



Proximate and anti-nutritional composition of “ntiti-ikpa”, and “ntubiri”, traditional diets of the ikwerre ethnic national in Nigeria

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ABSTRACT

The proximate and anti-nutritional composition of “ntiti-ikpa” and “ntubiri”, diets of Ikwerre people was studied. The diets were prepared following their traditional methods of preparation. Results of proximate contents revealed the presence of high carbohydrates, fibre and proteins in the studied samples. Anti-nutrients such as tannins, alkaloids, oxalates, phytates were also detected in the studied samples. Aside being anti-nutrients, some of the anti-nutrient compounds could as well be beneficial to the body. This study has shown the proximate and anti-nutritional composition of “ntiti-ikpa” and “ntubiri” diets.

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Introduction

Foods are generally the best arsenal to good health and they come in different forms or types (Kyle and Cole, 2001). Traditional foods, defined as those foods consumed the way our ancestors ate them are among the existing types of food (Onwuejiogwu, 1984; Achi, 2005a; Achi, 2005b; Trichopoulou et al., 2006). Such foods have the characteristics of being naturally grown, simple, nutrient-dense, and are thoughtfully prepared. Traditionally prepared foods are among the tools used to showcase the tradition and culture of the people (Onwuejiogwu, 1984; Trichopoulou et al., 2007).

Nigeria is among the countries of the world with multi-ethnic groups. These ethnic groups have different traditional foods which have played a major role in the traditions of different cultures and regions existing within the country for years. These foods are also among agents of integration and unity among Nigerians. Presently traditionally prepared foods in Nigeria are at the danger of extinction and are fast being replaced by conventional or fast foods (Duncan, 1992).

“ntiti-ikpa” and “ntubiri” diets of Ikwerre people of Rivers State, Nigeria are among the traditionally prepared foods that are at the danger of extinction and are fast being replaced by conventional or fast foods. The Ikwerre people make up the Ikwerre ethnic group found in Rivers State, South-South, Nigeria. They speak Ikwerre language as their dialect and are traditionally farmers. Aside performing the biological functions of edible food in the body, “ntiti-ikpa” and “ntubiri” also perform the functions of showcasing the tradition and custom of the Ikwerre people and as well act as agents of ethnic unity among them (Nduka, 1993). There is need to investigate and document the constituents of these traditional foods and possibly relating the constituents to pharmacological functions on consumption before they go into extinction since studies existing on some traditional foods (Amadi et al., 2013a; Amadi et al., 2013b; Duru et al., 2013; Benjamin et al., 2012a; Benjamin et

al., 2012b; Amadi et al., 2011) of Ikwerre people did not inculcate diets such as “ntiti-ikpa” and “ntubiri”

The present study therefore investigated the proximate and anti-nutritional composition of “ntiti-ikpa” and “ntubiri” diets of Ikwerre people of Nigeria.

Materials and Methods

The study of “ntiti-ikpa” and “ntubiri” was carried out in Isiokpo in Ikwerre Local Government Area of Rivers State, South-South, Nigeria where they are produced for domestic consumption.

Sample collection

The ingredients used in the preparation of “ntubiri” and “ntiti-ikpa” were purchased from a local market in Isiokpo, Ikwerre Local Government Area of Rivers State, South-South, Nigeria.

“ntubiri” preparation

Six hundred and fifty grams (650g) of peeled water yam (*Dioscorea alata*) was properly washed and crushed by scraping with kitchen knife to a semi-molten form into a bowl. 220ml of water was heated in a cooking pot on a cooking stove and allowed to boil. 40g of ground prawn and 120g of dried tilapia fish were added to the pot and allowed to boil. After boiling for about 5min, 7g of ground dried pepper, 10g of salt, a cube of maggi, 20g of crayfish, 30g onion were added and allowed to boil for another 5min. 100ml of red palm oil (RPO) was added to the crushed water yam bowl to hold it together because of its adhesive properties and mixed thoroughly. Portions of the mixed, crushed water yam were collected with spoon and put into the boiling pot containing the ingredients, covered and allowed to boil for 20 min.

“ntiti-ikpa” preparation

Ground corn of 4,120g weight was put into a mixing bowl. 1,200g of peeled ripe banana was washed, meshed and transferred to mixing bowl containing the corn. They were both mixed with a turning ladle for 5min. 400ml of red palm oil (RPO) was added to the mixture of corn and banana and mixed

thoroughly to a homogenous mixture. After mixing, 210g of sliced onion, 40g of ground crayfish and 15g of sliced fresh paper were added separately to the mixture in the bowl and mixed thoroughly to a light consistency. 80g of salt was added to the contents of the bowel and also stirred continuously for 10min to get a smooth consistency. The mixture was put in fresh clean leaves of *Pandemus candelabrum* (etere) which were folded and tied with strings of rope. The wrapped samples were placed one by one into a cooking pot steaming with water on a cooking stove and allowed to steam for 30 min. After cooking, the contents were unwrapped and served.

