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THE IMPACT OF PROCESSING ON THE NUTRITIONAL, MINERAL AND VITAMIN COMPOSITION OF CASHEW NUT

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ABSTRACT

Proximate composition, vitamin composition and mineral composition of both the raw and the processed forms of Cashew nut (*Anarcadiun occidentale*) was investigated using standard analytical methods. The proximate composition in percentage were as follows;10.87 ±0.035 for moisture content,89.14±0.035 for dry matter, 4.27±0.050 for ash, 2.88 ±0.057 for crude fibre,39.36±0.106 for ether, 28.20±0.057 for crude protein and 14.44±0.021 for carbohydrate all in the raw form. In the processed form we had; 8.75±0.014, 91.25±0.014, 4.22±0.021, 2.92±0.035, 42.80 ± 0.021, 28.60± 0.1489, 28.60± 0.1489 for moisture, dry matter, ash, crude fibre, ether extract, crude protein and carbohydrate respectively. The mineral composition (mg/100g) of raw cashew nut showed for calcium 21.85±0.014, magnesium 36.58 ±0.177,sodium 15.87±0.042 potassium 38.62±0.262, phosphorus 13.87 ±0.050 and iron 1.30±0.007.For the processed cashew nuts we had; 21.20±0.0009, 35.84±0.007, 14.88±0.057, 37.18±0.028, 12.21±0.042 and 1.14±0.014 for calcium, magnesium, sodium, potassium, phosphorus and iron respectively. The vitamin composition for the raw cashew nut revealed the following results; vitamin B1 0.01±0.000, vitamin B2 0.08±0.0009, Vitamin B3 0.11±0.014, vitamin C 5.28±0.028, vitamin E 8.83±0.100 and vitamin A 3.76±0.028 and for the processed nuts: 0.09±0.014, 0.05±0.014, 0.09±0.000, 3.57±0.042, 5.25±0.050 and 2.84±0.014 respectively. The investigations showed that cashew nut is very nutritious and could be anti-carcinogenic. They are also good sources of energy. They could also be used to alleviate impairments caused by lack of trace elements.

KEYWORDS: impact, processing, nutritional, mineral, vitamin, composition.

INTRODUCTION

Nutrition is one of the central cores to effectively understanding and managing your health, life cycle and growth. Edible nuts are cultivated and grown in a number of growing conditions and climates, and are valued for their sensory, nutritional, and health attributes.

Nuts possess anti-inflammatory activity; reduce cell proliferation, and lower serum low-density lipoprotein absorption, thereby lowering total plasma cholesterol and LDL levels. Dietary phytosterols may offer protection from cancers such as colon, breast, and prostate cancers [Amaral et al. 2003]. Nuts also contain significant amounts of squalene and tocopherols. Squalene has important beneficial effects on health and tocopherols are powerful antioxidants, which in high doses may reduce the risk of (coronary heart disease) CHD [Ryan et al. 2006].

Due to high cost of food substance or unavailability of food substance containing the essential classes of food and other needed nutrients. There is need to diversify our source of nutrients using nuts. This study is aimed or geared towards finding out the different nutrient composition of cashew nuts, and how these nutrients are affected when processed. The study will also help us take healthy decisions concerning the foods we consume. The aim of this research is to evaluate and compare the proximate, mineral and vitamin composition of Cashew nut in the raw and the processed forms in order to ascertain their possible usefulness as nutrient rich food and to ascertain the best form in which they should be consumed. Cashew nuts form a major part of the diet of Nigerians consumed as a meal. It is also eaten as snacks.

Cashew is a heart like shaped fruit widely grown in Africa and West Indies. The cashew tree is a native of Brazil and is a valuable cash crop in the Americans, West Indies, Madagascar, India and Malaysian (Frankel, 1991). World Bank data estimates that 97% of production is from wild trees and only 3% is from established plantation (Rosengarten, 1984). In Nigeria, about 5000-7000 tones are produced annually

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mainly as an export crop (Aremu et al., 2006). Africa is the third largest global source of cashew nut and produces about 100,000 tonnes per year. The cashew nut kernel has a pleasant taste and flavour and can be eaten raw, fried or sometimes salted or sweetened with sugar. It also contributes as an important source of invisible fat in the diet being widely used in a variety of ways. There has been a growing demand for cashew in temperate countries where the demand is increasing (Russel, 1979). The nut contains an acrid compound which is a powerful vesicant that is abrasive to the skin. The cashew shell contains 25% of this reddish brown oil, industrially known as cashew nut shell liquid (CNSL) which is a by product of the roasting process. The kernel is considered to be of high nutritive quality and growing conditions, the variety of cashew may have an influence on kernel composition (Ohler, 1979). Cashew is also one of the few sources of phenol (Ohler, 1979).

