THE EFFECT OF PROCESSING TIME ON THE PROXIMATE AND PHYTOCHEMICAL COMPOSITION OF *Brachystegia eurycoma*

*UNEGBU CHIKA C[1]., NJOKU S.C[1]., AJAH OBINNA[2] AND CHIMA VICTOR[2]

1. Department of chemistry/biochemistry, Federal Polytechnic Nekede, Owerri, Imo State, Ngeria
2. Department of Pharmaceutical Technology, Federal Polytechnic Nekede, Owerri, Imo State, Ngeria

*Correspondence E.mail address: buffaogb@yahoo.com

ABSTRACT

Proximate and phytochemical analysis of the seeds of *Brachystegia eurycoma* were carried out on the boiled and soaked samples at different time interval to ascertain which of the treatment method that is more conserved. The phytochemical and proximate analysis were carried out using standard method described by Harbone (1973) and A.O.A.C. (2005) There is significant differences ($P<0.05$) between the samples and the control in the moisture, ash, fibre, protein, fat and carbohydrate content. The moisture content of the seeds increases as treatment time increases, the moisture value ranges between 9.72±0.01 – 13.8±0.01%. The control has the highest value in the ash, fat, fibre and protein content. The phytochemical result showed that there is a significant difference between the treated samples and the control in the alkaloid determination with the value ranging from 4.38±0.06 – 7.41±0.01%, flavonoid content of the samples decreases as the treatment time increases @0.05 level of significance. The flavonoid value of all the samples ranges from 0.76±0.01 – 2.28±0.01%. The tannin and saponin value shows significant different ($P<0.05$) between the control and the treated samples. The result indicated that processing has effect on the nutritional composition, and thus, shorter time frame should be adopted for treatment.

KEYWORDS: *Brachystegia eurycoma*, Nutrition, Phytochemical, proximate, processing time,

1. INTRODUCTION

Brachystegia eurycoma belongs to the family caesalpiniaceae, phylum spermatophyte and order fabaceae. *Brachystegia eurycoma* is known as “achi” in igbo land, “akalada” in Yoruba, “Akpakpa or apaupan” in Ijaw, “dewen” in Benin, “okwe” in Edo, “okung” in Efiki. The plant has been found to have potential medicinal and domestic uses, and is a traditional food plant in Africa. This little known seed help improve nutrition, boost food security, foster rural development and support sustainable land scare. The seed of *Brachystegia eurycoma*is a rich source of mineral like Na, K, Mg, etc., and nutrient like protein, crude fibre, ash, fat, carbohydrate, and also good source of alkaloids, tannins, saponins, flavonoid (Okenwa et al, 2013). In Nigeria, the main culinary use of gum from *Brachystegia eurycoma* is in thickening soups. Research carried out on phytochemical composition and anti-inflammatory activities of *Brachystegia eurycoma* revealed that the seeds and stem bark possess anti-inflammatory activities which may be due to the presence of bioactive constituents in them (Igwe et al, 2013). In Nigeria, various indigenous seeds are used as both food and medicine, and one of such seed is *Brachystegia eurycoma*. *Brachystegia eurycoma* are consumed and processed by people in different ways to remove the seed coat, without knowing the effect of the processing method on the seed’s nutritional and phytochemical compositions.

Hence, it becomes imperative to establish the effect of soaking and boiling as processing methods on the proximate and phytochemical composition of *Brachystegia eurycoma* seeds.

2. MATERIALS AND METHOD

2.1 SAMPLE COLLECTION AND PREPARATION

The matured seeds of *Brachystegia eurycoma* were bought from relief market in Owerri, Imo State, Nigeria. The seeds were sorted and then divided into 3 parts.The first part was sub-divided into 5 parts, and each of the parts were boiled at different time interval of 20, 30, 40, 50 and 60 minutes separately. The second part was sub-divided into five parts and soaked at different time interval of 6, 12, 18, 24 and 30 hours separately. The third part was not given any treatment. All the seed were de hulled, dried under the sun, and separately milled. The milled samples were labeled and stored properly for use.

2.2 PROXIMATE ANALYSIS

Protein, ash, crude fibre, fat, moisture and carbohydrate were determined for all the samples. According to A.O.A.C. (2005) official procedures. The nitrogen was determined bykjeldahl method.

2.3 DETERMINATION OF PHYTOCHEMICALS

Alkaloids were ascertained according to the method of Harbone (1973) while tannin was determined using the method of Van-Burden and Robinson (1981). Saponin was determined using the method of Obadoni and Ochuko (2001). Flavonoids were determined according to method of Boham and Kocipia (1994).

