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Some Selected Phytochemicals in Extracts of three Popular Vegetables in South-Eastern, Nigeria

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ABSTRACT

The thrust of this work was to evaluate some phytochemicals in extracts of fluted pumpkin leaves (Telferia occidentalis); eggplant fruit (Solanum melongena); and egg plant leaves (Solanum nigrum). Current standard methods were used to determine the saponins, flavonoids and phenol content of the samples. Means, standard deviation, standard error of the means, ANOVA and Duncan's New Multiple Range test were statistical tools employed in the analysis of data generated from the experiment. Extracts of the three samples had high and comparable saponins (69.40, 72.60mg and 64mg/100ml, respectively) (P>0.05) and flavonoids in egg plant fruit/leaf were lower (5.76 and 13.25mg/100ml, respectively) when compared to fluted pumpkin extract (P<0.05). Extracts of eggplant leaves and fruits also had high and comparable phenols (178.67 and 150.67mg/100ml) (P>0.05). Nevertheless, extracts of the three plants proved to be good sources of the analysed phytochemicals.

KEYWORDS: Phytochemical, vegetables, extracts.

INTRODUCTION:

The medical values of vegetables are dictated by their phytochemical and other chemical constituents (Fallah, Alavian, Heydari and Abolmaali, 2005). Phytochemicals are chemicals that may affect health but are not yet established as food nutrients (Micronutrient Information Centre, 2010). The medicinal values of these plant foods are information of enormous significance. Phytochemicals give plants natural defence against diseases and they perform similar function for humans (Nnam, Onyechi and Madukwe, 2012). Many varieties of leafy vegetables contain bioactive substances (phytochemicals). Processing destroys many pnytochemicals. Hence vegetables provide better phytochemicals when consumed raw. Aqueous extract of fresh fluted pumpkin leaves has been noted as having health benefits. Besides, local specie of eggplant fruits and leaves too are usually consumed raw in south eastern Nigeria. However, there is dearth of information on phytochemical levels in these locally consumed popular vegetables. The thrust of this work was therefore, to bridge the knowledge gap.

MATERIALS AND METHODS:

Source of the materials: Fluted pumpkin leaves *(Telferia occidentalis),* locally available eggplant fruit *(Solanum melongena)* and eggplant leaves *(Solanum nigrum)* were purchased from local retailers in Ogige market in Nsukka, Enugu State, Nigeria.

Methods:

Sample preparation: Two hundred and fifty grams each of *Telferia occidentalis* leaves and *Solanum melongena* fruits and leaves *(Solanum nugrum)* were washed separately; blended using a Gallenkamp mixer Kenwood-MPR 201 and juices were extracted using a knowledge kitchen electric juice extractor. The extracts were bottled, labelled and taken for various chemical analyses.

Chemical analysis: Flavonoid was determined using a method described by Boham and Kocipai (1974). Determination of total phenols was by the use of spectrophotometric method of AOAC (2005). Saponins were determined using the method of Obadoni and Ochuko (2001).

Statistical analysis: All determinations were done in triplicates. Data from all determinations were subjected to means and analysis of variance (ANOVA). Duncan's studentized New Multiple Range test was used for mean separation and comparison (Steel and Torrie, 1960).

RESULT:

Table 1: Phytochemical composition of fluted pumpkin leaf *(Telferia occidentalis),* eggplant fruit *(Solanum melongena)* and eggplant leaf *(Solanum nigrum)* extracts (mg/100ml).

Samples	Saponins	Flavonoids	Phenols
Fluted pumpkin leaves	$64.00^{b}\pm1.80$	$72.24^{a}\pm14.52$	$66.67^{b}\pm16.00$
Eggplant fruit	$72.50^{a}\pm2.60$	$13.25^{b}\pm1.75$	$150.67^{a}\pm7.20$
Eggplant leaves	$69.40^{ab}\pm23.69$	$5.76^{b}\pm0.00$	$178.67^{a}\pm22.00$