MATERIALS AND METHOD

Cashew nut was purchased from Umuahia main market, Abia State and was divided into two groups. The nuts were examined to ensure that they were viable before use for this experiment. The first portion was cracked, ground and air dried, while the second portion was oven dried at 40_oC.

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Moisture content of the nuts were determined by the gravimetric method described by (James, 1995).Total ash was determined by the incineration method (AOAC, 1999).Protein was determined by Kjeldahl digestion method described by James (1995). The Fat content of the samples was determined by the continuous solvent extraction method using a soxhlex apparatus. This method was described by Pearson (1976). Crude Fibre was determined by the Wende method (James, 1995). The carbohydrate content was calculated by difference in nitrogen free extraction (NFE) as described by James (1995). For vitamins and minerals; the sample for the determination of the element was subjected to acid digestion using concentrated percloric acid and hydrochloric acid and subsequently the different elements were determined using appropriate methods as described by James (1995).Calcium and magnesium content of the sample was determined by complexiometric titration. Sodium and potassium were determined by flame photometry method. The phosphorus in the sample was determined by the ranado-molybdate (yellow) spectrometry described by James (1995). The spectrophotometric method by Onwuka, 2005 was employed in the determination of vitamin content. Vitamin C content of the sample was determined by the Barakat titrimetric method. (Barakat, 1973)

RESULTS

Table 1 Proximate analysis of the raw cashew nut and the processed cashew nut,

SAMPLE	RCN	PCN
Moisture	10.87 ±0.035^c	8.75 ±0.014^d
Dry Matter	89.14 ±0.035^c	91.25 ±0.014^b
Ash	4.27 ±0.050^a	4.22 ±0.021^a
Crude Fibre	2.88 ±0.057^d	2.92 ±0.035^d
Ether Extract	39.36 ±0.106^e	42.80 ±0.021^b
Crude Protein	28.20 ±0.057^b	28.60 ±0.148^a
Carbohydrate	14.44 ±0.021^b	18.60 ±0.128^a

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Fig 1: Histogramic Representation of the result of the proximate analysis carried out on Cashew nuts.

