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PROXIMATE COMPOSITION AND PHYTOCHEMICAL ANALYSIS OF THE ENDOSPERM OF *COCOS NUCIFERA L.*

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ABSTRACT

This proximate composition and phytochemical constituents of the endosperm of *Cocos nucifera* were determined using standard methods. The proximate composition recorded the levels (%) of carbohydrate, protein, fibre, moisture, fat and ash as 27.57±0.40, 1.93±0.02, 1.50±0.01, 43.50±0.40, 24.50±0.30 and 1.00±0.03 respectively, which revealed a rich content of moisture, carbohydrate and crude fat. The phytochemicals and their concentrations were phenols (1.40±0.01mg/100g), flavonoids (3.80±0.20mg/100g), alkaloids (4.20±0.30%), saponins (0.60±0.04%), tannins (3.42±0.02mg/100g), glycosides (0.042±0.02mg/100g), steroids (3.00±0.10%) and carotenoids (5.00±0.20%). These findings, therefore, do not only make this fruit popular to be consumed as good nutrient source, but may also be valuable in drug development.

Keywords: Phytochemicals, Proximate composition and *Cocos nucifera.*

INTRODUCTION

Cocos nucifera endosperm is a member of the family Arecaceae. It is the only accepted species in the genus *Cocos* [1]. The term coconut can refer to the entire coconut palm, the seed or the fruit, which is botanically a drupe,

not a nut. The term coconut was derived from 16th century as Portugal and Spanish *Cocos*, meaning ''grinding face'' from the three small holes on the coconut shell that resemble human facial features [2].

Cocos nucifera endosperm is a large palm, growing up to 30 meters tall, with pinnate leaves 4-6 meters long. They are generally classified into two types: tall and dwarf. On very fertile land, a tall coconut palm tree can yield up to 75 fruits per year, but more often the yield is less than 30 mainly due to poor cultural practice [3]. It is an important fruit tree in the tropical regions and the fruit can be made into a variety of foods and beverages. The edible part of coconut fruit (coconut meat and coconut water) is the endosperm tissue [3].

The endosperm or ''meat'' is the white and fleshy edible part of the coconut. Although coconut meat contains less fat than many oil seeds and seeds such as almonds, it is noted for its high content of medium chain saturated fat. About 90% of the fat found in coconut meat is saturated, a proportion exceeding that of foods such as lard, butter and tallow. Like most nut meats, coconut meat contains less sugar and more protein than popular fruits such as banana, apple and oranges [4]. Nutritional quality of coconut may be evaluated by chemical analysis of the food for proximate composition such as protein, carbohydrate etc. The most important of these for energy storage is glucose, a six-carbon sugar [5]. Moisture is another essential nutrient which provides medium in which biochemical reactions take place. Crude fibre is the inorganic residue that shortens the transit time of food through the gastrointestinal tract, reduces low density lipoprotein cholesterol and reduces risk of colon cancer [6]. Natural fat and oil are another proximate composition of coconut meat and it supplies energy to the body. It yields more energy on combustion than carbohydrate. However, the main function of fat is energy storage [7].

Phytochemicals are plant or fruit-derived chemical components that can be used as therapeutic agents. They reduce the risk of cancer due to dietary fibres, polyphenol antioxidants and anti-inflammatory effects [8]. The phytochemicals are produced via secondary metabolism in relatively small amounts [9]. Some groups of phytochemicals which appear to have significant health potentials are phenols, flavonoids, alkaloids, saponin, tannins, glycosides, cartenoids and steroids [9].

In view of the afore-mentioned activities of the proximate and phytochemical constituents, there is need to ascertain the levels of these nutritionally and pharmacologically active components in the endosperm of *Cocos nucifera.*

MATERIALS AND METHOD

Materials

The nuts of *Cocos nucifera linn* were collected from Okposi in Ohaozara L.G.A., of Ebonyi State, Nigeria. The chemicals and reagents were of analytical grade.

Methods

The phytochemical and proximate analysis

The coconut husk was removed to obtain the endosperm and was crushed using mortar and pestle. Afterward, it was transferred to a clean dry container. The phytochemical and proximate analyses were determined using the methods of [10].