Mean ± SD of three determinations

Table 1 presents the phytochemical composition of fluted pumpkin leaf *(Telferia occidentalis),* eggplant fruit *(Solanum melongena)* and eggplant leaf *(Solanum nigrum)* extracts (mg/100ml). The saponin content of the eggplant fruit and leaves differed. The eggplant fruit extract had the highest value (72.50 mg/100ml) and differed significantly from that of the fluted pumpkin leaves (P<0.05). However, extracts of the eggplant fruits had a close value with that of the leaves (72.50 vs 68.40 mg/100ml P>0.05). The extract of the fluted pumpkin leaves had the least value for saponins (62 mg/100ml). However, there was no significant difference in the saponin content of both extracts of fluted pumpkin and eggplant leaves (64.00 and 69.40 mg/100ml, respectively) even though the eggplant leaves had 5.40mg of saponin more than fluted pumpkin leaves (69.40 – 60.00 mg/100ml).

The flavonoid values for the three samples varied from 5.76 to 72.2 mg/100ml. The extracts from eggplant leaves had the least flavonoids (5.76mg). The eggplant fruit had higher value than the leaves (13.25 vs 5.76 mg/100ml). The difference, however was not significant (P>0.05). The fluted pumpkin leaf extract had the highest value of flavonoid (72.24 mg/100ml). This value differed significantly from that obtained from both the eggplant leaves and fruits (72.24 vs 5.76 and 13.25 mg/100ml) (P<0.05).

The values of the phenols in the three samples varied. The difference ranged from 66.67 to 178.67 mg/100ml. Both the eggplant fruit and leaf extracts had higher and comparable values (178 and 150.67 mg/100ml, respectively; P>0.05) than the fluted pumpkin leaf extracts (66.67 vs 178.67 and 150.67 mg/100ml; P<0.05). The eggplant leaf extract had an edge over that from eggplant fruit in phenol values

(178.67 vs 150.67 mg/100ml). However, the difference was not significant (P>0.05).

DISCUSSION:

The lower concentration of saponins in fluted pumpkin leaf extract appeared to suggest that eggplant leaves and fruits extracts are better sources of the phytochemical. On the other hand, the high and comparable saponins for both leaves and fruits of eggplant were indications that either the leaves or the fruits could supply equal concentration of the phytochemical. The slightly higher saponins (a difference of 3.90mg) in eggplant fruit than that of the leaves suggested that saponins might be more concentrated in the fruit than the leaves. The values reported in this study were much higher than values reported by Okwu and Josiah (2006) and Harisaranray, Suesh and Saravanababu (2009). These authors observed equal values of saponins (1.46 – 1.72mg/100g) in *Aspillia Africana and Bryophyllum pinnatum; and Rauwolfia serpentina* and *Ephedra vulgaris*.

The lower levels of flavonoids in the extracts of eggplant leaves than in the fruits showed that the eggplant leaf extract was a source of flavonoids.. The higher flavonoids in the extracts of fluted pumpkin leaves than in either the extracts of fruits and leaves of eggplant demonstrated the superiority of fluted pumpkin leaves as richer source of flavonoids than the leaves and fruits of eggplant (P<0.05). The flavonoids of the three vegetables in this study were higher than the result of the work done by Okwu (2004) and Madukwe, Ugwuoke and Ezeugwu (2013). The higher concentrations could be attributed to treatment. The extracts from the present work were extracted without any fluid contrary to that by Okwu and Josiah (2006). They used 100 ml of diethyl ether in their extraction. Water leaf was reported to have comparable quantity for flavonoids as the three vegetables under study (Aja, Okaka, Ibiam, Uraku and Onu, 2010).

The significantly higher levels of phenol in the extracts of eggplant leaves and fruits over fluted pumpkin leaf extract was an indication of their superiority as sources of phenol. However, their phenol levels were higher than that observed by Edeogun, Omosun and Uche (2006). The later researchers dried their samples before extraction. Rickman, Barrett and Bruhn (2007) found out that fresh vegetables contain more micronutrients and phytochemicals than heat treated samples. They also observed that the initial thermal treatment of processed products can cause loss of water-soluble and oxygen-labile nutrients such as vitamin C and the B vitamins. The loss of phytochemicals in the heat treated samples suggested that the phytochemicals may be volatile when treated.

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