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Assessment of Some Biochemical Parameters among Chronic Consumers of Alligator Pepper (*Afromomu meligueta*) in Amassoma Bayelsa State Nigeria

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Abstract

Alligator pepper is a spice that belongs to the family Zingibreaceae and is used for the treatment of infectious disease such as urinary tract infection caused by Echerichia coli. This study was aimed on the assessment of some biochemical parameters among chronic consumers of alligator pepper (Afromomu meligueta) in Amassoma, Bayelsa State, Nigeria. Sixty apparently healthy participants within the ages of 35-53 years were randomly selected for this study and subsequently categorized into three groups: experimental group one < 2 years consumers of alligator pepper (20 participants), experimental group two, 2-10 years consumers of alligator pepper (20 participants) and control group, non-consumers of alligator pepper (20 participants). Thereafter, 5ml of blood specimens was withdrawn from each of the participants into lithium heparin anti-coagulated bottles respectively via venipuncture technique and spun for 2,500 revolution/minute using 800 D macro centrifuge. The obtained plasma was subsequently used for the measurement of the following biochemical parameters: alanine aminotransferase (colorimetric method), aspartate aminotransferase (colorimetric method), C-reactive protein (latex turbidimetry method), interleukin-6 (elascience method), urea (urease berthelot method), creatinine (Jaffe reaction method), troponin-1 (immune turbidimetry method) and creatinineKinase-MB (immune inhibition method) using SPSS 23.0 version as statistical package. The participants' data in experimental group one showed no statistically significant differences ($p>0.05$) in the mean values of all the measured biochemical parameters as compared to that of the control group while that of the experimental group two showed statistically significant elevations ($p = 0.02$) in the mean value of alanine aminotransferase (17.21 ± 0.96) and ($p = 0.02$) in the mean value of aspartate aminotransferase (15.10 ± 0.86) as compared to the control group: alanine aminotransferase (8.20 ± 0.31) and aspartate aminotransferase (7.80 ± 0.28) respectively. However, the mean values of the other biochemical parameters were not altered significantly ($p>0.05$). In conclusion, chronic consumption of alligator pepper (Afromomu meligueta) for a period of 2-10 years may put the consumers at the risk of hepatotoxicity. It is thus recommended that chronic consumption of this fruit for this period should be with extreme caution

Keywords: *Alligator pepper, Biochemical parameters, Assessment, Chronic consumers, Amassoma, Bayelsa State, Nigeria*

1 INTRODUCTION

Africa is widely recognized for its utilization of herbs as efficacious remedies for a diverse range of human ailments. These plants have been determined to have positive effects in both traditional and modern medicine (Abd El-Ghani, 2016). Approximately 70% of drugs are produced from herbs, and more than 80% of the rural population depends on these herbs for fundamental healthcare as estimated by Akinyemi *et al.* in 2000.

These medicinal plants are regarded as a plentiful reservoir of bioactive substances referred to as secondary metabolites. These compounds exhibit several biological characteristics such as anti-inflammatory, anti-tumoral, anti-viral, analgesic, and anti-malarial properties (Azzez *et al.*, 2020). Alligator pepper, scientifically referred to as *Afromomu meligueta*, produces ovoid-shaped fruits that are fresh and crimson in colour. Nevertheless, the colour of the dried ones changes to brown (Chiejina and Ukeh, 2012). The fruit, which has a comparable composition to ginger, is used in Nigeria and several regions of West Africa to cure infectious illnesses, such as urinary tract infections (Moret, 2013). The seeds of this plant are used as a spice in cooking due to its fragrant smell and strong taste. In addition, they are utilized as a treatment for snakebites, stomachaches, diarrhoea, hypertension, aphrodisiac effects, measles, and leprosy (Oludare, 2020).

Studies have demonstrated that this pepper have the ability to enhance sexual arousal. Gingerol, a constituent of ginger, exhibits anti-inflammatory properties via inhibiting the formation of leukotrienes and prostaglandins. This confers protection against bodily inflammation (Adefegha and Oboh, 2012). The research conducted by Inegbenebor *et al.*, 2009; Uloneme *et al.*, 2014; Victoria and Azibaola, 2022, revealed that pregnant rats with a high dosage of alligator pepper underwent first trimester pregnancy termination. Hence, it is recommended that breastfeeding and expectant mothers, particularly those in the initial stage of pregnancy, refrain from consuming this fruit in order to mitigate the risk of miscarriage.