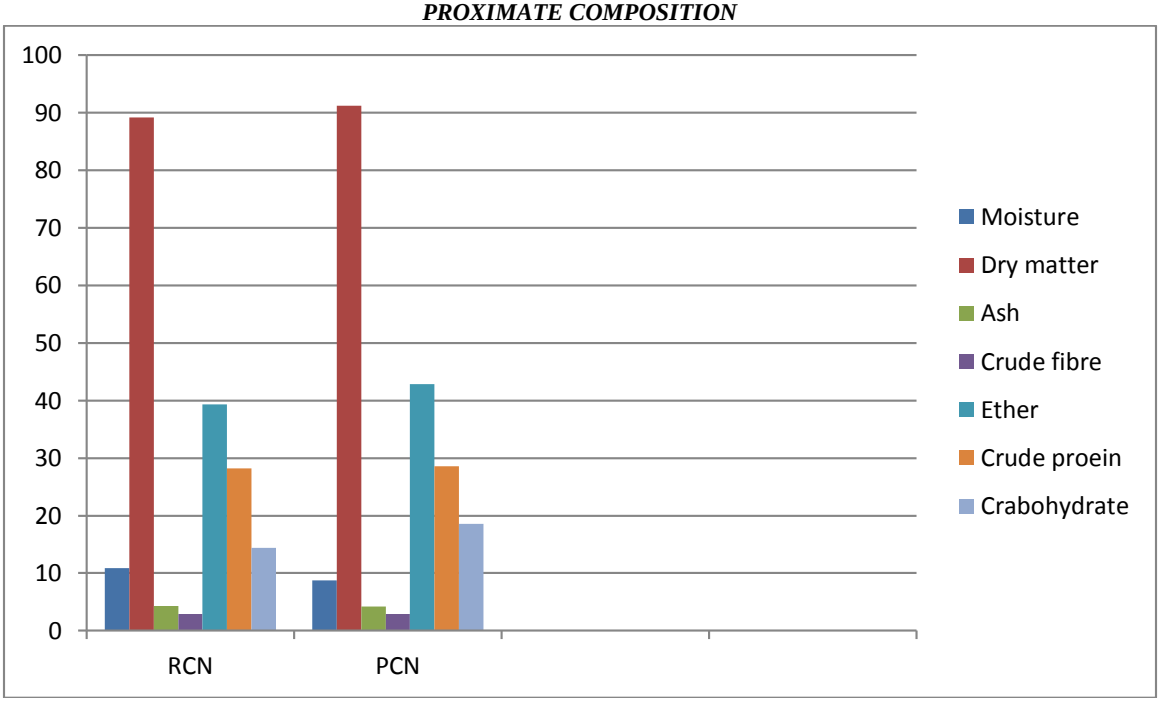

Table 2: Mineral Analysis of raw and processed cashew nut.

Minerals	RCN	PCN
Calcium	21.85 ±0.014^{c}	21.20 ±0.000^{a}
Magnesium	36.58 ±0.177^{c}	35.84 ±0.007^{d}
Sodium	15.87 ±0.042^{b}	14.88 ±0.057^{c}
Potassium	38.62 ±0.262^{a}	37.18 ±0.028^{b}
Phosphorus	13.87 ±0.050^{c}	12.21 ±0.042^{d}
Iron	1.30±0.007^{c}	1.14 ±0.014^{d}

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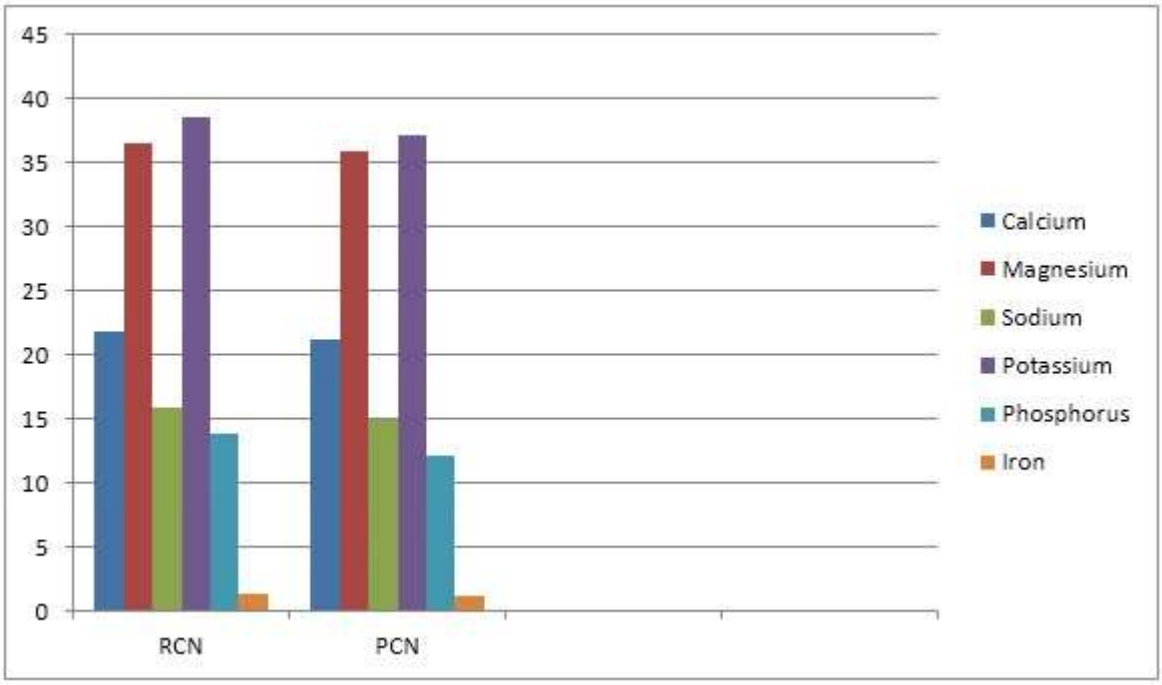
Fig 2: Histographic representation of the result of the Mineral composition carried out on the nuts.