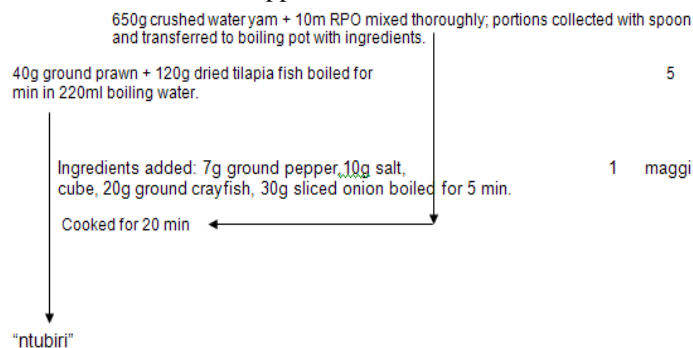


Fig. 1: Flow-chart for the preparation of "ntubiri"

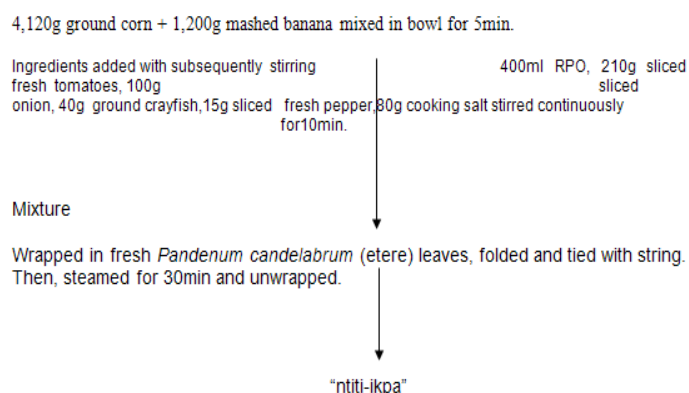


Fig. 2: Flow-chart for the preparation "ntiti-ikpa"

Preparation of samples for analysis

The prepared traditional food samples were dried in an oven for 70°C for 48 hours. The dried samples were ground with a hand mill into powdered form and stored in air-tight sample containers at 4°C until required for analysis.

Proximate composition analysis

The proximate contents of the samples were done using standard methods. The moisture, crude proteins, crude fat, ash, fibre and carbohydrate contents were determined using the methods of AOAC (1990). The energy value was calculated using the Atwater factor of 4:9:4 for proteins, fat and carbohydrates respectively as reported by Onyeike *et al.* (1995).

Anti-nutrient composition analysis

Alkaloids, saponins, tannins, phytates, cyanogenic glycosides, and oxalates in the investigated food samples were qualitatively analysed using the methods of Sofowora (1980) and Harborne (1973), while their quantitative analysis were done using the methods of AOAC (1990).

Statistical analysis

Results obtained in the present study were presented as mean and standard deviation while Student's t-test described by Pearson and Hartley (1966) and Steel and Torris (1960) were used for test of significance between the samples.

Results and Discussion

Proximate composition

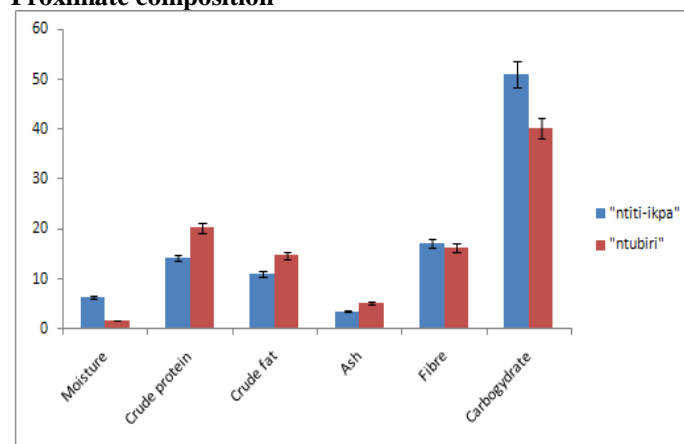


Fig.3: Proximate composition (%) of "ntiti-ikpa" and "ntubiri"

