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Evaluation of "mgbam" traditional food on haematological profile and some selected biochemical parameters following consumption

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ABSTRACT

Evaluation of "mgbam" traditional food on haematological profile and some selected biochemical parameters was carried out using standard methods. Fifty-six male wistar albino rats were separated into seven groups of eight rats each. One group served as the control, two groups served as reference groups while the other groups served as test groups. The reference foods were basal feed and nutrend (commercial infants' food). The test groups were placed on compounded feed formulated with prepared "mgbam" and pelletized commercial rat feed using different proportions. Results obtained for haematological profile and biochemical parameters revealed that the studied food is good for health. This study has revealed the evaluation of "mgbam" traditional food on haematological profile and some selected biochemical parameters.

Introduction

Food comes in different forms and types. Food takes continental names such as European food, American food, African food, etc. It also takes country names such as Brazilian food, Chinese food, English food, Nigerian food, etc (Shunt *et al*., 1998). By definition, food is a general term used to describe any substance, which when ingested, digested and assimilated gives energy, replaces worn-out cells, facilitates growth and as well boosts immunity of the body (Amadi *et al*., 2011; Achi 2005; Uwakwe and Ayalogu, 1998; Ikoronye and Ngoody, 1985).

African foods are associated to the people of African continent. Different tribes and ethnic groups that exist in Nigeria, a country in African continent are associated with one or more foods, which are rooted on culture and tradition. Such foods are term traditional foods (Trichopoulou *et al*., 2007). They are prepared and eaten the way the ancestors prepared and ate them. In Nigeria, traditional foods are valued by the owners because they are used to showcase the traditions and customs of the people (Amadi *et al*., 2013a; Duru *et al*., 2013; Amadi *et al*., 2011; Cayot, 2007; Ach, 2005b). The 21st century saw the relegation of most traditional foods existing in Nigeria to the background due to emergence of fast foods.

"mgbam" is one of such traditional foods relegated to the background by fast foods. It is common among the Ikwerre ethnic national. The Ikwerre people are found in the present day River State, south-south geopolitical zone of Nigeria. They inhabit a substantial part of the northern half of River State. Ikwerre lies roughly within the coordinates 4º50'*N*, 5º15'*N*, 6º30'*E* and 7º15'*E* covering a land mass of about 21,400square kilometre (Amadi *et al*., 2013b; Nduka, 1993; Wahua, 1993). Benjamin *et al*., (2012) noted that "mgbam" is a melon-fungus cake peculiar to only the Ikwerre ethnic national. Onyeike and Ehirim (2001) noted other melon-fungus food products.

Although studies have shown that traditional foods are rich in nutrients (Duru *et al*., 2012; Amadi *et al*., 2011; Amadi *et al*., 2012b; Kikpi *et al*.,2009; Temple *et al*.,1996; Ibenoglu *et al*.,1995) but factors such as globalization, changes in taste, migration, belief about their safe nature, etc, militating against them have led to their poor production, low consumption, under-utilization, and poor translation of knowledge about them to the present generation (Duru *et al*., 2013). Director- General of Food and Agricultural Organisation, José Graziano da Silva on 27th September, 2012 in New York noted that traditional foods can improve diets and help mitigate high food prices. Using traditional foods against the high food prices in the world may not be achieved when their safe nature on consumption is being questioned.

There is need to evaluate the safe nature of available traditional foods that have not gone into extinction if the goal of using traditional foods against high food prices will be actualized. The present study therefore evaluated the effect of "mgbam" traditional food on haematological profile, hepatic and renal function using rats' model.

Materials and methods

The study on "mgbam" was carried out in Isiokpo community in Ikwerre Local Government Area of Rivers State situated in the Niger Delta region of Nigeria where it is produced for consumption.

Materials

The ingredients used in the preparation of "mgbam" were purchased from local markets in Isiokpo, Ikwerre local Government Area of Rivers State, Nigeria.