RESULTS

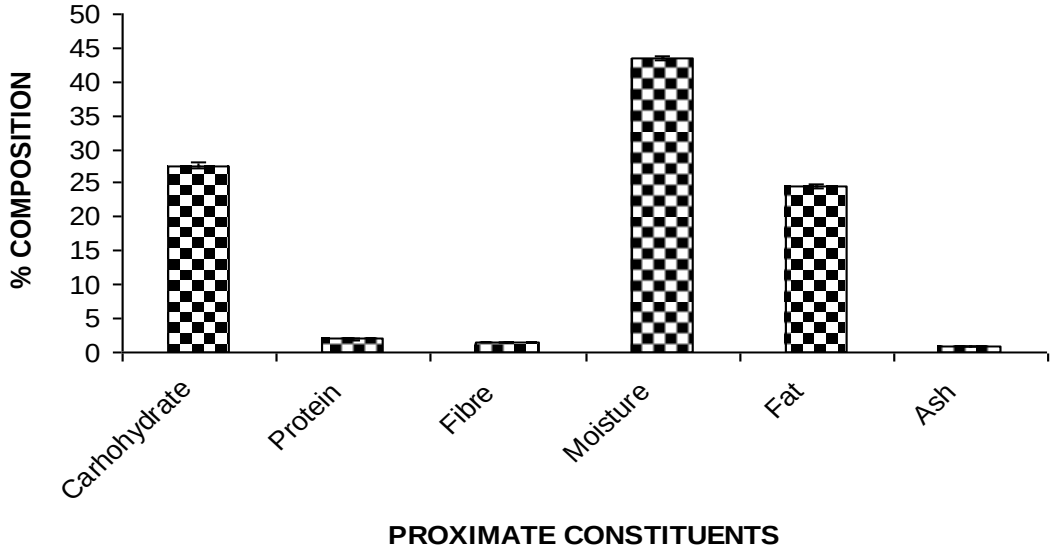

Figure 1: Proximate composition of the endosperm of *Cocos nucifera linn*

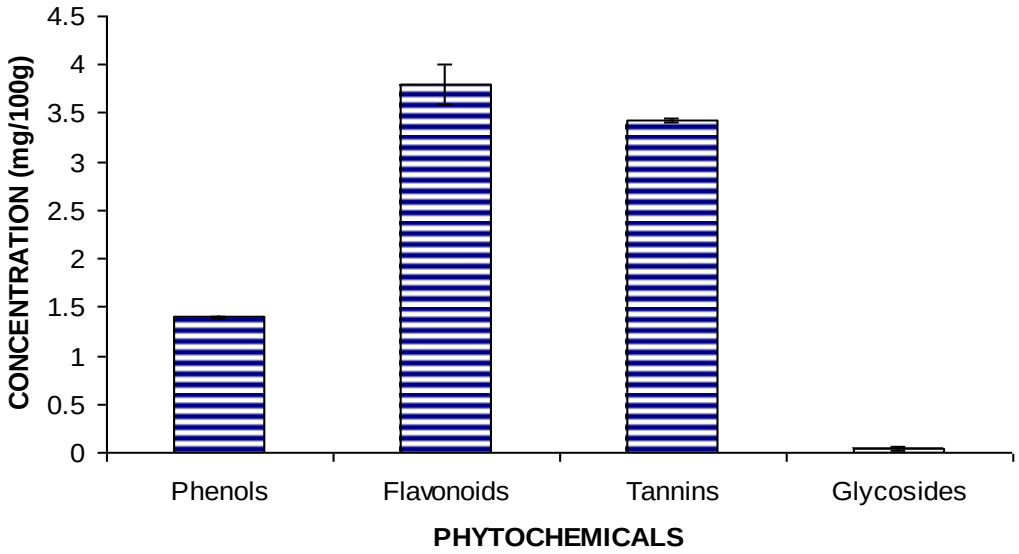

Figure 2: Some phytochemical contents (mg/100g) of the endosperm of *Cocos nucifera linn*

