Minerals and Vitamins Composition of Some Fermented Food Condiments and Complex Salt - Potassium Sesquioxide

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***Abstract*:- Selected vitamins and minerals composition of some indigenous African fermented food condiments: *parkia clappertoniana* (Nigerian name:'Irugba'), *coloynnthis citrullens* (Nigerian name:'Ogiri), *piper quineanes* (Nigerian name:'lyere') and complex salt - potassium sesquioxide (Nigerian name:'Kaun') using the methods described by the Association of Officials of Analytical Chemists (AOAC) and Pearson have been studied. The results for vitamins A, E and K showed the mean values of 76.67, 92.31, 116.92 (mg/100g of sample) for *parkia clappertoniana* respectively; 52.00, 15.64, 87.42 (mg/100g of sample) for *coloynnthis citrullens* respectively; and 10.00, 13.33, 28.95 (mg/100g of sample) for complex salt - potassium sesquioxide respectively. The *piper quineanes* was found to be highly deficient in vitamin A and E but has only 50.00 mg/100g of sample of vitamin K. The condiments have ash contents between 1.7 - 2.2 mg/100g, but significant variations in the minerals occurred in the profile of the different condiments with calcium (25.120 ppm/100g of sample) and potassium (12.330 ppm/100g of sample) were the abundant minerals present in complex salt - potassium sesquioxide followed by *parkia clappertoniana* (1.510 ppm/100g of sample), while Na Mg, Zn, Cu, Fe, Mn were in micro levels in the other samples suggesting that condiments can sufficiently contribute to our daily minerals and vitamins needs.**

Keywords: **condiments; minerals; vitamins; fermentation; complex salt; food.**

I. INTRODUCTION

Parkia clappertoniana (Nigerian name: 'Irugba') is a fermented African locust bean, *coloynnthis citrullens* (Nigerian name: 'Ogiri') - a fermented melon seeds from the edible fruits of melon, *piper quineanes* (Nigerian name: 'lyere') - a dried matured black pepper and potassium sesquioxide (Nigerian name: 'Kaun') is a complex salt of potassium (probably potassium sesquioxide) are indigenous food condiments in many tropical countries particularly Nigeria. They are used for various reasons which include protection of foods against deterioration, improve flavor and to enhance nutritive value (Oguntoyinbo, 2014; Okorie and Olasupo, 2013a; Olakunle and Adebayo, 2012; Olasupo, 2014). Among the foremost vital sensible achievements of nutritional science has been the replacement of vitamins and minerals lost throughout food process (Taylor and Duodu, 2015). The restorations of lost nutrients are achieved by the addition of condiments (Eze *et al*, 2014). Many authors have reportable the biochemical changes and microbiological studies of the fermentation of African locust bean (Odunfa, 1985; Odunfa and Oyeyiola, 1985). Microbiology and amino acid composition of *coloynnthis citrullens* ('Ogiri') had additionally been reported (Odunfa, 1981b). Chilies are among important condiments fruits used for sauces, soup and seasoning of many commercial foods (Mathew and Shakaracharyam, 1971). They have been shown to be a good source of vitamin C as reported by Keshinro and Ketiku (Keshinro and Ketiku, 1983), while Olaofe and Sanni (1988) reported amino acid and minerals contents of agricultural products. Nutrient and antinutrient composition of condiments produced from some fermented underutilized legumes, spices and food condiments, proximate Composition of some wild phytochemical contents of African oil bean seed have been widely reported in the literature (Ganiyu, 2006; Green *et al*., 2012; Armand *et al*., 2012; Okorie, P. C and Olasupo, 2014; Nurudeen *et al*., 2016). The *parkia clappertoniana* ('Irugba'), *coloynnthis citrullens* ('Ogiri'), *piper quineanes* ('lyere') and complex salt - potassium sesquioxide ('Kaun') are just of many local condiments used in local and modern pharmaceutical preparations (Mathew and Shakaracharyam, 1971). Protein and essential fatty acids of food condiment from melon, calcium iron and oxalate contents of Indian condiments and spices were among the studies in the literature (Okorie and Olasupo, 2014; Ramasastri, 1983). In view of the insufficient data on the degree of vitamins and mineral levels in most condiments, this work hope to provide sizable information to dieticians, food scientists and nutritionists.

II. MATERIALS AND METHODS

The condiments were purchased at Owode market, Offa Kwara State, Nigeria while the vitamin injections (vitamin A, E and K) were bought from Danax Pharmaceutical Stores, Ibadan, Oyo State, Nigeria. 'Irugba' (*parkia clapppeitoana*): 'Ogiri' - a fermented melon seeds from the edible fruits of melon (*colocvnmthis citrullens*) 'Iyere'- a dried matured black

pepper climbing tree (*piper quineanes*) and 'Kaun'-a complex salt of potassium (potassium sesquioxide). Aldrich Sigma (Gillingham Dorset, UK) supplied Na, K, Ca, Mg, Fe, Zn, Cu and Mn. The extraction, purification and determination of vitamins were determined by Pearson method (Pearson, 1991). The ash contents were also determined by the air - oven and dry-ashing methods of AOAC, (2012) and Ogbadu *et al*., (1989).