The seeds of this fruit have also been shown to have purgative, anti-helminthic, and haemostatic qualities. Pharmacological research has demonstrated that the seeds have qualities that can inhibit the formation of ulcers, fight against microbial infections, and safeguard cells (Victoria and Azibaola, 2022). The seed harbours chemical compounds known as 6-paradol and 6-shogoal, which confer upon it antibacterial and antifungal characteristics (Gireesh, 2021). Although alligator pepper has been associated with numerous health advantages, limited research suggests that consuming it in large doses over an extended period of time may lead to liver damage (Nebojsa *et al.*, 2010). However, we have seen that persons of all age groups in this particular research area consume this fruit without being conscious of its qualities. Consequently, we have chosen to do this study with the objective of evaluating some biochemical indicators in individuals who regularly consume alligator pepper (*Afromomu meligueta*) in Amassoma, Bayelsa State, Nigeria.

2. MATERIALS AND METHODS

2.1 Geographic Region of Study

The study was conducted in Amassoma, a town located in the Southern Ijaw region of Bayelsa State, Nigeria. Amassoma has a population of 6,970 and is situated in the Niger Delta, which is recognized as the third largest delta globally. The settlement is positioned at latitude 5.20N and longitude 6.050E (Daupamowei, 2018).

2.2 Ethical Approval

All volunteers gave their verbal consent, and the study obtained ethical approval from the College of Health Research Ethics Committee, following the guidelines of the World Medical Association of Helsinki - Ethical Principles of 2008.

2.3 Voluntary Group

The study had sixty apparently healthy participants who were categorized into the following groups:

2.4 Control Group

The study included a cohort of twenty participants, ranging in age from 35 to 53 years, who were in a healthy state and had not consumed alligator pepper (*Afromomu meligueta*).

2.5 Experimental Group One

The cohort consisted of twenty apparently asymptomatic participants, ranging in age from 35 to 53 years, who had ingested alligator pepper (*Afromomu meligueta*) for a duration of less than two years.

2.6 Experimental Group Two

The cohort consisted of twenty apparently asymptomatic individuals, ranging in age from 35 to 53 years, who had consumed alligator pepper (*Afromomu meligueta*) for a duration of 2-10 years. All the apparently healthy volunteers exhibited no signs of substance misuse or nicotine addiction. Furthermore, they were completely free from any illnesses.

2.7 Quantified Biochemical Parameters

2.7.1 Alanine Aminotransferase

The colorimetric approach, first devised by Randox Laboratories Limited and improved by Emmanuel in 2020, was utilized.

2.7.2 Aspartate Aminotransferase

The colorimetric approach established by Egoro *et al.*, 2021, and previously proven by Randox Laboratories Limited, situated in the United Kingdom, was utilized.

2.7.3 C-reactive Protein

The updated latex turbidimetry technique, developed by Emmanuel *et al.* in 2020 and previously presented by Spinreact Diagnostic Spain, was utilized.

2.7.4 Interleukin-6

The Elascience approach, catalogued as E-EL-HO.102, was later modified by Egoro *et al.* in 2023 and subsequently implemented.

2.7.5 Urea

The urease Berthelot method, originally described by Randox Laboratories Limited in Crumlin County Antrim, United Kingdom (address: 55 Diamond Road, BT294QY), and later updated by Emmanuel *et al.*, 2021, was used.

2.7.6 Creatinine

The Jaffe reaction method, originally described by Randox Laboratories Limited in Crumlin County Antrim, BT294QY, United Kingdom, and then modified by Emmanuel *et al.*, 2021, was utilized.

2.7.7 Troponin- 1

The dual vial liquid stable immune turbidimetric method, initially documented by Diazyme under catalogue number DZ145A in the United States, and then adapted by Emmanuel *et al.*, 2023, was utilized.

2.7.8 CreatinineKinase-MB

The immune-inhibition approach, as initially outlined by Atlas medical reagents unit 4, William James House Cowley Road Cambridge CB40WX, and subsequently modified by Emmanuel *et al*. in 2023, was utilized.

2.8 Inclusion and Exclusion Criteria

This study only included persons who had used Alligator pepper (*Afromomu meligueta*) for less than 2 years or between 2-10 years, and who do not have any significant illnesses. Persons who are addicted to snuff, abuse of drugs, smoking cigarettes, or are not in apparent good health were removed from the study.

2.9 Statistical Analysis

The results were displayed as the mean and standard deviation, and the disparities between the control and experimental groups were assessed using a student "t" test. The results were later determined to be statistically significant with a p-value of less than 0.05.

