American Journal of Advanced Drug Delivery

www.ajadd.co.uk

Original Article

Protein and Mineral Element Content of Coconut (*Cocos nucifera*) Water from Different Species

Chuku, L.C.*and Kalagbor G.I

Dept. of Biochemistry, University of Port Harcourt, P.M.B. 5323, Port Harcourt, Rivers State, Nigeria.

Date of Receipt- 02/12/2013
Date of Revision- 07/02/2014
Date of Acceptance- 12/02/2014

Address for Correspondence
Dept. of Biochemistry, University of Port Harcourt, P.M.B. 5323, Port Harcourt,Rivers State, Nigeria.
E-mail:
chuku_lawrence@yahoo.com

ABSTRACT

The mineral element content of coconut water from three (3) different species was determined in samples gotten form Rivers State. Ca, Na, K, Fe, Cu, S, P and Cl were determined using the Atomic Absorption Spectrometry (AAS) excluding chloride which was determined by titration method. The concentration of this mineral element studied lies within the ranges (ppm) with Ca (25-55), Na (40-85), K (110-165), Fe (0.542-1.625), Cu (0.000-0.018), S (10.35-30.00), P (0.01-0.53), Cl (2050.00-2565.00). The protein content (i.e. % total protein) was determined as crude protein using the macro-kjeldahl Markham distillation method. The values ranged between 0.30-0.40, 0.10-0.20, and 0.49-0.55 for the three different species respectively.

Keywords: Coconut, Protein, Mineral, Element, Water, Specie, Atomic absorption spectrophotometer, Macro kjeldahl.

INTRODUCTION

The coconut

The coconut fruit is a fibrous drupe consisting of a thin hard skin (exocarp), a thick layer of fibrous mesocarp (husk), the hard endocarp (shell), the white endosperm (kernel) and the large cavity filled with liquid (water) when immature. The exocarp is usually green, sometimes bronze. The fruit shape vary from elongated to spherical and weigh between 850 to 370g when mature[1].

The water is a clear liquid found in the interior of coconut. In a healthy and undamaged coconut, the water is sterile. Its sodium and potassium content makes it an ideal drink for rehydration. The characteristics of the coconut water changes as the coconut ages. A very young coconut (i.e. about 3-5 months, before the endosperm begins to form), has tasteless water that is somewhat astringent. Water from a mature coconut is slightly salty to the taste, but when the coconut grows well on land, the

salty taste disappears. The best time to harvest a coconut for drinking is at age 6-7 months, just as the jelly-like endosperm begins to form. At this stage the water has maximum sweetness and low acidity[1].

MATERIALS AND METHODS

Materials (Sample collections)

The coconut used for this research analysis was gotten from Woji in Obio-Akpor local government area of Rivers State, Nigeria.

Preparation of sample for analysis

The coconut fruit was taken to the University of Port Harcourt plant herbarium for specie identification. Thereafter the hard skin (exocarp) and the mesocarp (husk) are removed with the aid of a cutlass, to get the shell which is also cracked and broken with the aid of a cutlass. The pulp was punctured with a knife to create a route for the water to be extracted. The water was put into a well labeled bottle and store in the refrigerator to avoid contamination and growth of microorganism.

Analytical procedure

Determination of mineral element content

The sample was investigated for mineral element composition by using atomic absorption spectrophotometer (AAS), Bulk Scientific model AVG 210. Appropriate working standard solution was prepared for each element. The calibration curves were obtained for concentration versus absorbance. The data were statistically analyzed by using fitting of straight line by least square method. All elements were determined in the medicinal plant (*S. florida*) under this investigation procedure. Laboratory procedures for the preparation and determination of macro and micronutrients were used as outlined by Shah *et al*. (2009) for plant samples.

Determination of total protein

The nitrogen value which is the precursor for protein of a substance was determined by micro kjeldahl method. The nitrogen value was converted to protein by multiplying to a factor of 6.25.

The protein values were reported in percentage (AOCS, 2000; Okwu and Morah, 2004).

RESULTS

In the cause of determining the concentration of mineral element and protein content of a natural coconut water from different species, the following tabulated results were obtained.

DISCUSSION

Comparing the results obtained from the three (3) different species analyzed, it was confirmed that some concentration values are below recommended limits, but they are still considered as values for the concentration of this mineral elements been that they are higher than the values of the equipment detection limits. It was also confirmed from the above results that a natural coconut posses some protein content, although not very significant (Pandala, 1958).

The determination of the presence of mineral elements in the natural coconut water from the different species using AAS analytical method was characterized as being fast, precise, and accurate. The method allows for and establishment of statistical interval for the concentration of mineral elements in coconut water.

CONCLUSION

It is widely consumed as a refreshing drink and it is considered to have some medicinal properties such as being used as an oral liquid for hydration, gastric and intestinal problems and also as urinary stone solvent, since its enzymatic composition enhances stone dissolution.

Coconut water has been verified to contain some mineral elements which can be readily accepted by the body, found in the blood and causes no harm to body cells and tissues. Intake of coconut water is a good source of mineral element supply to the body since no side-effect has been recorded.

Finally the coconut water is one of nature's clear liquid which has numerous functions in the body and its excessive intake does not have any recorded side-effect.

REFERENCES

1. Cocoinfo International (2004): Introduction about coconut water. *Cocoinfo International* vol.11, No.1 2004/issn0854-5006P.
2. Coconut Development Board: Medicinal properties of coconut. *Journal of the coconut development board on tender coconuts*.
3. Columbia encyclopedia (2008): The Columbia encyclopedia on coconut, sixth edition 2008.
4. F.A.O. (2008). Food and Agriculture Organization of United Nation Database. http://apps.faorg/accessed in July 208.
5. Pandala K.M (1958): Coconut water and its uses, *Coconut Bull*. 12, No.5, 167-173.
6. Pradera *et al* (1942): Percentage of Total Protein Content in coconut water. *Journal of nutrients in tender coconut water.*
7. Species profile: Species profile for Pacific Island Agro forestry. (www.traditionaltree.org).

Table 1. Mineral element concentration (ppm) and total protein (%) in different species

Samples	Ca	Na	K	Fe	Cu	S	P	Cl^-	Total protein
A	44.9	50.02	154.33	0.552	0.013	10.57	0.05	2550.00	0.35
B	25.975	29.8	147.04	0.578	0.011	23.79	0.16	2010.00	0.21
C	31.55	80.33	118.6	1.611	0.002	29.08	0.51	2060.00	0.546

Where:
Sample A – "Pear shaped"
Sample B– "Native coconut"
Sample C – "Round shaped"