Nutrient and Antinutrient Composition of “Onunu” and “Mgbam”, Traditional Foods of Ikwerre Ethnic Nationality in South-Southern Nigeria

B.A. Amadi, E. O. Ayalogu and E. Onyeike

Department of Biochemistry, Evan Enwerem (Formerly Imo State) University, Owerri, Nigeria.
Department of Biochemistry, University of Port Harcourt, Port Harcourt, Nigeria

Corresponding Author: B.A. Amadi

Abstract
The proximate nutrient and anti nutrient composition of “Onunu” and Mgbam, traditional diets of Ikwerre ethnic nationality, South-Southern Nigeria was evaluated. Values of crude protein, crude fat, ash and energy content were significantly (P≤0.05) higher in “Mgbam” than in “Onunu” while the reverse was the case for the values of carbohydrate, fiber and moisture. The energy value in Kcal 100g sample was 499.39 in “Mgbam” and was significantly higher (P≤0.05) than the value of 348.25 in “Onunu” due to a relatively higher crude fat and crude protein in the former compared to the latter. The anti-nutrient screening revealed that both samples are rich in tannins and phytates but with very little saponins, cyanogenic glycosides, alkaloids and oxalates however, flavonoids were absent. The anti-nutrient composition indicated that values of tannins, cyanogenic glycosides, phytates and oxalates were significantly higher in “Mgbam” than in onunu while the reverse was the case for alkaloids. There was no significant difference (P≤0.05) in the Saponin contents of both samples. Results obtained showed that both traditional foods are good sources of the nutrients studied and suggests relative safety for their consumption.

Keywords: traditional foods, proximate composition, anti-nutrient composition

INTRODUCTION
Food is one of the basic necessities of life (Okaka and Okaka, 2001). The need for food begins with the beginning of life, for it must provide the essential components of life and growth. Traditional foods are a recognizable, specific cuisine or food peculiar to a particular ethnic group, locality, community or society (Kyle and Cole, 2001). These foods consumed by different ethnic groups have been the pride of culinary traditions for centuries (Achi, 2005).

In Nigeria, the dietary behavior of the citizenry depends on the climatic features and the vegetative zones which influence the agricultural output. In other words, these traditional foods are mainly made from crops that are cultivated and processed within or around such an ethnic group.

“Onunu” and “Mgbam” are traditional foods produced in the South-Southern part of Nigeria. “Onunu” is peculiar to both the Ikwerre and Kalabari ethnic nationality and prepared mainly with white yam (Dioscorea rotundata) and ripe plantain (Musa paradisiaca) while “Mgbam” is a melon-fungus cake peculiar to only the Ikwerre ethnic nationality.

The production of “Onunu” and “Mgbam” is basically an indigenous traditional process that has not been subjected to any scientific investigation, but considering its role in the enhancement of the diets of the people in South-South Nigeria, there is need to investigate the nutritional and anti-nutritional composition of the products and thus the role in providing food security to the people.

MATERIALS AND METHODS
The study of “onunu” and “mgbam” preparation was carried out in Isiokpo community in Ikwerre Local Government Area of Rivers State, South-South Nigeria where they are produced for home consumption.

Materials: The ingredients used in the preparation of “onunu” and “mgbam” were purchased from Local markets in Isiokpo, Ikwerre Local Government Area of Rivers State, South-South, Nigeria.

Preparation of “Onunu”
Some quantity of peeled yam (D. rotundata) and peeled ripe plantain (Musa paradisiaca) were cut into cubes, washed and boiled with water in a cooking pot for 20 minutes. The boiled yam and plantain were transferred to a local mortar and pounded together to a paste using a local pestle. During the process of pounding, red palm oil and a teaspoonful of iodized salt were added in aliquots to improve colour and taste respectively. A local stew was prepared by...
frying red palm oil in a cooking pot for 2 minutes (but not allowed to bleach) after which the pot containing the fried oil was brought down from the cooking stove without bleaching so as to retain the vitamin A content of the oil. The following ingredients were added to the fried oil in the pot on ground and mixed together: sliced onions, sliced fresh pepper, sliced fresh tomatoes, fresh fish with salt and ground crayfish to taste. The whole mixture in the pot were transferred to the cooking stove again and allowed to fry for 5 minutes after which some quantity of water was added and allowed to boil for another three (3) minutes and the stew is ready. The stew was used to serve the already prepared “onunu” paste to make a complete diet.

*RPO – Red palm oil

**Fig. 1: Flow chart of preparation of “onunu” with stew**

**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 (*Citralius vulgaris*) seed was added to the pounded *asu’* powder and pounded together for another 3 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 (2 mls) of hot water were added drop wise to the mixture to form a colloid, mixed and pounded again until oils exuded from the mixture. The colloidal mixture was molded and cold-pressed into small balls which formed the melon cake (*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 pot and steamed for about 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 cakes or “mgbam”) were unwrapped and are ready for consumption. It may be eaten as such or used as an ingredient for cooking soup.