Values (mg/100g) on the Y axis.

Table 3: Vitamin composition of the raw and processed cashew nut.

Vitamins	RCN	PCN
BI	0.01 ±0.000[c]	0.09 ±0.014[a]
B2	0.08 ±0.000[a]	0.05 ±0.014[b]
B3	0.11 ±0.014[a]	0.09 ±0.000[b]
C	5.28 ±0.028[a]	3.57 ±0.042[c]
E	8.83 ±0.100[b]	5.25 ±0.050[d]
A	3.76 ±0.028[a]	2.84 ±0.014[d]

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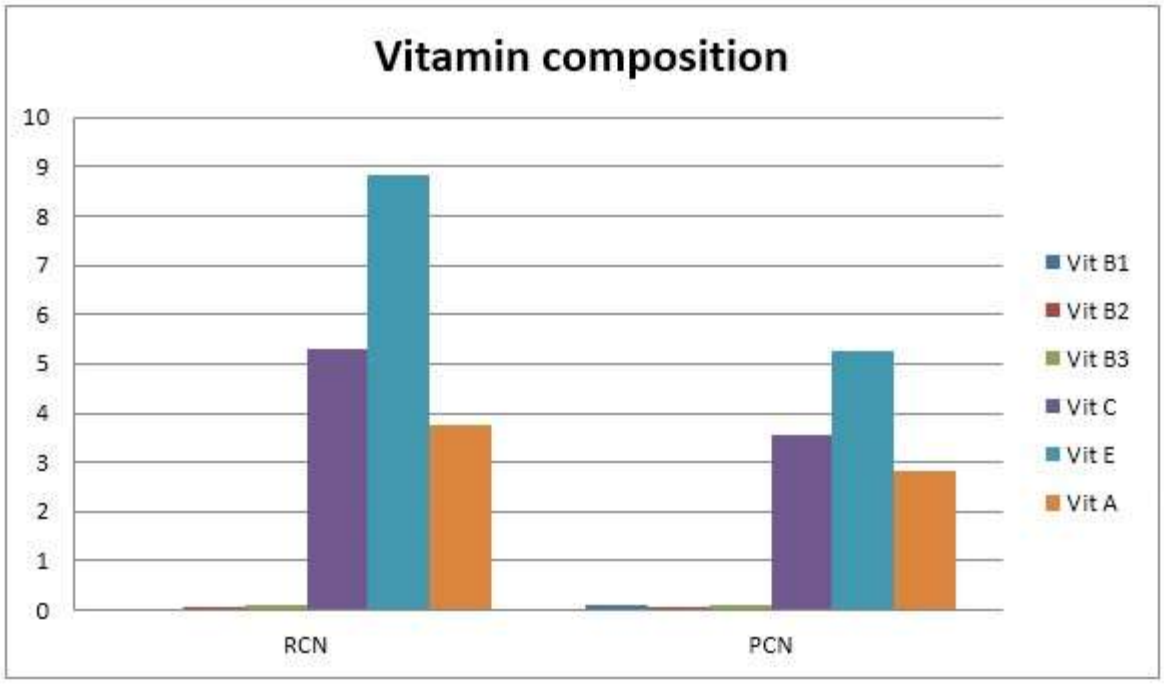
Fig 3: Histographic representation of the result of Vitamin composition of the raw and processed cashew nut.



Values (mg/100g) on the Y axis.

The result from the tables above shows the values of nutritional parameters of Cashew nut with their standard deviations.
The same alphabet on two or more values of a parameter of the different groups show no significant difference between the groups (i.e. P>0.05)

DISCUSSION

There was a (P<0.05) significant difference in the moisture contents between the raw and processed forms of cashew nut. A significant (P<0.05) increase in dry matter was observed when processed. This indicated that processing increases the dry matter of Cashew nut. This is a good development since the presence of moisture or high range of moisture in food makes it spoil faster indicating decrease in the shelf life of the food.

