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The Effects of *Aframomum melegueta* Aqueous extract on the Liver Enzymes of Adult wistar Rats

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ABSTRACT

This study is aimed at investigating the effects of *Aframomum melegueta* aqueous extract on liver enzymes of adult wistar rats. Twenty healthy wistar rats weighing between 180-215kg were used. They were divided 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 were orally administered with 0.55ml, 0.65ml and 0.75ml of aqueous extract of *Aframomum melegueta* respectively for twenty eight days. The control A and experimental groups were weighed, anaesthetized under chloroform vapour and dissected. Liver tissues were removed and weighed. Blood samples were collected through cardiac puncture using sterile syringes and needles. Blood for serum preparation was collected into sterile plain tubes without anticoagulant. The activities of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) were determined using randox kit method. The final body weight of the experimental groups increased significantly ($P<0.001$) with the control. The relative liver weight of the experimental groups (B, C & D) statistically increased ($P<0.001$) relative to the control. The activity levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) in the experimental groups (B, C & D) are similar with the control (A). This study therefore suggest that consumption of *Aframomum melegueta* aqueous extract at low and high doses did not cause biochemical alteration in the liver enzymes.

Keywords: Liver weight, Body weight, *Aframomum melegueta*, Wistar rats, Hepatoprotective

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INTRODUCTION

Aframomum melegueta (Alligator pepper) is a herb whose seeds have traditional usage mostly as a pungent spice to season foods with. This herb is botanically in the same family as ginger and shares many bioactives, and has been (medicinally speaking) traditionally used mostly for digestive and intestinal health and some other sporadic uses not related to food[1].

Aframomum melegueta tends to contain 6-Gingerol, 8-Gingerol, methyl 6-Gingerol, 6-shogaol, 6-Paradol, Rac-6-Dihydroparadol, 6-Gingeredione, and 2-(5-butylfuran-2-yl) [2,3].

It is used in the treatment of hypertension[4], tuberculosis[5] and a remedy for snakebites and scorpion sting[6].

The seeds have antimicrobial properties similar to many spices[7,8] and has some molluscicidal[9] and repellant properties[10,11].

Aframomum melegueta appears to have a polyphenolic content of 2.28 ± 0.02mg/g with 0.55mg/g flavonoids which is comparatively high to other African spices tested although low relative to other herbs[12]. Therefore, there is need to investigate the properties of *Aframomum melegueta* phytochemicals on the liver enzymes.

This study therefore aims at evaluating the effects of *Aframomum melegueta* on the liver enzymes of adult wistar rats.

MATERIALS AND METHOD

Breeding of Animals

Twenty adult wistar rats were obtained from the animal house of Anatomy Department, University of Calabar, Cross River State. The ethical committee permission was gotten from facultyb of basic medical sciences Nnamdi Azikiwe University Ethical committee. The animals were bred in the animal house of Deparment of Anatomy, 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 pallets from Agro feed mill Nigeria Ltd.

Drug Preparation

Aframomum melegueta were obtained from Mbaise in Imo State, Nigeria. It was identified and authenticated at herbarium unit of botany department of Nnamdi Azikiwe University, Akwa. It was grinded into powder with a grinding machine. 200mg/kg body weight were dissolved in 5mls of distilled water and administered to the animals.

Experimental Protocol

The twenty adult wistar rats were divided into four groups (A, B, C & D) of five animals each. Group A served as the control and were administered orally with 0.35ml of distilled water; the experimental groups (B, C & D) were orally administered with 0.55ml, 0.65ml and 0.75ml of *Aframomum melegueta* aqueous extract respectively for twenty eight days. The control with the experimental groups were weighed, anaesthetized under chloroform vapour and dissected. Liver tissues were removed and weighed. Blood samples were collected by cardiac puncture using sterile syringes and needles. Blood for serum preparation was collected into sterile plain tubes without anti-coagulant. Serum samples were separated into sterile plain tubes and stored in the refrigerator for analysis. Activities of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) were carried out using randox kit method.

RESULTS AND DISCUSSION

Morphometric Analysis of Body Weight

Table 1: Comparison of mean initial and final body weight and weight change in all the groups (A, B, C & D).

	Group A	Group B	Group C	Group D	F-Ratio	Prob of sig
Initial body weight	190.20 ± 2.30	192.20 ± 3.60	193.40 ± 4.10	194.10 ± 2.70	64.240	<0.001
Final body weight	215.30 ± 4.20	219.40 ± 3.50	220.70 ± 3,20	221.60 ± 2.40	40.180	<0.001
Weight change	25.10 ± 3.70	27.20 ± 4.10	27.30 ± 3.90	27.50 ± 3.40	19.155	<0.001

The final body weight for the experimental groups increased significantly (P<0.001) relative to the control. **(Mean ± SEM given for each measurement)**

Morphometric Analysis of Liver Weight

Table 2: Comparison of mean relative weight of group A & experimental groups(B, C & D)

	Group A	Group B	Group C	Group D	F-Ratio	Prob of sig
Liver Weight	4.80 ± 0.150	4.95 ± 0.200	5.10 ± 0.400	5.15± 0.350	40.60	<0.001

The relative liver weight for the experimental groups (B, C & D) increased significantly (P<0.001) relative to the control A. (Mean ± SEM given for each measurement)

Aframomum melegueta has been noted to inhibit the α-amylase enzyme with an IC_{50} of 4.837 ± 0.56mg/ml which may be related to the bioactives shared with ginger as this has been noted to a similar degree with red and white ginger plants[13].

