregnancy (g)	Mean gestation period (days)	Average no of litter	Average weight of litters (g)
<u>Control</u>					
(1) n = 3	Nil	150±2.5	24	8	5.5
(2) n = 2	Nil	125±4.0	24	8	5.4
<u>Experimental</u>					
(1) (n=5)	10mg	75±5.0	22±0	3.5	5.2
(2) (n=5)	20mg	55±0.1**	20±1.5	2	2.5
(3) (n=5)	30mg	43±2.0**	Nil	Nil	Nil
(4) (n=5)	40mg	25±0.5**	Nil	Nil	Nil

* $P < 0.05$; ** $P < 0.001$ Control Compared with Experimental Students t-test n = Number of animals.

Discussion

Studies on *Aframomum melegueta* have shown its use as food, in brewing and flavouring of vinegar (Celtnet spice Guide, 2007). There is also report on the ocular toxicity effect of its granulated moiety (Igwe et al., 1999). Findings in the present investigation clearly demonstrate convergent and divergent biological activities of two different forms of preparation for ingestion, of the same seed *Aframomum melegueta*. Weight gain was common to aqueous pepper

recipients and the rats that received the dry matter.

The weight gain in the aqueous group was due to accumulation of water, fat, protein and products of conception (Miller, 2007), since the animals were actually pregnant and littered morphologically normal offspring. Moreover there was no adverse effect on fertility probably due to low dose of water-soluble components of *Aframomum melegueta*. These water-soluble components although caused reduction in weight gain

during pregnancy, the reduction did not adversely affect the offspring.

Conversely the weight gain in the animals that received granulated alligator pepper was corporeal and not due to gestation because their pregnancy was terminated before the foetus was viable, thus the animals did not litter: The water-insoluble contents of *Aframomum melegueta* might have been responsible for the infertility recorded presently and manifested as non-littering by the rats that ingested alligator pepper beyond 20mg/kg bwt in this group. This infertility activity of *Aframomum melegueta* was indicated by copious vaginal discharge which precedes abortion especially in early pregnancy (Inegbenebor 2006). It is noteworthy that earlier work in our laboratory (Inegbenebor et al., 2009) showed that Sprague Dawley rats tolerated lower doses of alligator pepper till very high dose of 50mg became abortifacient whereas in Wistar albino rats the pepper became abortifacient at much lower doses of 30mg/kg bwt to 40mg/kg bwt. This would suggest that the abortifacient activity of *Aframomum melegueta* is species specific.

The present investigation would like to suggest by way of conclusion that the single seed of *Aframomum melegueta* could be usefully harnessed in fertility clinics. The need on the other hand to develop potent abortifacient drug using internal resources as alligator pepper, could find the spice a ready source. While we are not advocating abortion, the 20-40% maternal deaths in Nigeria, which are related to unsafe abortion (Okonofua, 2002) could be reduced to the barest

minimum by replacing criminal abortion with safe abortion using human-specific doses of alligator pepper only when the mother's life is in danger.

References

- Celtnet Spice Guide (1) (<http://www.celtnet.org.uk/recipes/spice-entry.php?term=cardamom>) (accessed July 21, 2007)
- Gernot Katzer's spice dictionary (2) (<http://www.uni-graz.at/rkatzer/engl/spice-geo.html>) accessed July 22, 2007).
- Tropilab.com/nengrekondrepepre.htm/enwikipedia.org/wiki/Alligator pepper
- Igwe, S.A., Eneruwa, I.C., Modie, J.A. (1999). Ocular toxicity of *Aframomum melegueta* (alligator pepper) on healthy Igbo. *Journal of Ethnopharmacology* 65(3), 203-206.
- Inegbenebor, U., Ebomoyi, M.I., Amadi, K., Onyia, K.A. (2009a). Effect of Alligator pepper (*Zingiberaceae Aframomum melegueta*) on first Trimester Pregnancy in Sprague Dawley Rats. *Nig. J. Physiol. Sci.* 24(2), 161-164.
- Inegbenebor, U., Ebomoyi, M.I., Amadi, K., Onyia, K.A., Aigbiremolen, A.W. (2009b). Effect of Aqueous Extract of Alligator pepper (*Zingiberaceae, Aframomum melegueta*) on Gestational weight gain. *Nig. J. Physiol. Sci.* 24(2), 165-169.
- Inegbenebor, U. (2006). Management of Unwanted Pregnancy in Nigerian Adolescents. *Journal of Applied and Basic Sciences*; 4: 43-47.
- Miller, J.B (2007). Litter size and sympathetic activity in young adult rats. *Am. J. Physiol. Integr. Comp Physiol.* 283: R1113-R1121.
- Okonofua, F.E. (2002). Unwanted Pregnancy, unsafe Abortion and the Law in Nigeria *Trop. J. Obstet Gynae.* 29 (S1): S15 – S17.