The percentage moisture content of food materials and the state in which it exists in foods is important in determining their storage stability (Okaka and Okaka, 2005). Foods with high moisture contents in free form have a much shorter shelf-life (Okaka and Okaka, 2005). The moisture content of "ntiti-ikpa" was significantly ($p < 0.05$) higher than that of "ntubiri" (Fig.3). This could be suggestive of shorter-shelf life for "ntiti-ikpa" than "ntubiri". Proteins are macromolecules with amino acid as their building blocks (Uwakwe and Ayalogu, 1998; Olusanya, 2008). The protein contents of "ntiti-ikpa" and "ntubiri" were higher than that of "onunu" (13.12%), a recipe of Ikwerre people (Amadi *et al.*, 2011). Their high values could be suggestive that both diets can contribute significantly to the daily requirement of protein as recommended by NRC (1974). Typical fats found in foods are categorized into saturated and unsaturated fatty acids (Connor, 1994). Plant fats are usually more saturated and better sources of polyunsaturated essential fatty acids (Lin, 1993). Polyunsaturated essential fatty acids are important metabolites necessary in the maturation of sperm cells and maintaining skin smoothness and integrity (Connor, 1993; Okaka and Okaka, 2005). Crude fat content of "ntubiri" was significantly ($p < 0.05$) higher than that of "ntiti-ikpa". The fat contents of the studied diets were lower than that of "mgbam" (36.35%), and higher than that of "kantong" (10.46%) as reported by Amadi *et al.*, 2011 and Kpikpiet *et al.*, 2009 respectively. The ash content in food is an indicator of inorganic mineral content and the quality of the food sample, although the mineral may be toxic or essential (Amoo and Agunbiade, 2010). Ash content in "ntubiri" as observed in the present study was higher than that of "ntiti-ikpa". This could be an indication of more minerals in it than "ntiti-ikpa" diet. Crude fibre includes theoretically materials that are indigestible in human and animal organism (Onwuka, 2005). Studies have shown that insoluble fibre binds water, making stools softer and bulkier. Therefore, fibre is helpful in the treatment and prevention of constipation, haemorrhoids and diverticulosis (Anderson *et al.*, 2007). The fibre contents of the diets under study are relatively comparable and were higher than those of "onunu" (9.90%) and "mgbam" (3.70%) (Amadi *et al.*, 2011). Carbohydrates are energy storing compounds found in foods and they come in different forms (Olusanya, 2008). The carbohydrate content of "ntiti-ikpa" was significantly higher ($p < 0.05$) than that of "ntubiri" in the present study. This high value could be attributed to its constituents. The observed values in the studied diets were higher than those of "mgbam" (10.20%) traditional diet of Ikwerre ethnic nationality

in Nigeria (Amadiet al., 2011) and “kantong” (9.70%) traditional food of Northern Ghana (Kpikpiet al., 2009).

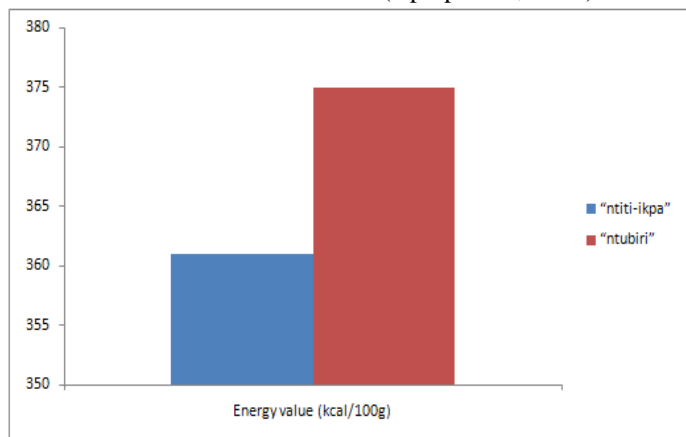


Fig. 4: Energy values of “ntiti-ikpa” and “ntubiri”

The energy values (Fig. 2) observed in the studied diets was comparable to those of “onunu” and “mgbam” diets (Amadiet al., 2011)

Anti-nutrient composition

Table 1. Anti-nutrient screening of “ntiti-ikpa” and “ntubiri”

| Parameter | “ntiti-ikpa” | “ntubiri” |
|-----------------------|--------------|-----------|
| Tannins | +++ | ++ |
| Saponins | + | + |
| Cyanogenic glycosides | + | + |
| Phytates | ++ | ++ |
| Oxalates | + | + |
| Alkaloids | + | + |

Key: + = slightly present; ++ = moderately present; +++ = highly present.