3. RESULTS

The results of measured biochemical parameters in the control and experimental group one are reported in Table 1 below:

Table 1: Biochemical parameters of control group compared with that of experimental group one (< 2 years)

Parameters	Control group (n=20)	Experimental group (n=20)	p-value	Remarks
ALT (U/I)	8.20 ± 0.31	8.23 ± 0.34	0.73	NS
AST (U/I)	7.80 ± 0.28	7.84 ± 0.30	0.82	NS
CRP (mg/L)	4.30 ± 0.14	4.32 ± 0.15	0.85	NS
IL-6 (pg/mL)	9.10 ± 0.08	9.12 ± 0.10	0.87	NS
Urea (mmol/L)	1.85 ± 0.22	1.89 ± 0.27	0.79	NS
Creatinine (µmol/L)	53.25 ± 1.10	53.29 ± 1.13	0.83	NS
Troponin 1 ($\times 10^{-2}$) IU/L	1.21 ± 0.32	1.23 ± 0.33	0.71	NS
CKMB (IU/L)	4.60 ± 0.81	4.62 ± 0.84	0.87	NS

Values are in mean and standard deviation

KEYS: ALT = Alanine aminotransferase, AST = Aspartate aminotransferase, CRP = C reactive protein, IL-6 = Interleukin-6, CKMB = CreatinineKinase-MB, NS = Not statistically significant, n = Number of participants.

The results showed that there was no statistically significant distinction ($p>0.05$) in the average values of all the measured biochemical parameters between the individuals in experimental group one and those in the control group.

The measured biochemical parameters for the control and experimental group two are presented in Table 2 below:

Table 2: Biochemical parameters of control group compared with that of experimental group two (2-10 years)

Parameters	Control group (n=20)	Experimental group (n=20)	p-value	Remarks
ALT (U/I)	8.20 ± 0.31	17.21 ± 0.96	0.02	S
AST (U/I)	7.80 ± 0.28	15.10 ± 0.86	0.02	S
CRP (mg/L)	4.30 ± 0.14	4.34 ± 0.13	0.71	NS
IL-6 (pg/mL)	9.10 ± 0.08	9.14 ± 0.13	0.89	NS
Urea (mmol/L)	1.85 ± 0.22	1.90 ± 0.30	0.75	NS
Creatinine (µmol/L)	53.25 ± 1.10	53.31 ± 1.15	0.80	NS
Troponin 1 ($\times 10^{-2}$) IU/L	1.21 ± 0.32	1.25 ± 0.36	0.66	NS
CKMB (IU/L)	4.60 ± 0.81	4.64 ± 0.85	0.78	NS

Values are in mean and standard deviation

KEYS: ALT = Alanine aminotransferase, AST = Aspartate aminotransferase, CRP = C-reactive protein, IL-6 = Interleukin-6, CKMB = CreatinineKinase –MB, NS = Not statistically significant, S = Statistical significant, n = Number of participants

The findings indicated that the average levels (17.21 ± 0.96) of alanine aminotransferase (p = 0.02) and (15.10 ± 0.86) aspartate aminotransferase (p = 0.02) in experimental group two were significantly different from those in the control group. However, the levels of C-reactive protein (4.34 ± 0.13) (p = 0.71), interleukin-6 (9.14 ± 0.13) (p = 0.89), urea (1.90 ± 0.30) (p = 0.75), creatinine (53.31 ± 1.15) (p = 0.80), troponin-1 (1.25 ± 0.36) (p = 0.66), and creatinineKinase-MB (4.64 ± 0.85) (p = 0.78) were not substantially altered.

4 DISCUSSION

This study examined the mean levels of plasma alanine aminotransferase, aspartate aminotransferase, C-reactive protein, interleukin-6, urea, creatinine, troponin-1, and creatinineKinase-MB in two groups of individuals. The first group consumed alligator pepper (*Afromomu meligueta*) for less than 2 years, while the second group consumed it for 2-10 years. The control group comprised individuals who abstained from consuming alligator pepper (*Afromomu meligueta*).

The study's results showed that there was no significant change (p = 0.73) in the mean plasma alanine aminotransferase value for individuals who consumed alligator pepper (*Afromomu*

meligueta) for less than 2 years (experimental group one) compared to those who did not consume alligator pepper (*Afromomu meligueta*) (control group), as shown in Table 1. This finding contradicts the earlier research conducted by Nebojsa *et al.*, 2010 and Chinaka *et al.*, 2014. It suggests that ingesting alligator pepper (*Afromomu meligueta*) for less than 2 years does not harm the structure and function of the liver.

