



Original Research Article

## The Effects of *Aframomum Melegueta* Aqueous Extract on the Kidneys of Adult Wistar Rats

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### ABSTRACT

*Aframomum melegueta* seeds have long been used as a spice and traditionally as a medicine. The effects of *Aframomum melegueta* aqueous extract were studied. Twenty wistar rats weighing between 180-215kg were used. They were grouped into four groups (A, B, C & D) of five animals each. Group A served as the control and was orally administered with 0.35ml of distilled water; the experimental groups B, C & D were orally administered with 0.55ml, 0.65ml and 0.75ml of aqueous extract of *Aframomum melegueta* respectively for twenty eight days. The animals were weighed after the last administration, anaesthetized under chlorine vapour and dissected. Kidney tissues were reviewed, weighed and trimmed down to a size of 3mm × 3mm thick and fixed in 10% formalin for histological studies. The experimental groups' body weight increased significantly relative to control. The organ (kidney) weight of the experiment groups was statistically similar with the control A. Histological examination showed no apparent toxicity on the kidney tissues.

**Keywords:** *Aframomum melegueta*, Kidney, Organ weight, Wistar rats, Body weight.

### INTRODUCTION

*Aframomum melegueta* is a species in the ginger family, zingiberaceae. This spice is commonly known as grains of paradise, melegueta pepper, alligator pepper, guinea grains or guinea pepper.

It is a native of West Africa. It is also an important cash crop in the Basketo district of southern Ethiopia. <sup>[1]</sup>

It is commonly employed in the cuisines of West and North Africa where it has been traditionally imported through caravan routes through the Sahara desert, and whence they were distributed to Sicily and the rest of Italy. <sup>[2,3,4]</sup>

The presence of the seeds in the diets of lowland gorillas seems to have some sort of medicinal properties for their cardiovascular health in the wild. As captive lowland gorillas haven't had them usually available in their diets, it could be a cause of their occasionally poor cardiovascular health in zoos. <sup>[5]</sup>

Today, it is being used in gourmet cuisine as a replacement to pepper and is used in craft beers <sup>[6]</sup>, gins and Norwegian akvavit. In America, grains of paradise are starting to enjoy slight resurgence in popularity due to their use by some well

known chefs in okra stew and TV cooking show ‘Good Eats’.<sup>[7]</sup>

*Aframomum melegueta* has been introduced to the Caribbean and Latin America where it is used in religious rites.<sup>[8,9]</sup>

In West Africa, folk medicine, grains of paradise are valued for their warming and digestive properties, and among the Efik people in Nigeria have been used for divination and ordeals determining guilt.<sup>[10]</sup> Also the spice is used for the purpose of alleviating stomachache and diarrhea as well as hypertension and tuberculosis.<sup>[11,12,12]</sup>

The study is therefore aimed at investigating the effects of *Aframomum melegueta* on the kidneys using adult wistar rats.

## MATERIALS AND METHODS

**Breeding of Animals:** Twenty healthy adult wistar rats were procured from the animal house of Anatomy Department University of Calabar, Cross River State and bred in the animal house of Nnamdi Azikiwe University, Nnewi Campus. They were allowed for seven days acclimatization under normal temperature before their weights were taken. They were fed ad libitum with water and guinea feed pellets from Agro feed mill Nigeria Ltd.

**Drug Preparation:** *Aframomum melegueta* were obtained from Nkwo market in Nnewi Anambra State, Nigeria and grinded into powder with a grinding machine. 200mg/1kg body weight were dissolved in

5mls of distilled water and administered to the animals.

**Experimental protocol:** The twenty healthy adult wistar rats were allocated into four groups (A, B, C & D) of five animals each. Group A served as the control and received 0.35ml of distilled water; the experimental groups (B, C & D) received 0.55ml, 0.65ml and 0.75ml of aqueous extract of *Aframomum melegueta* respectively for twenty eight days. The control and experimental groups were anaesthetized using chloroform inhalation method and dissected, kidney tissues were removed, weighed, trimmed down and fixed in 10% formaldehyde for histological studies.

**Tissue Processing:** The tissues were transferred into an automatic processor where they went through a process of fixation, dehydration, clearing, infiltration, embedding, sectioning and staining. Fixation was carried out in 10% formaldehyde. The tissues were washed over night in running tap water after four hours in 10% formaldehyde. Dehydration of the fixed tissues were carried out in different percentages of alcohol 50%, 70% and 90% absolute. The tissues were then cleared in xylene and embedded in paraffin wax. Serial sections of 5micron thick are obtained using a rotatory microtome. The tissue sections were deparaffined hydrated and stained using the routine haematoxylin and eosin method. The stained sections were then examined under the light microscope.

## RESULTS

### Morphometric Analysis of Body Weights

Table 1: Comparison of mean initial and final body weight and weight change in all the groups (A, B, C & D). (Mean  $\pm$  SEM given for each measurement).

	GROUP A	GROUP B	GROUP C	GROUP D	F-RRTIO	Prob. of Sig.
Initial body weight	190.20 $\pm$ 2.30	192.20 $\pm$ 3.60	193.40 $\pm$ 4.10	194.10 $\pm$ 2.70	64.240	<0.001
Final body weight	215.30 $\pm$ 4.20	219.40 $\pm$ 3.50	220.70 $\pm$ 3.20	221.60 $\pm$ 2.40	40.180	<0.001
Weight change	25.10 $\pm$ 3.70	27.20 $\pm$ 4.10	27.30 $\pm$ 3.90	27.50 $\pm$ 3.40	19.155	<0.001

The final body weight for the experimental groups increased significantly ( $P < 0.001$ ) relative to the control.