2.4 STATISTICAL ANALYSIS

All measurements were carried out in triplicate, The means and standard deviation were determined. Analysis of variances (ANOVA) was used to determine the differences between the means at $p<0.05$ level of significance.

3. RESULT

Table 1: Result on the effect of soaking and boiling time on the proximate components of *Brachystegiaeurycoma*

Sample	Sample size	% moisture	% ash	% fibre	% fat	% protein	% carbohydrate
A	3	9.29 ± 6.32^{c}	3.60 ± 0.05^{f}	3.60 ± 0.18^{b}	9.24 ± 0.08^{b}	18.38 ± 0.01^{d}	43.43 ± 0.01^{f}
B	3	11.80 ± 0.05^{b}	3.45 ± 0.05^{g}	3.55 ± 0.04^{c}	8.09 ± 0.03^{c}	17.88 ± 0.01^{f}	54.68 ± 0.10^{b}
C	3	12.21 ± 0.19^{b}	3.40 ± 0.11^{h}	3.40 ± 0.02^{e}	7.78 ± 0.05^{c}	16.56 ± 0.01^{j}	54.62 ± 0.40^{b}
D	3	12.66 ± 0.01^{b}	3.33 ± 0.12^{i}	3.35 ± 0.04^{f}	7.54 ± 0.02^{c}	16.94 ± 0.01^{i}	55.83 ± 0.14^{a}
E	3	13.8 ± 0.01^{a}	3.25 ± 0.10^{j}	2.65 ± 0.02^{g}	7.48 ± 0.01^{c}	16.19 ± 0.04^{k}	56.00 ± 0.02^{a}
F	3	9.90 ± 0.01^{b}	3.92 ± 0.03^{b}	3.80 ± 0.03^{a}	12.24 ± 0.02^{a}	18.69 ± 0.04^{b}	51.72 ± 0.02^{c}
G	3	10.22 ± 0.08^{b}	3.85 ± 0.02^{c}	3.65 ± 0.03^{b}	12.06 ± 0.04^{a}	18.50 ± 0.04^{c}	51.72 ± 0.09^{e}
H	3	10.51 ± 0.03^{b}	3.80 ± 0.01^{d}	3.55 ± 0.01^{c}	11.62 ± 001^{a}	18.06 ± 0.03^{e}	52.64 ± 0.02^{c}
I	3	10.74 ± 0.06^{b}	3.75 ± 0.02^{d}	3.50 ± 0.04^{d}	11.86 ± 0.48^{a}	17.75 ± 0.02^{g}	52.56 ± 0.47^{c}

J	3	10.90±0.03[b]	3.70±0.04[e]	3.42±0.07[e]	8.51±5.79[c]	17.56±0.01[b]	52.24±0.04[a]
K	3	9.72±0.01[b]	4.05±0.02[a]	3.85±0.02[a]	12.41±0.02[a]	19.13±0.01[a]	50.69±0.28[e]

Treatment affected by proximate composition of *Brachystegiaeurycoma*to a great extent as there is significant differences at ($P<0.05$) in the ash, fibre, protein and carbohydrate contents. The higher the treatment time , the higher the effect. These composition decreased with treatment time. Moisture content did not show much significant differences at ($P\geq0.05$) and the value increased with treatment.

Soaking for 18 hours preserved the nutrients and also eliminated anti nutrients like tannin to a greater extent.

Table 2: Effect of soaking and boiling time on the phytochemical components of *Brachystegiaeurycoma*

Sample	Sample size	Alkaloid (%) mean ± S.D	Flavonoids mean ± S.D	Tannins mean ± S.D	Saponins mean ± S.D
A	3	6.28±0.04[g]	1.93±0.04[d]	9.03±0.04[b]	1.62±0.01[a]

B	3	5.92±0.01^{h}	1.52±0.01^{f}	8.88±0.08^{c}	0.82±0.02^{g}
C	3	5.64±0.01^{i}	1.26±0.05^{g}	8.53±0.18^{d}	0.76±0.01^{i}
D	3	4.67±0.05^{i}	1.08±0.01^{h}	8.61±0.01^{d}	0.70±0.01^{i}
E	3	4.38±0.06^{k}	0.76±0.01^{i}	6.08±0.02^{e}	0.69±0.01^{j}
F	3	7.26±0.04^{b}	2.26±0.01^{a}	3.75±0.01^{f}	1.28±0.01^{c}
G	3	7.13±0.04^{c}	2.20±0.04^{b}	2.25±0.03^{g}	1.14±0.01^{d}
H	3	7.06±0.01^{d}	2.10±0.01^{c}	0.75±0.01^{h}	0.96±0.01^{e}
I	3	6.86±0.01^{e}	1.80±0.02^{e}	0.75±0.02^{h}	0.84±0.02^{f}
J	3	6.52±0.01^{f}	1.56±0.01^{f}	0.50±0.02^{i}	0.80±0.04^{h}
K	3	7.41±0.01^{a}	2.28±0.01^{a}	9.25±0.01^{a}	1.32±0.01^{b}