Statistical analysis

Statistical analysis was carried out to determine the mean, standard deviation, coefficient of variation in per cent. The one-way Analysis of Variance (ANOVA), SPSS 17 used to evaluate data with the Software StatSoft, Inc. (USA).

III. RESULTS AND DISCUSSION

Table 1 present the vitamins A, E and K. present in Nigerian condiments: *parkia clappertoniana*, *coloynnthis citrullens*, and complex salt - potassium sesquioxide with their mean values as shown. The *piper quineanes* was found to be highly deficient in vitamin A and E but had 50mg/l00g of sample of vitamin K and it was the most abundant vitamin present with the overall mean values of 45.82±14.91 mg/l00mL followed by vitamin A 33.17±16.4 mg/l00mL and finally vitamin E 33.17±16.4 mg/l00mL. In Table 1 the vitamins A, E and K content of condiments varied considerably from 0.0 to 92.31 mg/100 g of sample. The vitamins E and A in *parkia clappertoniana*, with 92.31±0.31 mg/100 g and 70.67±0.13 mg/l00mL were the highest levels found, respectively. The *coloynnthis citrullens*, was richer in vitamin K (87.42±0.1392.31 mg/100 g), followed by vitamin A (52.00±0.21 mg/100 g), *piper quineanes* had 50.00±0.01 mg/100 g of vitamin K, while the lowest levels of vitamin E were observed in "Kauri" 4.00±0.01 mg/100 g. These vitamins A, E and K values found in condiments in this case were higher when compared with 0.39 and 10.02 mg/100 g for most fruits.

Table 1: Vitamins contents of some Nigeria condiments (rng/100g of sample)

Vitamins	parkia clappertoniana	coloynnthis citrullens	piper quineanes	complex salt - potassium	**Mean values (x̄±SD)**
A	70.67±0.13	52.00±0.21	0.00	10.00±0.02	33.17±16.4
E	92.31±0.31	15.64±0.14	0.00	4.00±0.01	27.99±15.4
K	16.92±0.11	87.42±0.13	50.00±0.01	28.95±0.15	45.82±14.91
CV	0.65	0.69	0.00	0.91	-

x̄ = mean; STD = standard deviation; CV = coefficient of variation

The vitamin C was surprisingly not found in all the samples analyzed. Unlike water-soluble vitamin C found in oranges, grapes fruits, apples and mangoes with 42.1 - 62.4, 28.5 - 52.0, 1.1 - 3.5, and 9.1 -18.6 mg/100 g samples, respectively (Adeyeye and Ajewole, 1992; Hels *et al*., 2004; Franke *et al* ., 2004) as further illustrated in Figure 1.