Preparation of "mgbam"

"asu", a local fungus of *Pleurotus specie* was pounded using a local mortar and pestle for about 2 minutes after which some quantity of ground melon (*Citrullus vulgaris*) seed was added to the pounded "asu" powder and pounded for three

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minutes until the mixture turned brown, appearing to clog together and exuding some oil. Ground pepper was added to the mixture and pounded for another 2 minutes. Half (1/2) desert spoonful of iodized cooking salt was added while pounding still continued. A little quantity (2mls) of hot water were added drop wise to the mixture to form a colloids, mixed and pounded again until oils exuded from the mixture. The colloidal mixture was moulded and cold pressured into small balls which formed the melon cake known as "mgbam". Wrapping leaves of "omu-edu" (*Molatus specie*- a parallel veinated leaf that resembles the palm frond) were washed with clean water and a minimum of 3 moulds were placed parallel on the leaf which was folded and tied with a string. Some quantity of water was put into a cooking stove and steamed for 7 minutes using a cooking stove before the wrapped samples were placed one by one into the pot and allowed to cook or boil for about 25 minutes. After cooking, the contents (melon- fungus cake or "mgbam") were unwrapped and are ready for consumption. It may be eaten as such or used as an ingredient for cooking soup.

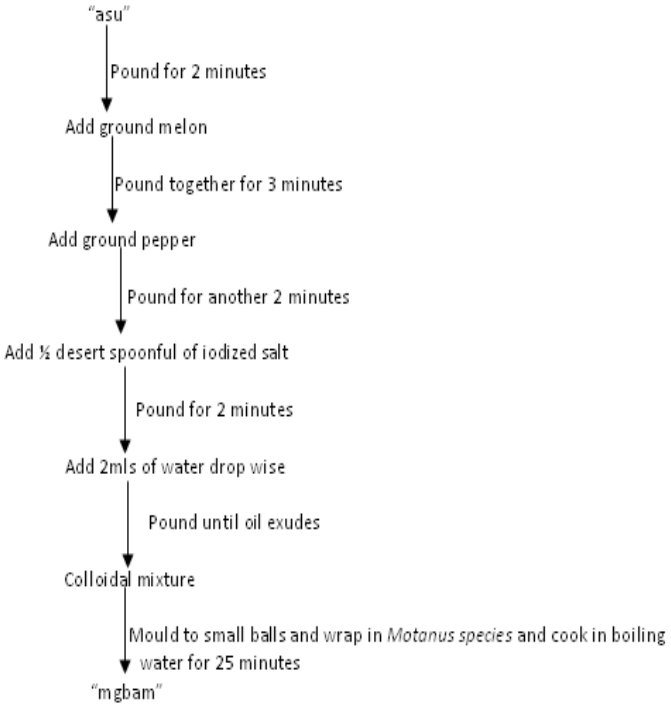

Figure 1: Flowchart for the preparation of "mgbam"

Sample preparation for analyses

The prepared "mgbam" was oven dried at 70^{o}C for 48 hours. The dried sample was ground into flour using hand mill device. The ground sample was stored in air tight container till needed for analyses.

Experimental animals

Fifty-six male wistar albino rats weighing between 70g-80g obtained from the animal colony of Department of Biochemistry, Abia State University, Uturu, Abia State Nigeria were used in this study. The animals were housed in clean and dry plastic cages with good ventilation, and were given pelletized commercial rat feed (Pfizer Livestock Co., Ltd, Aba, Nigeria) and portable water *ad libitum*. The rats were given the same feed before acclimatization. The acclimatization period lasted for 7days. After acclimatization period, the animals were allocated to seven groups of eight rats each. Their weights were equalised as nearly as possible. Aside the control group, groups placed on basal feed and nutrend^{TM} (commercial infants' food from Nestle Foods Nigeria PLC) were also used as reference diets in the present study. Four groups (I_5-I_{20}) were given compounded rat feed for twenty-eight days. Treatments for the rats were as follows.

Control group= Normal feed+ portable water; Basal feed group = 20% basal feed + 80% normal rat feed + portable water; Nutrend group = 20% nutrend + 80% normal rat feed + portable water; Group I5= 5% of "mgbam"+ 95% of normal feed + portable water; Group I10 = 10% of "mgbam"+ 90% of normal feed + portable water; Group I15= 15% of "mgbam"+ 85% of normal feed + portable water; Group I20= 20% of "mgbam"+ 80% of normal feed + portable water.

