

EFFECT OF ALLIGATOR PEPPER (ZINGIBERACEAE *AFRAMOMUM MELEGUETA*) ON FIRST TRIMESTER PREGNANCY IN SPRAGUE DAWLEY RATS

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Summary: Alligator pepper (*Aframomum melegueta*) is a spice that is widely used in many cultures for entertainment, religious rites, food flavor and as a part of many traditional doctors medications. Pregnant women are among those who ingest Alligator pepper in these activities. This experiment was carried out to determine the health risk or benefit of Alligator pepper to pregnant women if any. Fifteen male rats and fifteen female rats of proven fertility from a pilot study were randomly paired in fifteen cages in a well ventilated room. After three days of mating, the males were withdrawn from the females, which were allowed to stay in their separate maternity cages for 18-25 days. The females in the control group were fed with normal rat chow and clean drinking water *ad libitum* for the duration of the experiment. Each of the rats in the experimental group was served 20 g of rat chow mixed with 50mg of Alligator pepper for one day only and thereafter fed with normal rat chow and clean drinking water *ad libitum* for 18-25 days. The rats in the control group had a mean of 7 litters each, while the rats in the experimental group did not litter at all. It was concluded that ingestion of large quantities of Alligator pepper poses a health risk to women in their first trimester of pregnancy.

Key words : Effect, Alligator pepper, Herbal remedy, Nutrition, Pregnancy

Introduction

Alligator pepper is widely used by many cultures in Nigeria for various purposes. It is served along with Kola nuts to guests for entertainment, members of the Iyayi (Faith) Society of Nigeria as communion and used for religious rites by diviners for invoking spirits. It is a common ingredient in pepper soup, a spicy delight in most parts of West Africa. Concoctions made of Alligator pepper are often used by traditional doctors as medications for various ailments. (Personal observation) Pregnant women are not excluded from eating this widely used substance. The constituents of an essential oil, extractable by hydro-distillation from the seeds of *Aframomum melegueta* include two sesquiterpene hydrocarbons, humelene and caryophyllene, their oxides and a few non-terpenoids. (Ajaiyieoba and Ekundayo, 1999).

There is a need to know the danger, pregnant women are exposed to, when this substance is used

as an ingredient in food or served during religious rites and naming ceremonies. Hence, this investigation aims to find out if granulated alligator pepper poses any health risk to pregnant women especially in their first trimester. It also aims to determine other effects of alligator pepper in pregnancy if any.

Materials and methods

Pilot study: selection of experimental rats

Twenty (20), six months old female and 20, six months old male Sprague Dawley rats, of the same strain; each weighing 125-150g and inbred in Ambrose Alli University Animal House, were kept in standard cages in a well ventilated room for acclimatization, for a period of two weeks. During the acclimatization period, normal rat chow and clean drinking water were given to the rats *ad libitum*.

After the acclimatization period, a pilot study was carried out thus; Twenty female rats were randomly put in 20 cages, (A -T) Twenty male rats of the same breed were randomly allocated to the female rats and left to cohabit for three days, so that mating could take place. Thereafter, the males were withdrawn and were put in separate cages labeled (MA, MB, ... MT) based on the female rat each male rat mated with. The female rats were left in their maternity cages for 18-25 days.

Experimental Study: To determine the effect of Alligator pepper on pregnancy

Three weeks after the weaning of the offsprings, the fertile female rats A, B, C, D, E, F, G, J, L, M, N, P, Q, R and T from the above pilot study, were selected, weighed and randomly allocated into fifteen cages (1-15). Their weights then ranged between 145g and 200g.

Experimental Animals

Fifteen female and fifteen male Sprague dawley rats of proven fertility were used for this study. The rats were now eight months old and were kept in cages in a well ventilated laboratory. The rats were fed with normal rat chow and clean water *ad libitum*.

Experimental drug

Alligator pepper, obtained in Ekpoma market, Edo state, Nigeria and ground into powder with a clean grinding machine.

Method

The fifteen selected female rats of proven fertility from the pilot study were randomly allocated into fifteen cages (1-15). Each female rat was kept in a separate cage so that there were fifteen cages for the fifteen rats. Female rats (1 – 8) served as the Control rats while female rats (9-15) served as the Experimental rats. The fifteen selected male

rats of proven fertility from the pilot study were randomly allocated to the fifteen cages containing fifteen female rats so that each cage contained one female rat and one male rat. They were left in their various cages for three days in order to allow mating to occur. After three days, the males were withdrawn from the females. The male rats were put in separate cages labeled (M1-M15) based on the female rat each male rat mated with.

The female rats were left in their initial cages so that each female rat occupied a separate maternity cage.