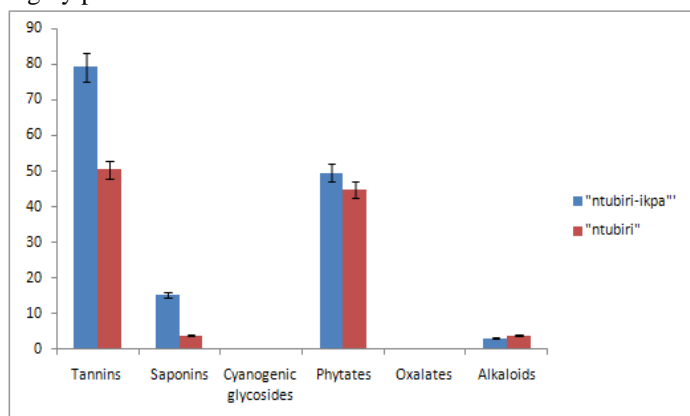


Fig. 5: Anti-nutrient composition (mg/100g) of “ntiti-ikpa” and “ntubiri”

The anti-nutrients screening and quantitative analysis of the investigated diets are presented in Table 1 and Fig. 5 respectively. The obtained results showed the presence of anti-nutrients such as tannins, saponins, cyanogenic glycosides, phytates, oxalates and alkaloids. These compounds are mostly biosynthesized intrinsic components and sometimes contribute to food colour and flavour (Okaka and Okaka, 2005). They are collectively called anti-nutrients because they affect the nutrient composition of many food materials, but could as well be beneficial to health at low concentrations in foods (Osugwuet al., 2007). Tannins act as anti-nutritional factor in two ways; firstly, by bringing about astringent reaction of food in the mouth hence making such food unpalatable and secondly by forming complex with and thus precipitate proteins in gut, reducing the digestibility or inhibiting digestive enzymes (Onwuka, 2005). Rao and Desotheale (1982) noted that tannins interfere with dietary iron absorption. Nevertheless, different

authors (Morton, 1987; Stray, 1998; Kozioc and Marcia, 1998; Okwu, 2004) have reported that tannins hasten the healing of wounds, and inflamed mucous membranes. Here lie the beneficial effects of having tannins in food materials. Tannins content of “ntiti-ikpa” in the present study were significantly ($p < 0.05$) higher than that of “ntubiri”. Their observed values in the studied diets were lower than that of “mgbam” (93.60 mg/100g) as reported by Amadiet al., (2011). Saponins are glycoside components often referred to as “natural detergent” because of their foamy nature (Seigler, 1998). They are known to possess both beneficial and deleterious properties depending on their concentrations in a sample (Oakenful and Sidhu, 1989). The beneficial effects of saponins have been reported by authors such as George (1965), Seigler (1998), Sadipo and Akiniyi (2000), Osugwuet al., (2007). Saponins content of “ntiti-ikpa” in this study were significantly higher ($p < 0.05$) than those of “ntubiri”. Seigler (1998) noted that only the negative effects of glycosides are known. Onwuka (2005) noted that the knowledge of cyanogenic glycoside contents of food is important due to inherent cyanide that they produce on hydrolysis. This cyanide is known to affect respiratory chain negatively. Bolhuis (1954) went further to state that the lethal level of cyanogenic glycosides for adult man is 50-60 mg/kg body weight. It therefore means that cyanogenic glycosides content of “ntiti-ikpa” (0.008 mg/100g) and “ntubiri” (0.04 mg/100g) are too low to bring about the poisonous effect noted by Onwuka (2005) on consumption. Phytates are known to form insoluble salts with essential mineral like calcium, iron, magnesium, and zinc in food, rendering them unavailable for absorption into the blood stream (Bingham, 1978). Further studies have revealed that half of the phytate taken into the body are basically excreted unchanged (Onwuka, 2005). The observed phytate levels of the studied diets were higher than those of “onunu” and “mgbam” diets. Alkaloids are basic natural products occurring primarily in plants (Osagie, 1998). They are mostly found in forms of salts with organic acids. According to Osagie, (1998), some of their toxicological manifestations include gastro intestinal upset and neurological disorders especially in dose excess of 20mg/100g sample. The implication here is that the alkaloid contents of the studied diets are low to bring about these effects. Dietary oxalates are known to complex with calcium, magnesium, and iron to form insoluble oxalate salts, which results in oxalate stone hence interfering with the utilization of above mentioned minerals (Munro, and Bassir, 1969). The oxalate contents of the studied diets are comparable and were higher than the values reported for “onunu” and “mgbam” (Amadiet al., 2011).

Conclusion

This study has shown the proximate and anti-nutritional composition of “ntiti-ikpa” and “ntubiri” diets of Ikwerre people in Rivers State, South-South, Nigeria.

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