The treatment of experimental animals was in accordance to the National Institute of Health (NIH) guidelines for the care and use of laboratory animals (1985).

Blood sample collection

At the end of twenty-eight days treatment period, the rats were reweighed, and sacrificed by making incisions at their cervical regions with sterile blade after authanization using chloroform in a closed container. Blood was collected by cardiac puncture into anticoagulant free tubes with corks for hepatic and renal studies while that of haematological profile was collected in lithium-heparin tubes. The tubes were used for analysis.

Haematological analysis

Blood percentage (Hb), and red blood cell (RBC), were determined using the methods of Baker *et al*., (1998). Westergreen`s method was used for erythrocyte sedimentation rate (ESR), counting chamber and slide method were used for white blood cell total count (WBC) and differential counts respectively while haematocrit method was used for packed cell volume (PCV). Mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) and mean cell volume (MCV) were determined as described by Ikewuchi and Ikewuchi (2013).

Serum assay

The levels of alkaline phosphatase (ALP) were determined by Write *et al.* (1972). Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were determined as described by Reitman and Frankel (1958). The assay of bilirubin both conjugated and total was carried out using the Jendrasik and Groff (1938). Creatinine was determined as described by Heinegard and Triderstorm (1973) while urea was done using Urease-Berthlot method.

Statistical analysis

Results were presented as mean and standard error of eight determinations. Significant difference was established using student t-test as described by Steel and Torris (1963). Each test group was compared to control group at 5% significant level.

Results and discussion

Assessment of haematological indices is relevant in risk evaluation of changes in the system (Olson *et al*., 2000). Hb increased significantly ($p<0.05$) in test (I_5-I_{20}) against the control (Figure 1). The increase could be due to consumption of "mgbam" traditional food hence the food may have affected haematopoietin, a glycoprotein hormone that facilitates red cells production positively. The observed increase in Hb levels of test rats (I_5-I_{20}) were higher than Hb level of rats placed on basal feed but compared to Hb level of rats placed on nutrend (Figure 1). When the rate at which red cells are produced becomes lower than their rate of destruction, disease condition such as anaemia will result in the body (Baker *et al*., 1998).

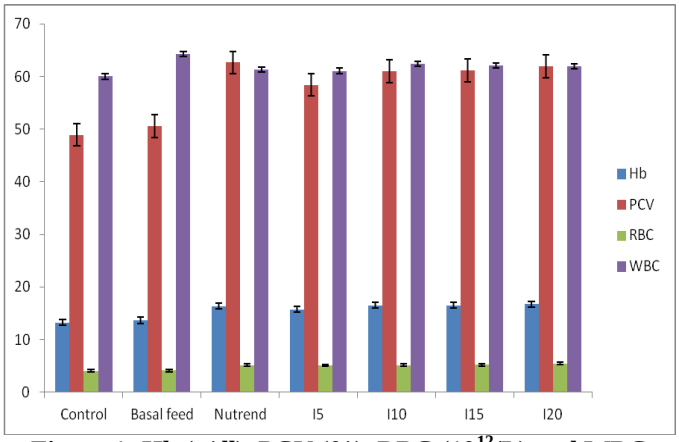

Figure 1: Hb (g/dl), PCV (%), RBC (10^{12}/L) and WBC (10^{9}/L) levels of rats fed "mgbam" traditional food.

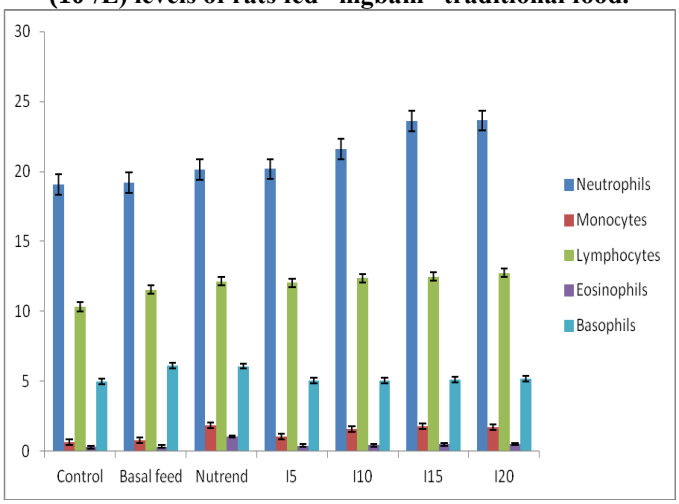

Figure 2: Differential counts (%) of rats fed "mgbam traditional food.