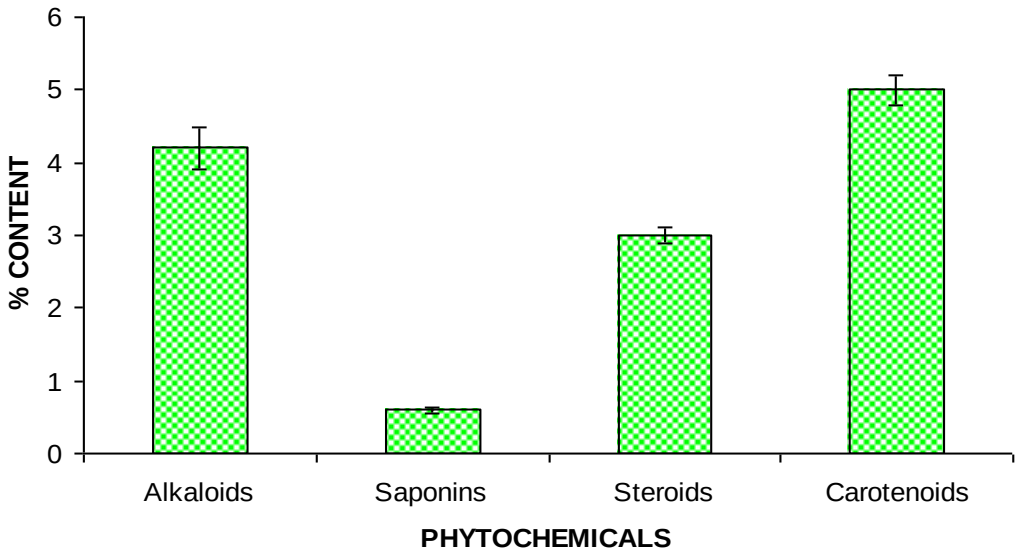

Figure 3: Some phytochemical contents (%) of the endosperm of *Cocos nucifera linn*

DISCUSSION AND CONCLUSION

The recorded proximate compositions of the endosperm of *Cocos nucifera* showed that the fruits were rich in nutrients especially carbohydrate, moisture and crude fat than the other components such as ash content, crude fibre and crude protein in that order (Fig. 1). The report of Dike (2010), [11], on proximate compositions of some plant species revealed that among the fruits/seeds studied, 80% of the plant species have edible fruit mesocarp and endocarp. The seeds having edible seed tegmen and endocarp formed 40%. The entire fruit and seed of two plant species, *Dennettia tripetala* and *Xylopia aehiopica* in the family *Annonaceae* are edible. In the study of fruit and seed, the family of *Annononaceae* with 9.86% had the highest value of crude protein while the family *Guttiferae* with 1.28% had the least value. The range lower than between 16.0 and 35.1 % was recorded in legumes such as *Arachis hypogaea* and soya beans respectively. Within the species, percentage crude protein varied between 1.28 and 11.9 in *Garcinia kola* and *Xylopia aethiopica* respectively. The percentage fat was least in the family of *Anacardiaceae* with 1.98% [11]. The proximate analysis of *Terminalia catappa* leaves revealed the presence of moisture, fat, carbohydrates, fibre and ash at different levels. The leaves showed high levels of carbohydrates and fat with low levels of protein and ash [12].

The results of the phytochemical analysis of the endosperm of *Cocos nucifera* showed the presence of carotenoids, alkaloids, tannins, steroids, flavonoids, and phenols with trace amounts of glycosides and saponins. Higher levels of flavonoids and tannins relative to the other components were identified (Fig. 2). This may be attributed to the colour pigments of coconut palm [13]. Phytochemical constituents of some medicinal plants showed that the leaves and stems are rich in alkaloids, flavonoids, tannin and saponins [14]. They were known to show medicinal activity as well as

exhibiting physiological activity. Steroids and phlobatannins were found to be present in all the plants. It has been found that some of these investigated plants contained steroidal compounds. It should be noted that the steroidal compounds are of importance in pharmacy due to their relationship with such compounds as sex hormones. Vegetables with steroidal structure could serve as potent starting material in synthesis of these hormones [14].

In conclusion, the proximate analysis revealed that the fruit contained carbohydrate, crude fat, moisture, crude fibre, crude protein and a trace amount of ash while the phytochemical analysis showed that it had carotenoids, tannins, flavonoids, alkaloids, steroids, phenols, saponins and trace amounts of glycosides. Based on the results of this research, coconut fruits could have nutritional and energy needs for man and can be applied in the development of medicine. Therefore, the need to explore coconut as medicine is important due to the presence of bioactive substances which are very useful in the pharmaceutical industry.

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