**Fig. 2: Flowchart for the preparation of “Mgbam”**

**Preparation of Samples for Assay**

The prepared samples of “Onunu” with stew mixed homogenously and “Mgbam” were dried in an oven at 70°C for 48 hours. The dried samples were ground with a hand mill into powdered form and stored in air tight containers at 40°C until required for analyses.
Proximate Analysis
Proximate analysis of the samples for moisture, crude protein, crude fat, ash, fiber and carbohydrate contents were carried out in triplicates according to standard methods of AOAC (1990). The energy value was calculated using the Atwater factors of 4, 9 and 4 for protein, fat and carbohydrate respectively as reported by Edem et al. (1990) and Onyeike et al. (1995).

Antinutrient Analysis
The qualitative screening for ant nutrients was carried out as described by Sofowora (1980) and Harborne (1973). The samples were screened for alkaloids, saponins, tannins, phytates, cyanogenic glycosides, flavonoids and oxalates. Quantitative determination of oxalates, phytates, tannins saponins and flavonoids and oxalates. Quantitative determination of oxalates, phytates, tannins, saponins, and cyanogenic glycosides were carried out in triplicates, using the method of AOAC (1990).

Statistical Analysis
Results were presented as mean ± standard deviation. Student’s t-test as described by Pearson and Hartley (1966) and Steel and Torris (1960) were used for test of significance between the samples.

RESULTS AND DISCUSSION
The proximate composition and energy value of the samples investigated are shown in Table 1. The carbohydrate (47.71±0.13%) and fiber (9.90±1.03%) contents of “onunu” were significantly higher (P ≤ 0.05) than those of “mgbam” (10.20±0.48% and 3.78±0.12% respectively). The reason for the high carbohydrate and fiber content of “onunu” could be attributed to the 2 basic ingredients (D. rotundata and ripe M. paradisiaca) used in the preparation of the food that are known to be high in their carbohydrate and fiber contents. Bradbury and Holloway (1988) reported the carbohydrate and fiber contents of D. rotundata as 30.5% and 0.6% respectively while Oladele et al. (1984) gave the carbohydrate and fiber contents of ripe M. Paradisiaca as 47.5% and 1.1% respectively. The fiber content of “onunu” was comparable to the 9.70% obtained by Kpikpi et al. (2009) for “kantong”, a traditional fermented condiment in Northern Ghana.

The protein content of “Mgbam” (30.63±0.23%) was significantly higher (P<0.05) than that of “onunu” (12.12±1.42%) mainly because of the high protein content of the major ingredients (melon Citrullus vulgaris seed and asu’, a fungus of the Pleurotus species). Achinewhu (1998) reported the protein content of melon seed as 33.8%. The protein content of onunu (13.12%) was comparable to the 13.69±0.54% obtained by Umoh (1972) for “ekpan nkukwo” (grated cocoyam and dried shrimp, a traditional diet of South-Eastern Nigeria).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Onunu</th>
<th>Mgbam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate (%)</td>
<td>47.71±0.03</td>
<td>10.20±0.48</td>
</tr>
<tr>
<td>Crude Protein (%)</td>
<td>13.12±1.42</td>
<td>30.63±0.23</td>
</tr>
<tr>
<td>Crude fat (%)</td>
<td>11.65±0.53</td>
<td>36.35±2.32</td>
</tr>
<tr>
<td>Fiber (%)</td>
<td>9.90±1.03</td>
<td>3.78±0.12</td>
</tr>
<tr>
<td>Moisture (%)</td>
<td>13.80±0.48</td>
<td>12.20±0.27</td>
</tr>
<tr>
<td>Ash (%)</td>
<td>3.80±0.26</td>
<td>6.85±0.14</td>
</tr>
<tr>
<td>Energy value (kcal/100g sample)</td>
<td>348.25±4.12</td>
<td>499.39±48.73</td>
</tr>
</tbody>
</table>