The study findings showed that there were no significant changes ($p = 0.82$) in the mean plasma aspartate aminotransferase value in individuals who consumed alligator pepper (*Afromomu meligueta*) for less than 2 years (experimental group one), compared to individuals who did not consume alligator pepper (*Afromomu meligueta*) (control group), as shown in Table 1. In contrast to previous studies conducted by Nebojsa *et al.*, 2010 and Chinaka *et al.*, 2014, this finding suggests that consuming alligator pepper (*Afromomu meligueta*) for less than 2 years does not harm the structure and function of the liver.

The study revealed that there were no noteworthy alterations in the mean levels of plasma C-reactive protein ($p = 0.85$) and interleukin-6 ($p = 0.87$) among individuals who consumed alligator pepper (*Afromomu meligueta*) for less than 2 years (experimental group one) in comparison to those who did not consume alligator pepper (*Afromomu meligueta*) (control group), as demonstrated in Table 1. According to Nebojsa *et al.*, 2014, chewing alligator pepper (*Afromomu meligueta*) for less than 2 years does not appear to lead to any inflammatory diseases in consumers.

The study found that there were no significant changes in the mean levels of plasma urea ($p = 0.79$) and creatinine ($p = 0.83$) in individuals who consumed alligator pepper (*Afromomu meligueta*) for less than 2 years (experimental group one), compared to those who did not consume alligator pepper (control group), as shown in Table 1. This finding aligns with the previous studies conducted by Obiki *et al.*, 2014 and Oguwike *et al.*, 2020, suggesting that taking alligator pepper (*Afromomu meligueta*) for a duration of less than 2 years is unlikely to cause any detrimental effects on the structure and function of the kidneys.

The study revealed that there were no statistically significant alterations in the mean concentrations of plasma troponin-1 ($p = 0.71$) and creatinineKinase ($p = 0.87$) among individuals who consumed alligator pepper (*Afromomu meligueta*) for a duration of less than 2 years (experimental group one) in comparison to those who did not consume alligator pepper (control group), as demonstrated in Table1. This discovery, which contradicts the previous investigation carried out by Talha *et al.*, 2021, indicates that the consumption of alligator pepper (*Afromomu meligueta*) for a duration of less than 2 years does not adversely affect the structure and function of the heart.

The results of this study, shown in Table 2, revealed that individuals who consumed alligator pepper (*Afromomu meligueta*) for a period of 2-10 years (experimental group two) had significantly higher levels of plasma alanine aminotransferase ($p = 0.02$) and aspartate aminotransferase ($p = 0.02$) compared to those who did not consume alligator pepper (*Afromomu meligueta*) (control group).

This discovery, in line with the prior research conducted by Nebojsa *et al.*, 2010 and Chinaka *et al.*, 2014, indicates that the liver may be undergoing harmful effects. The toxicity can be ascribed to the liver's incapacity to metabolize the many gingerols and similar chemicals present in higher levels in alligator pepper grains (*Afromomu meligueata*), resulting in damage to its structure and the release of these enzymes into the plasma.

Nevertheless, the data shown in this Table indicate that the mean values of C-reactive protein ($p = 0.71$) and interleukin-6 ($p = 0.89$), which serve as markers for inflammation, did not exhibit any statistically significant alterations when compared to the control group. This finding is consistent with the previous study conducted by Nebojsa *et al.* in 2014. There were no significant changes observed in the average levels of urea ($p = 0.75$) and creatinine ($p = 0.80$), which are biomarkers for kidney function, as compared to the control group. This discovery supports the previous investigations carried out by Obiki *et al.*, 2014 and Oguwike *et al.*, 2020. The mean values of troponin-1 ($p = 0.66$) and creatinine kinase-MB ($p = 0.78$), which are indicators for heart health, did not exhibit any statistically significant alterations in comparison to the control group. This finding is consistent with the previous investigation carried out by Talha *et al.*, 2021.

CONCLUSION

Based on this study, the ingestion of alligator pepper (*Afromomu meligueta*) over a span of 2-10 years can lead to liver harm. Nevertheless, consuming it for a duration of less than 2 years did not result in any detrimental impact on liver enzymes, inflammatory indicators, kidney function, and heart biomarkers.

Competing Interest

None

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Recommendation

It is crucial to use great caution when taking alligator pepper (*Afromomu meligueta*) for an extended duration of 2-10 years.

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