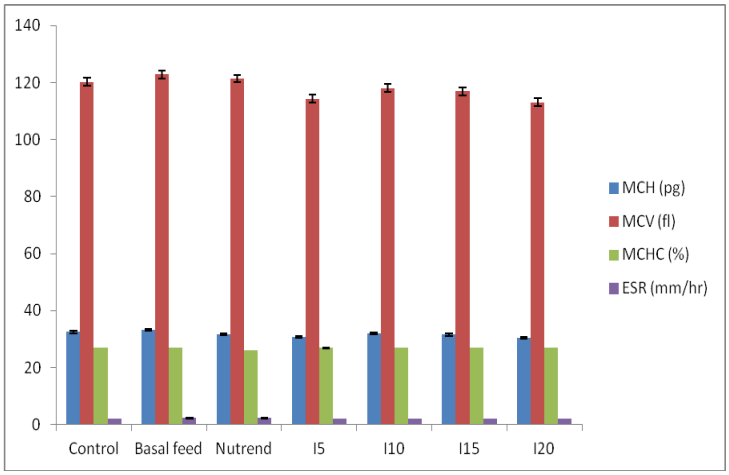

Figure 3: MCH, MCV, MCHC, and ESR levels of rats "mgbam" traditional food.

Such condition may not be possible with "mgbam" traditional food since test rats in this study had apparent increase in RBC levels against those of the control rats and rats on basal feed (Figure1). The RBC levels of test groups compared to that of rats placed on nutrend (Figure 1). The PCV levels were significantly ($p<0.05$) increased against the control but compared to that of rats on nutrend (Figure 1). Increase in Hb, RBC and PCV levels of rats placed on a traditional food was earlier reported by Duru *et al.*, (2013) on "nduduagworagwo" food. WBC mobilization known as leucocytosis is observed when foreign substances enter the body (Barker *et al.*, 1998). WBC levels of test groups in this study increased apparently in group (I_5) but became significant ($p<0.05$) in groups (I_{10}-I_{20}) against the control (Figure 2). The observed WBC levels in this study were lower than that of rats placed on basal feed and comparable to that of rats placed on nutrend (Figure 1). The differential counts (Figure 2) revealed that aside neutrophils, which were significantly increased ($p<0.05$) in groups I_{15}, and I_{20} (Figure 2), basophils, eosinophils, lymphocytes and monocytes were insignificantly affected ($p>0.05$) in the test rats when compared to those of the control (Figure 2). Basophils, eosinophils, lymphocytes and monocytes levels of test rats in the present study were comparable to those of rats placed on basal feed and nutrend (Figure 2). Mean cell volume (MCV) levels of test rats reduced significantly against the control in this study (Figure 3). Adebayo *et al.*, (2005) noted that MCHC and MCH relate to individual red blood cells. The same authors further linked MCHC and MCH to morphology and osmotic fragility of red blood cells. The observed insignificant effect ($p>0.05$) on MCHC and MCH levels (Figure 3) of test groups against those of the control could be indication that consumption of "mgbam" traditional food may not alter the morphology and osmotic fragility of red blood cells. Similar effects on MCHC and MCH were reported on rats fed "nduduagworagwo" traditional food by Duru *et al.*, (2013).