A non significant (P>0.05) decrease in ash content was observed when Cashew nut was processed. Ash is a non organic compound containing mineral compound of food and nutritionally it aids in the metabolism of other organic compounds such as fat and carbohydrate (Mc William 1978).The observed decrease in ash content on processing was not significant (P>0.05) and therefore of no major concern. Significant (P<0.05) increase in crude protein was observed when the Cashew nut was processed. It has been reported by (Nandi 1998) that the protein content of cashew nut is one of the most important factors in future breeding of cashew nut. Protein is very important for the repair of worn out tissues in the body, promotes growth and organ development.

The Carbohydrate content of the Cashew nut increased significantly (P<0.05) as a result of processing. Cashew nuts have moderate concentration of carbohydrate and are therefore an energy food implying that the consumption of Cashew nuts by young and old gives enough energy to carry out specific metabolic functions (Giwa and Abiodun 2010)

The result of the proximate analysis carried out on Cashew nut in the raw and processed form showed that there was a significant change in some parameters

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tested for except for ash and crude fiber which showed no significant (P>0.05) difference. Crude fiber is known to aid digestion in humans.(Ihekoronye and Ngoddy, 1985) indicating that food or diet low in fiber content is undesirable and can cause constipation and that such diets have been associated with diseases of colon like piles, appendicitis and cancer (Okon, 1983)

There was significant increase in ether extract composition on processing of the Cashew nuts. The fat and oil content of nuts contribute substantially to their high energy content (Ohler 1979, Wade and Staffor, 1968). However fat can also promote rancidity leading to development of unpleasant and odorous compounds (Ihekoronye and Ngoddy, 1985). Diets too high in fats predispose consumers to different illness such as obesity, coronary heart disease (Okpala and Chinyelu, 2011) and are therefore not desirable.

There was a significant (P<0.05) difference in mineral composition between the raw and the processed forms of the Cashew nuts. The results showed that processing decreased all the minerals tested for in Cashew nuts significantly (P<0.05), it may therefore be advised that Cashew nuts be taken in its raw form. Calcium is essential for the normal development of the body. It is an important constituent of bones and teeth. It is also essential for many metabolic processes including nerve function, muscle contraction and blood clothing. A deficiency of calcium in the body leads to conditions such as rickets, osteomalacia and osteoporosis. A deficiency of calcium in the blood may lead to tetany. The presence of calcium in trace amount is very necessary and can alleviate nutritional impairments such as; rickets. (www.medlineplus.gov)

Magnesium is important for proper functioning of muscle and nervous tissues. It is required as a cofactor for many enzymes in the body. Phosphorus just like calcium is important in bone formation, metabolism and in energy conversion and storage in the body. Sodium and potassium are important for nerve transmission and osmolarity while iron is an essential component in the transport of oxygen in the body. A deficiency of iron will lead to anaemia, therefore adequate intake of potassium and iron is necessary for a healthy life. (www.emedicinehealth.com)

There was a reduction in all the vitamins contained in Cashew nut when processed except for Vitamin B1, which increased significantly (P<0.05) from 0.01-0.09.This shows that processing has an obvious impact on the vitamin content of Cashew nuts. It is therefore preferred that Cashew nuts be consumed in the raw form as much as possible since they can also be consumed without processing and have not been associated with toxicity in the raw form. There are claims that raw Cashew nuts are sweeter, tastier and more nutritious than their cooked counterparts. (www.living-foods.com). Vitamin B1 is a co enzyme in the decarboxylation reactions of carbohydrate metabolism and a deficiency of it causes beri-beri. Vitamin B2 and B3 have the same function with other vitamin B complex, which is they are constituted of co-enzymes FAD and FMN (AOAC, 1999). Vitamin C is essential in maintaining healthy connective tissues, integrity of cell wall, and synthesis of collagen; it is also necessary to prevent scurvy. Vitamin A is essential for growth, vision in dim light and the maintenance of soft mucous tissues. (www.medlineplus.gov)

Cashew nuts have appreciable amounts of vitamins, minerals and nutrients. The high content of ascorbic acid also indicates that Cashew nut in both raw and processed form can be used to prevent or at least minimize the formation of carcinogenic substances from dietary materials (Head 1998). The presence of carbohydrates, fat and protein also makes it a good source of energy. I recommend the enlightenment of consumers on the nutritional benefits of the consumption of Cashew nuts and that further studies be carried out on the anti-nutritional and functional properties of this nut.

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