Aframomum melegueta has also been noted to inhibit α-glucosidase with an IC_{50} of 2.14 ± 1.08 mg/ml.

An intervention in 19 otherwise healthy men noted that in persons with a response to cold exposure therapy (19°C with light clothing) that administration of an ethanolic extract of *Aframomum melegueta* (10mg of 15.2% 6-gingerol, 12.5% 6-paradol, 1.7% 6-shogaol and 4.0% 6-gingeredione) was able to increase the metabolic rate after 4 weeks of supplementation with 2 hours of cold exposure therapy[3]. Persons with no response to cold exposure failed to show a response to *Aframomum melegueta* supplementations[3].

In rats given a large amount of alcohol (4.8g/kg) for 15 days, congestion of *Aframomum melegueta* (100-200mg/kg water extracts) noted that the higher dose was able to prevent an increase in liver weight and fully abolish lipid peroxidation as assessed by MDA while preserving both GSH and GST, hepatic superoxide dismutase (SOD) was not significantly influenced by *Aframomum melegueta* despite it being reduced with ethanol[14]. The increase in serum AST and ALT was also fully normalized[14].

In the present study, there was significant body weight gain in the experimental groups compared with the control. The organ weight of the experimental animals were similar with the control.

Table 3: Activities of serum levels of Aspartate aminotransferase (AST), Alanine aminotransferase (ALT) and Alkaline phosphatase (ALP)

	Group A	Group B	Group C	Group D	F-Ratio	Prob of sig
ASP	75.50 ± 2.40	76.20 ± 5.40	77.20 ± 2.60	77.90 ± 1.90	30.040	<0.001
ALT	60.50 ± 2.50	61.20 ± 3.20	61.90 ± 4.40	62.10 ± 6.20	32.060	<0.001
ALP	185.10 ± 6.20	185.70 ± 3.20	186.20 ± 4.10	186.90 ± 3.70	11.700	<0.001

The experimental groups (B, C & D) activity levels in aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) increased significantly (P<0.001) relative to the control.(Mean ± SEM given for each measurement)

CONCLUSION

From the present study, no significant alterations were noted in body weight, organ weight AST, ALT and ALP liver enzymes. Hence *Aframomum melegueta* has protective potentials.

REFERENCES

1. Ilic N *et al* Toxicological evaluation of grains of paradise (*Aframomum melegueta*) (roscoe) K. Schium. J. Ethnopharmacol 2010: 127 (2): 352-6.
2. Groblacher B et al Putative mycobacterial efflux inhibitors from the seeds of *Aframomum melegueta*. J. Nat Prod. 2012: 75 (7): 1393-9.
3. Sugita J *et al* Grains of paradise (*Aframomum melegueta*) extract activates brown adipose tissue and increases whole body energy expenditure in men Br. J. Nutr. 2013: 110 (4): 733-8.

4. Gbolade A Ethnobotanical study of plants used in treating hypertension in Edo State of Nigeria. J. Ethnopharmacol 2012: 144 (1): 1-10.
5. Ogbole OO, Ajaiyeoba EO Traditional management of tuberculosis in Ogun State of Nigeria: the practice and ethnobotanic survey Afr. J. Tradit complement Altern Med. 2009: 7 (1): 79-84.
6. Lans C *et al* Medicinal and ethnoveterinary remedies of hunters in Trinidad BMC complement Altern Med. 2001; 1: 10.
7. Van Andel T, Myren B, Van Onselen S Ghanas herbal market J. Ethnopharmacol. 2012: 140 (2): 368-78.
8. Konning GH, Agyare C, Ennison B Antimicrobial activity of some medicinal plants from Ghana Fitoterapia 2004: 75 (1): 65-7.
9. Ndamukong KJ *et al* Molluscicidal activity of some Camerounian plant on Bulinus species East Afri Med Journal 2006: 83 (3): 102-9.
10. Ukeh DA *et al* Repellant activity of alligator pepper, *Aframomum melegueta* and ginger, zingiber officinale, against the maize weevil, sitophilus zeamals. Phytochemistry 2009: 70 (4): 62-4.
11. Ukeh DA *et al* Behavioural responses of the maize weevil, sitophilus zeamals to host (stored grain) and non host plant volatiles. Pest Manaf Sci. 2010: 66 (1): 44-50.
12. Adefegha SA, Oboh G Inhibition of key enzymes linked to type 2 diabetes and sodium nitroprusside induced lipid peroxidation in rat pancreas by water extractable phytochemicals from some tropical spices Pharm Biol 2012: 50 (7): 857-65.
13. Inhibitory effects of aqueous extract of two varieties of ginger on some key enzymes linked to type 2 diabetes in vivo. 2013: 6(7): 641-6.
14. Nwozo SO, Oyinloye BE Hepatoprotective effect of aqueous extract of *Aframomum melegueta* on ethanol induced toxicity in rats. Acta Biochem Pol. 2011: 58 (3): 355-8.