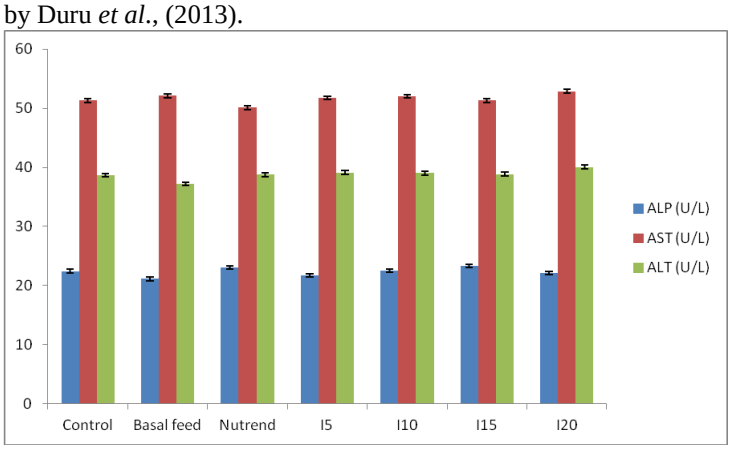

Figure 4: ALP, AST and ALT levels of rats fed "mgbam" traditional good

Key: ALP = alkaline phosphatase; AST = aspartate aminotransferase; ALT = alanine aminotransferase.

The consequence of tissue or organ damage is an increase in the enzyme associated with such tissue or organ in the body fluid (Friday, 2004; Nisirm, 1999). Alanine aminotransferase (ALT) is a cytoplasmic enzyme that is more specific to the liver hence its increase indicates hepatocellular damage (Aliyu *et al.*, 2006). ALT levels in test rats were insignificantly affected ($p>0.05$) when compared to the control (Figure 4). Aspartate aminotransferase (AST) is less specific than ALT though also an indicator of hepatocellular function (Ranjna, 1999). The observed AST levels of test groups in the present study were insignificantly affected ($p>0.05$) against the control. Friday (2004) noted that alkaline phosphatase (ALP) is found in a number of organs, most predominantly in bones and liver tissues; then indiscriminately in small intestine, kidney and placenta. The same author also noted that ALP exists as a number of isoenzymes, with each isoenzyme being tissue-specific. AST levels as observed in this study were not affected significantly ($p>0.05$) in test rats when compared to the control. The observation made on liver enzymes in the present study is line with the work of Duru *et al.*, (2013) on alkaline phosphatase (ALP); aspartate aminotransferase (AST); and alanine aminotransferase (ALT) of rats placed on "nduduagworagwo" traditional food. AST, ALT and ALP levels of test rats in this

study compared to those of rats placed on basal feed and nutrend (Figure 4). Generally, the observed insignificant effects on liver enzymes of test groups could be that "mgbam" traditional food can not alter hepatocellular integrity following consumption.

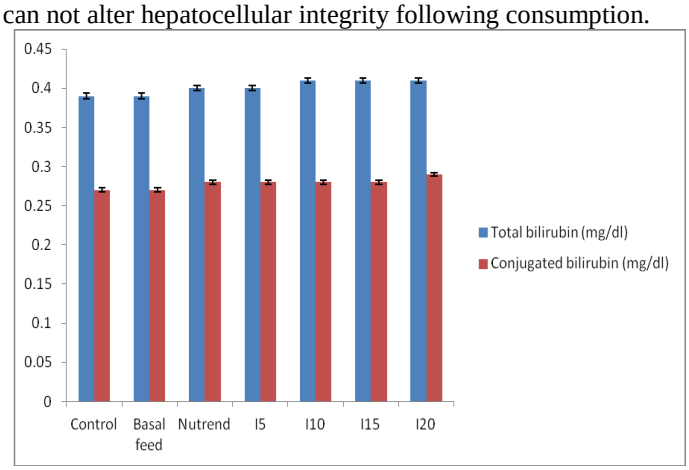

Figure 5: Total and Conjugated bilirubin levels of rats placed on "mgbam" traditional food.

The assay of bilirubin is very important because it serves as an important index used to correlate the body to certain disease conditions. Disease conditions such as jaundice, etc are associated to increased bilirubin content in the body (Oboh and Akindahunsi, 2005). Both the total and conjugated bilirubin levels of test rats in the present study were insignificantly affected ($p>0.05$) against the control (Figure 5) and compared to those of rats placed on basal feed and nutrend (Figure 5). This could be indication that consumption of "mgbam" may not be associated with diseases that occur due to bilirubin increase in the body. Similar observation was reported by Duru *et al.*, (2013) on bilirubin of rats fed "nduduagworagwo" traditional food.