Administration of Granulated Alligator pepper

Female rats 1-8 (Control group)

Female rats 1-8, which represented the control group, were fed with normal rat chow and water *ad libitum*. Alligator pepper was not administered to any of these rats throughout the duration of the experiment. The rats were observed in separate maternity cages for 18 to 25 days.

Female rats 9-15 (Experimental group)

Female rats were starved of rat chow for three hours after separation from the males on the fourth day following first day of exposure to their male partners. Thereafter, they were each served 20g of rat chow mixed with 50 mg of Alligator pepper. They were not served extra rat chow on the fourth day. There were no left over rat chow by the morning of the fifth day. From the fifth day to the end of the experiment, they had normal rat chow and clean water *ad libitum*. The rats were observed in separate maternity cages for 18 to 25 days.

Statistical analysis

This was done using cross tabulation and Daniel Soper's free software for calculating One Way Analysis of Variance (ANOVA) at 5% level of significance (Soper, 2009)

Effect of Alligator Pepper on Pregnancy

Table 2: Effect of granulated alligator pepper on pregnancy outcome in Sprague Dawley rats

Parameters	Control group (n=8)	Experimental Group (n=7)
Dose of granulated alligator pepper	Nil	50mg
Dose of alligator pepper (mg/Kg)	Nil	160g
Mean initial weight of rats	165g	160g
Mean weight of rats after 3 weeks	302.5g	212.6
Mean duration of pregnancy	24 days	Nil
Mean weight gain in pregnancy	137.5 ±17.66g	52.6* ±19.46g
Mean no of litters	7	Nil *

* P < 0.0001; n = no of rats in the group

Results

The results of the experiment are as shown in Tables 2. The female rats in the control group (Rats 1 -8) had a mean of 7 litters each, while the female rats in the experimental group (Rats 9-15) did not

litter at all. This was found to be statistically significant. (P<0.0001). There was also a significant difference (p < 0.0001) between the weight gain in the control and the experimental rats during pregnancy. Weight gain in the experimental rats declined after two weeks of pregnancy and coincided with presence of copious blood stained vaginal discharge.

Discussion

Results obtained from the investigation; depicted by the absence of litters by the female rats in the experimental group, their significant (p <0.0001) weight loss compared to the controls and the presence of copious blood stained vaginal discharge, contradict the usual fluid retention and weight gain during pregnancy.(Denton,1982) This could imply that the ingestion of alligator pepper by rats in the present experiment does not keep or nurture pregnancy as evidenced by the fact that none of the affected experimental rats littered even one offspring.

Table 1: Selection of rats for experimental study

S/N	Female Rat	Male Partner	Duration of Pregnancy	No of Litters delivered	SELECTION
A	MA	MA	24 DAYS	9	A, MA SELECTED
B	MB	MB	24 DAYS	9	B, MB SELECTED
C	MC	MC	27 DAYS	5	C MC SELECTED
D	MD	MD	27 DAYS	6	D MD SELECTED
E	ME	ME	23 DAYS	8	E, ME SELECTED
F	MF	MF	25 DAYS	3	F, MF SELECTED
G	MG	MG	23 DAYS	3	G, MG SELECTED
H	MH	MH	23 DAYS	1	
I	MI	MI	NIL	NIL	
J	MJ	MJ	23 DAYS	6	J, MJ SELECTED
K	MK	MK	NIL	NIL	
L	ML	ML	26 DAYS	4	L, ML SELECTED
M	MM	MM	23 DAYS	9	M, MM SELECTED
N	MN	MN	25 DAYS	7	N, MN SELECTED
O	MO	MO	23 DAYS	1	
P	MP	MP	24 DAYS	6	P, MP SELECTED
Q	MQ	MQ	23 DAYS	8	Q, MQ SELECTED
R	MR	MR	24 DAYS	5	R, MR SELECTED
S	MS	MS	NIL	NIL	
T	MT	MT	25 DAYS	5	T, MT SELECTED

The dose of granulated Alligator pepper was decided on because the rats tolerated the lower doses of extract of Alligator pepper used in a previous experiment on the effect of aqueous extract of Alligator pepper on Gestational weight gain'. (Inegbenebor *et al*, 2009). Previous reports have shown that ingestion of 350mg of wholeseed Alligator pepper (5-7mg/Kg body weight) caused diplopia and blurred vision in healthy Igbo men (Igwe *et al*, 1999). However, apart from the initial loss of appetite, none of the 7 rats, which ingested 50mg of Alligator pepper (286-345mg/Kg body weight) had serious side effects apart from the discontinuation of pregnancy.

Conclusion

When ingested in high doses, alligator pepper causes discontinuation of first trimester pregnancies in rats. ($p < 0.0001$) It will be unethical to carry out this experiment in human subjects. However, women in the reproductive age group might need to avoid eating Alligator pepper if they are desirous of childbirth or are in their first trimester of pregnancy.

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