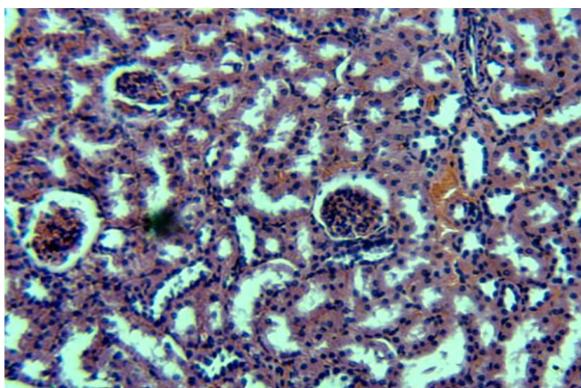
### Morphometric Analysis of Organ (liver) Weight

Table 2: Comparison of mean relative kidney weight of all the groups (A, B, C & D)  
(Mean  $\pm$  SEM given for each measurement)

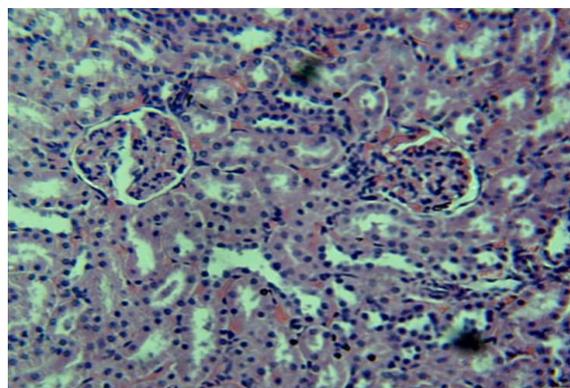
	GROUP A	GROUP B	GROUP C	GROUP D	F RATIO	Prob. of Sig.
Liver Weight	4.90 $\pm$ 0.400	4.95 $\pm$ 0.210	5.00 $\pm$ 0.320	5.35 $\pm$ 0.370	49.50	<0.001

The relative weights of the experimental groups increased significantly ( $P < 0.001$ ) with the control A.

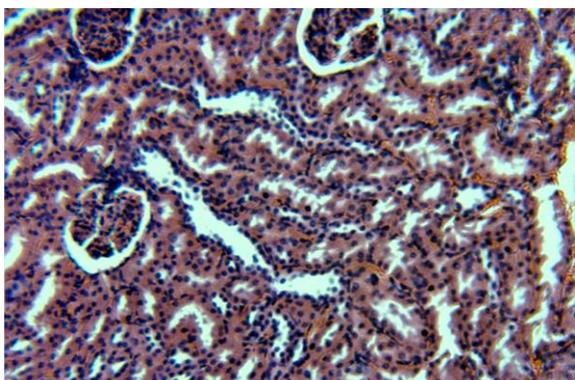
### Histopathological Findings



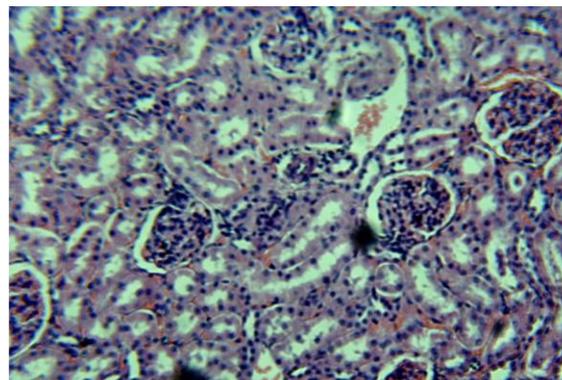
**Fig 1, Micrograph 1 (control)** showing normal histological structure of renal corpuscle (R), proximal convoluted tubule (P), distal convoluted tubule (D), Henle's loop (H), and Collecting tubule (ct), stained by H&E technique,



**Fig 3, Micrograph 3 Group C,** (treated with 0.65ml of *Aframomum melegueta* aqueous extract), showing non distortion of the histological structure of the kidney, stained by H & E technique, x 200.



**Fig 2, Micrograph 2 Group B,** (treated with 0.55ml of *Aframomum melegueta* aqueous extract) showing normal histoarchitecture of the kidney, stained by H & E technique, x200.



**Fig 4, Micrograph 4 Group D,** (treated with 0.75ml of *Aframomum melegueta* aqueous extract), showing normal histological structure of the kidney, though, vacuolation of renal corpuscle is observed, stained by H & E technique, x 200.

## DISCUSSION

*Aframomum melegueta* is a perennial herb that contains essential oils such as

gingerol, shagaol and paradol and it owes its pungency to these. It is equally been shown to contain alkaloids (piperine) essential oils and resins. [14]

The medicinal uses of *Aframomum melegueta* include its use as aphrodisiac, in measles and leprosy, for excessive lactation and post-partum hemorrhage, as purgative, galactagogue, anthelmintic and as hemostatic agent. [15]

Extracts of *Aframomum melegueta* have been reported to exhibit antioxidant effects on lard and groundnut oil. [16]

Antidiarrhea activity which may be as a result of inhibition of prostaglandin formation have been reported by Umuoko. [17]

Previous studies reported an anti-inflammatory effect which may be related to a membrane stabilizing activity [18] studies also showed antimicrobial and anti-fungal activity against schistosomes [18] and growth inhibition of bacillus cereus. [16]

In the present study, there was body weight gain in the experimental groups relative to the control. The organ (kidney) weight was statistically similar with the control. No histological distortion was observed in the kidney tissues. This could be as a result of antioxidant and hepatoprotective effects of aqueous extract of *Aframomum melegueta*.

## CONCLUSION

From the present study, no significant alterations were noted in body weight, organ weight and microscopic examination of the kidney tissues in low and high consumption of *Aframomum melegueta* aqueous extract.

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