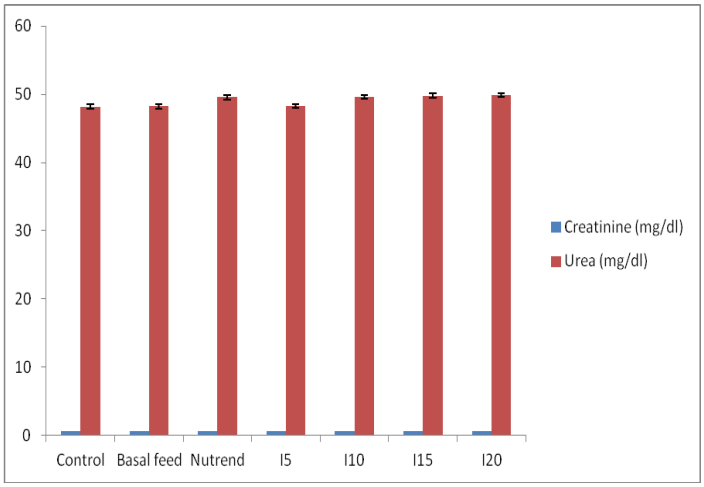

Figure 6: Creatinine and urea levels of rats fed "mgbam" traditional food.

Kidney function indices are used to mark its healthy state. Creatinine is a catabolic product associated with the muscle and excreted in the kidney (Nsirim, 1999). Its level in the serum is used as an indicator of kidney failure (Aliyu *et al.*, 2006). Decrease in urea excretion which leads to its retention in the body, is seen in many renal disease conditions. High blood urea is associated with increased tissue protein catabolism, excess breakdown of blood protein and diminished excretion of urea and could be a sign of azotaemia (Nduka, 1999). Observed creatinine and urea levels of test rats in the present study were insignificantly affected ($p>0.05$) when compared to those of the control (Figure 6). Creatinine and urea levels observed in test groups in the present study are comparable to those of rats placed on basal feed and nutrend (Figure 6).

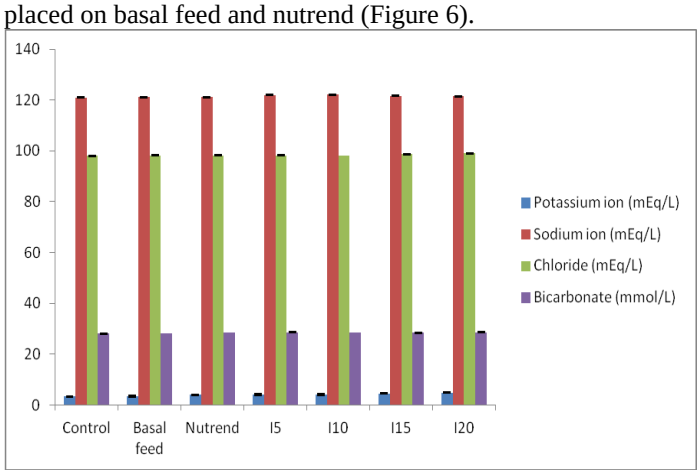

Figure 7: Electrolyte ion levels of rats fed "mgbam" traditional food.

There are existing channels and mechanisms through which electrolytes move round the body (Robert *et al*., 2003). They are mostly excreted by the kidney (Robert *et al*., 2003, Chris,1998). The electrolyte ions which include K^+, Na^+, Cl^-, and HCO_3^- levels were insignificantly affected ($p>0.05$) in test rats against those of the control (Figure 7). The electrolyte levels in test rats in this study compared to those of rats placed on basal feed and nutrend (Figure 7). On a general noted, these observations could be that "mgbam" does not affect the kidney function indices on consumption. Duru *et al*., (2013) reported similar observation on creatinine, urea and electrolyte levels of rats fed "nduduagworagwo" traditional food.

Conclusion

The present study has revealed the evaluation of "mgbam" traditional food on haematological profile and some selected biochemical parameters. Observations made from this study revealed that "mgbam" is good for health. Meanwhile the study on "mgbam" should be extended to other biochemical parameters.

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