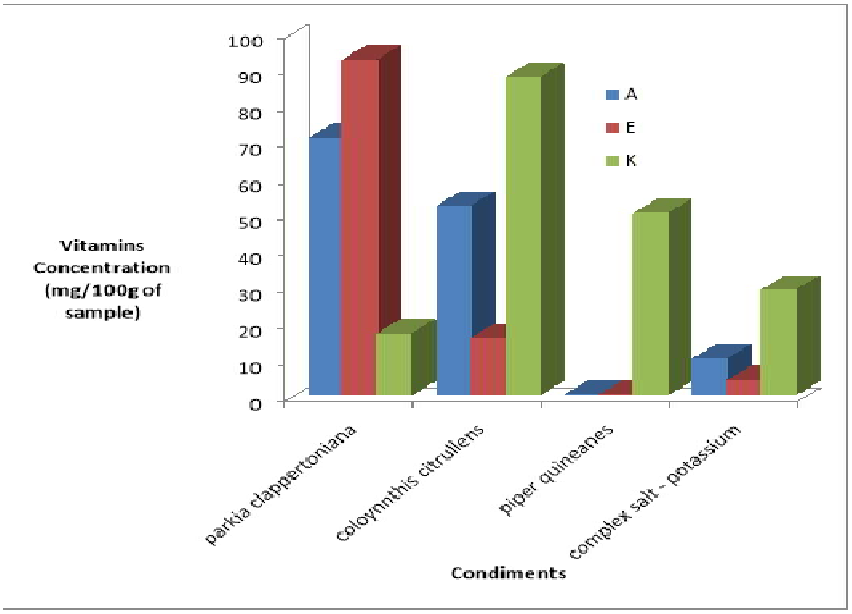


Figure 1: Distribution of vitamins in some Nigeria condiments

The condiments have ash contents between 1.7 - 2.2 mg/100g of sample, a range that fell between (2 - 9 mg/100 g of sample) as earlier reported by (Tchiegang and Mbougueng, 2005). The slight variations could probably due to the distinction in the origin and preparation of samples. The condiments analyzed may well be thought-about as good sources of minerals, compared to alternative foodstuffs. The Marama bean ash content varied between (2.8 - 4.6 mg/100 g of sample), national capital beans (2.78 mg/100 g of sample), legumes (3.7 - 4.4 mg/100 g of sample) as reported by Amarteifio and Moholo, (1998) and eight varieties of tomatoes (0.74 – 1.41 %) from Nigeria compared well with the range given in the literature, but 21 - 26.0 mg/100 g) reported for foliaceous vegetables (Ezeagu and Ibegbu, 2010; Hels *et al*., 2004; Franke *et al*., 2004).

In Table 2, the significant variation in the minerals occurred in the profile of the different condiments as shown.

Table 2: Mineral contents of some Nigerian condiments (ppm/100g sample)

Minerals	*parkia clappertoniana*	*coloynnthis citrullens*	*piper quineanes*	complex salt - potassium	Mean values ($\bar{x}$±SD)
Na	0.700	0.345	0.530	0.500	0.519±0.373
K	1.510	0.750	0.530	12.330	3.780±1.941
Ca	0.258	0.350	0.315	25.120	6.511±5.896
Mg	0.001	0.002	0.002	0.003	0.002±0.001
Fe	0.008	0.004	0.003	0.007	0.006±0.004
Zn	0.055	0.173	0.265	0.007	0.125±0.008
Cu	0.042	0.059	0.053	0.003	0.029±0.014
Mn	0.019	0.117	0.105	0.004	0.061±0.519
CV	0.165	0.112	0.976	0.195	-

Calcium (6.511±5.896 ppm/100g of sample) and potassium (3.780±1.941 ppm/100g of sample) overall mean values were the most abundant minerals present while Na, Mg, Fe, Zn, Cu, Mn were in micro levels as further illustrated in Figure 2.

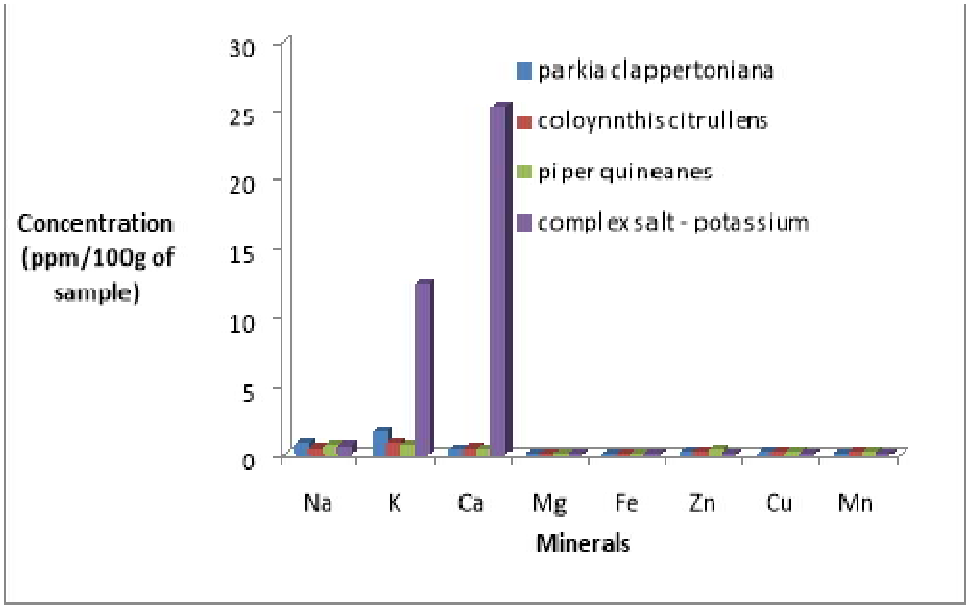


Figure 2: Distribution of minerals in some Nigeria condiments

The complex salt - potassium sesquioxide also has the largest amount of Calcium (25.120 ppm/100 g of sample) and potassium (12.330 ppm/100g of sample).

IV. CONCLUSION

Some vitamins and minerals in some African condiments are reported in this work. The *parkia clappertoniana*, *coloynnthis citrullens*, and complex salt - potassium sesquioxide, are good

sources of vitamin A, E, and K except *piper quineanes*, which has only vitamin K. The condiments have some minerals with higher levels of calcium and potassium particularly in complex salt - potassium sesquioxide, other minerals were in micro levels. In all, the condiments can sufficiently contribute to our daily vitamins and mineral needs.

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