Values are means± SD of triplicate determinations

The high level of protein in “mgbam” may indicate that it can contribute significantly to the daily protein requirements of 23-56g as recommended by the National Research Council (1974). “Mgbam” can therefore be recommended as a good source of protein for growing children, pregnant and nursing mothers as well as individuals suffering from protein deficiency diseases and disorders. The crude fat content was significantly higher (P ≤ 0.05) in “Mgbam” than in “Onunu” which may also be attributable to the high fat content of melon seed, the main ingredient of the diet. Achinewhu (1988) reported the crude fat content of melon seed as 55.30%. The crude fat content of “Mgbam” was comparably higher than those of “Kantong” (10.46%) and “ekpan nkukwo” (13.20±0.15%) as reported by kpikpi et al (2009) and Umoh (1972) respectively. Also the crude fat content of “Onunu” was comparable to the 11.63±0.13% obtained by Umoh (1972) for Gari-“afan” soup with smoked fish, another traditional diet of South Eastern Nigeria. The moisture contents were 13.80±0.48% and 12.20±0.2% for “Onunu” and “Mgbam” respectively. These values were high compared with that of standard “tarhana” sample (7.7±0.3%), tarhana sample without salt (6.9±0.2%) and tarhana sample with wholemeal flour (85.9±0.20%), traditional foods of Turkish origin as reported by Ibanoglu et al (1995). The relatively high moisture content of the samples suggests that they may be liable to bacterial spoilage during storage. High moisture content in foods has been shown to encourage microbial growth (Temple et al, 1996). The ash content of Mgbam...
(685±0.14%) was significantly higher (P≤0.05) than that of “Onunu” (3.80±0.26%). Both samples had ash contents of more than 3.0% and are therefore of nutritional importance as a previous report has indicated that, when leaves are to be used as food for humans, they should contain about 3.0% ash (Pivie and Butler, 1977). The energy content of 499.39±48.73 Kcal/100g sample for “Mgbam” was significantly higher than that for “Onunu” which was 348.25±4.12 Kcal/100g sample.

The anti nutrient profile of “onunu” and “mgbam” are presented in table 2. The screening revealed that both samples are rich in tannins and phytates but with very little saponins, cyanogenic glycoside, alkaloids and oxalates however, flavonoids was absent. Tannins saponins and alkaloids are known to have antimicrobial activity as well as other physiological activities (Sofowora, 1980; Evans, 2005).

Table 2. Anti-nutrient profile of “onunu” and “mgbam”

<table>
<thead>
<tr>
<th>Anti-nutrient</th>
<th>Onunu</th>
<th>Mgbam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tannins</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cyanogenic glycosides</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Phytates</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Oxalates</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Key + = slightly present, ++ = moderately present, +++ = highly present, - = absent

The concentration of some of the anti nutrients present in “onunu” and “mgbam” are given in table 3.

The tannin (93.60±2.00mg/100g) and phytate (77.88±2.00mg/100g) contents of “mgbam” were significantly higher (P≤0.05) than those of “onunu” (43.20±1.10mg/100g) and 23.76±0.18mg/100g) respectively. Tannins may decrease protein quality by decreasing digestibility and palatability (Osagie, 1998). The knowledge of the phytate level in foods is necessary because high concentration can cause adverse effects on the digestibility (Nwokolo and Bragg, 1977). Okaraonye and Ikewuchi (2009) also reported that phytate forms stable complexes with Cu²⁺, Zn²⁺, Co²⁺, Mn²⁺, Fe²⁺.

In Table 3, the oxalate content were 0.14±0.02 mg/100g and 0.26±0.07mg/100g for “onunu” and “mgbam” respectively. The level of oxalate report here is unlikely to pose toxicity problems to man since it is below the toxic levels of 25g (Oke, 1966; Munro and Bassir, 1969). There was no significant difference in saponin content between “onunu” (12.70±0.20mg/100g) and mgbam (10.65±0.20mg/100g) at the 5% level (P<0.05). Saponins reduce the uptake of certain nutrients including glucose and cholesterol at the gut through intra-luminal physico-chemical interaction (Okaraonye and Ikewuchi, 2009). Hence, it has been reported to have hypercholesterolemic effects (Prince et al, 1987) and thus they may aid in lessening the metabolic burden that would have been on the liver.

Table 3: Some Antinutrient content of “onunu” and “mgbam”

<table>
<thead>
<tr>
<th>Anti-nutrient</th>
<th>Onunu</th>
<th>Mgbam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tannins (mg/100g)</td>
<td>43.20±1.10</td>
<td>93.60±2.00</td>
</tr>
<tr>
<td>Saponins (mg/100g)</td>
<td>12.70±0.20</td>
<td>10.65±0.18</td>
</tr>
<tr>
<td>Cyanogenic glycosides (mg/100g)</td>
<td>0.08±0.40</td>
<td>0.12±0.16</td>
</tr>
<tr>
<td>Flavonoids (mg/100g)</td>
<td>23.76±0.18</td>
<td>77.88±2.00</td>
</tr>
<tr>
<td>Phytates (mg/100g)</td>
<td>5.06±1.05</td>
<td>1.82±0.10</td>
</tr>
<tr>
<td>Alkaloids (mg/100g)</td>
<td>5.06±1.05</td>
<td>1.82±0.10</td>
</tr>
<tr>
<td>Oxalates (mg/100g)</td>
<td>0.14±0.02</td>
<td>0.26±0.07</td>
</tr>
</tbody>
</table>

Values are mean±SD of triplicate determinations

REFERENCES