There is significant difference in all the phytochemicals studied (Alkaloids, flavonoids, tannins, saponins) in all the processing methods. There is a decrease on the value of the phytochemicals on treatment time.

4. DISCUSSION

The proximate result from table 1 above showed that with reference to moisture, there is an insignificant difference (P>0.05) between the control and the treated samples ranging from 9.29±6.32% - 13.8±0.01%. The moisture content exhibited by the samples is lower than 60-90% stated by (FAO 1986) as the highest value acceptable for moisture. Too much moisture in a food sample makes the food sample viable to microbial growth. High ash content in any food sample indicates high yields of minerals in the sample. The values of ash content of the samples (3.25±0.10 – 4.05±0.02) are within the range of 2-10% obtained for cereals and tubers. The value of the ash content of this research is higher than that gotten by Ikegwu et al. (2010) on ash content of *Brachystegia eurycoma*(1.48%) for the flour and (0.79%) for the starch extract.Methods of treatment may have affected the value of the ash content.The value of % fibre ranges from 2.65±0.02 -3.85±0.02 and it is higher than that obtained by Ikegwu et al. (2010), 2.22% for the flour and 0.69% for the starch extract of *Brachystegia eurycoma*. Fibre has many health benefits; it can prevent heart disease, diabetes, weight gain, some cancer and improve digestive health.

There is an insignificant difference (P>0.05) between the fat content of the control (12.41±0.02%) and the soaked samples from (6-24hrs) which ranges from (11.62±0.01 – 12.24±0.02%). But there is significant difference between the control and the boiled samples. This may be due to the dissolution of the fatas boiling proceeded.This result is in line with that of Ikegwu et al. (2010) for

the flour (10.52%) though higher than that of the starch (0.25%) of *Brachystegia eurycoma*. The value of the crude protein which ranged from (16.19±0.04 – 19.13±0.01) is higher than that of Ikegwu et al. (2010) for the flour of *Brachystegia eurycoma* (12.77%). The values of the phytochemicals decreased as the time of treatment increased. Soaking at 18 hours, seems to be the best treatment as it retained the alkaloids and flavonoids but reduced the tannins. Proteins supply amino acids, which helps in body building and replacement of worn out tissues. The boiled samples at 60 and 50minutes have the highest carbohydrate content of 56.00±0.02 and 55.83±0.14% respectively. Carbohydrate provides the body with the energy it needs.

The phytochemical results indicate that there is significant difference ($P<0.05$) between the control and all the phytochemicals studied in the treated samples. The range are (4.38±0.06 –7.41±0.01%, 0.76±0.01-2.28±0.01, 0.50±0.02 – 9.25±0.01, 0.69±0.01 – 1.62±0.01) for alkaloids, flavonoids, tannins and saponins respectively. This result deviated from the values obtained by Okenwa et al (2013) on *Brachystegia eurycoma* seed and stem bark which had alkaloids (1.74% and 0.70%), flavonoids (3.72% and 4.99%), tannins (0.70 and 0.37%) and saponins (0.87 and 1.94%) for the seed and stem bark respectively. Flavonoids are a group of polyphenolic compounds ubiquitously found in fruits and vegetables. They act as an antioxidant, vasodilation, anti-cancinogenic, anti-inflammatory, anti-bacterial, immune stimulating, anti-allergic, and antiviral etc. Saponin possesses antifungal properties, have ability to form foams in

aqueous solution and way exhibit cholesterol binding properties. Alkaloids are plant bases which exhibit certain physiological properties when used in herbal medicine, they have anti-malaria and anti-microbial activities e.g. quinine and its derivatives. Tannins are mostly associated with ulcer management, wound healing, control of bleeding and burn in herbal medicine.

5. CONCLUSION

From the result, the best treatment observed to be better and to have more conserved nutrients and bioactive compound is the soaking method, due when soaked for a longer time. It affects the composition but not much as boiling has on it. Thus soaking method of processing is advised to be adopted when using the seed as a condiment. The research also justifies the information on nutritional compositions of the seeds of *Brachystegia eurycoma*.

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