

Vitamin compositions in *Pterocarpus Santalinoide* leaves in Abakaliki, Ebonyi State, Nigeria

Abstract:

*Pterocarpussantalinoide*s is a common vegetable in Ebonyi State Nigeria. The vitamins analysis was carried out on the dry leaf sample using standard methods. The result of the vitamin analysis revealed the presence of vitamin A (154.74 ± 1.45 mg/l), vitamin B₁ (0.07 ± 0.02 mg/l), vitamin B₆ (0.02 ± 0.01 mg/l), vitamin B₁₂ (0.22 ± 0.03 mg/l), vitamin C (836.21 ± 2.45 mg/l), vitamin D (450 ± 4.95 mg/l), vitamin E (139.28 ± 5.10 mg/l) and vitamin K (10.13 ± 0.33 mg/l) in the sample. This shows that *Pterocarpussantalinoide*s is a good source of vitamin C and fat soluble vitamins and therefore its consumption should be encouraged.

Keywords: Vitamins, *Pterocarpussantalinoide*s, leaf and common vegetable

Introduction:

Plants play an important role in the cycle of nature, this is because life on earth basically depend on them (Okafor *et al.*, 1996). In ancient literature, it is clear that plants were earlier studied from viewpoints of their usefulness and this formed the birth day of botanical science (Jethroet *al.*, 1997). Plants provide man with all his needs as regards food, shelter, clothing, flavour and fragrance as well as medicine (Sofowora, 1993). They are naturally occurring substances that produces almost all the foods that animals as well as human eat and have a unique potential to make their own food through photosynthesis (Sheela, 2004).

Pterocarpus species belong to the family of Fabaceae and they grow throughout the Tropics (Ogan, 2004). The Nigerian species are trees with bright yellow flowers and usually have alternate leaflets (Osuagwuet *al.*, 2007). The fruit pod has an unusual irregular shape (Adetunji, 2007). It is a shade tree commonly found along riverine forest in Africa and tropical South America (Gallant, 1972). The plant can also help in erosion control because of the type of root system as well as nitrogen fixation (Osuagwuet *al.*, 2007). In Nigeria, many indigenous plants including *Pterocarpussantalinoide*s are used as food or medicine. The tender leaves are used as vegetable in soup making while the stem bark is used in making pepper soup (Ezeaguet *al.*, 1998). As a vegetable the leaves are fresh and edible, which can be eaten raw or cooked (Dhelltet *al.*, 2006). They are not only cheap source of nutrients but are also common sources (Okafor, 1983). Specifically, green leafy vegetables occupy an important place among the food crops as they provide adequate amounts of many vitamins and minerals for humans (Tianet *al.*, 1992). They are a rich source of carotene, ascorbic, riboflavin, folic acid and minerals (Sheela, 2004).

Various parts of *Pterocarpussantalinoide*s are used in traditional medicine in many African countries to treat an array of human ailments. Locally known as "Uturukpa", the fresh leaf of *Pterocarpussantalinoide*s are consumed locally, in soups preparation like Ogbono (draw soup) and Egwusi (Melon soup) by the Igbos of South East Nigeria and is reputed to be useful in the treatment of diarrhea and other gastrointestinal disorder (Okafor *et al.*, 1996).

Vitamins are organic substances without energetic value, but are necessary for the metabolism of animals or human organisms (LEBAS, 1969). These substances are not synthesized by the organism itself in adequate quantities, for this reason, vitamins must be provided by diets or through the intestinal flora activity (Jarret *et al.*, 1988). They act at very small concentrations mainly as co-enzymes or co-enzyme precursors but are never incorporated as constitutive part of the body (Corinoet *al.*, 1999). Vitamins are classified into thirteen (13) groups. The main molecules are named with letter and an additional number where necessary, according to the order of their discovery (Mateos and Blas, 1998). The most common classification system is based on solubility: nine (9) vitamins are water-soluble: the B-complex vitamins (or B-group) and vitamin C. Four (4) vitamins are fat-soluble (i.e. vitamin A, D, E and K). There is need to study the vitamin levels of plants to identify those with significant high levels, hence the need to determine the vitamins composition in fresh leaf of *Pterocarpussantalinoide*s a common vegetable in Ebonyi State.



Figure 1: Pterocarpussantalinooides Leaves

Materials and Methods

Materials: The chemicals and reagents were of analytical standard. Fresh leaves of wild grown *Pterocarpussantalinooides* were collected from Ikwo area of Ebonyi state, Nigeria. The botanical identification and authentication were done by Prof. J. C. Okafor; a plant taxonomist at Botany Department University of Nigeria Nsukka.

Methods

Determination of Vitamin: Determination of the vitamin contents in the test sample were carried out by the method described by Association of Official Analytical Chemist (AOAC), 1990.

Results

The result of vitamin analysis showed that *Pterocarpussantalinooides* leaf has the highest levels of vitamin C, followed by vitamins D, A, E, K and low levels of vitamins B₁, B₁₂ and B₆ as shown in the Table 1.

| Vitamins | Composition in mg/l |
|-----------------|---------------------|
| A | 154.74±1.45 |
| B ₁ | 0.07±0.02 |
| B ₆ | 0.02±0.01 |
| B ₁₂ | 0.22±0.03 |
| C | 836.21±2.45 |
| D | 450±4.95 |
| E | 139.28±5.10 |
| K | 10.13±0.33 |

Table 1: Vitamin Analysis Of PterocarpusSantalinooides Leaf.

Discussion and Conclusion:

Discussion: From the study, it was observed that vitamins such as vitamin A, B₁, B₆, B₁₂, C, D, E and K are present in the leaf of *Pterocarpussantalinooides*. This composition clearly showed that *Pterocarpussantalinooides* leaf is a good source of vitamins. Igwenyi and Elekwa, 2014 reported the presence of vitamin A (1.44±0.02mg/100g), vitamin B₁ (288.17±0.12mg/100g) and vitamin E (0.02±0.02mg/100g) in *Geranium robertianum* leaves. Offoret al. (2015) also reported that the fresh leaves of *Cucurbitalmoschata* and *Amaranthushybridus* recorded varying and

substantial concentrations of vitamins. *Cucurbitalmoschata* recorded higher amounts (mg/100g) of ascorbic acid, thiamine and riboflavin while *Amaranthushybridus* contained significantly higher amount of niacin (Offoret al., 2015).

According to food and Agricultural Organization and World Health Organization expert consultation on human vitamin requirement, recommended nutrient intakes for vitamin C for infant is 35mg/day, adult 45mg/day and adolescents (10-18years), pregnant mother and lactating mothers are 40mg/day, 55mg/day and 70mg/day respectively, while the analysis of vitamin C content in *Pterocarpussantalinoide*s leaves showed that it contains about 836.21 ± 2.45 mg/l and as such is a good source of ascorbic acid. This shows that it can be used to cure scurvy and protect against scurvy in unborn children in the womb as reported by Krebs et al., 1948. Studies by Baker et al., 1969 shows that the minimum amount of vitamin C needed to cure scurvy in men was less than 10mg/day.

The recommended nutrient intakes for vitamins D according to age as officiated by World Health Organization and Food and Agricultural Organization are infant 0-9years, 0.005mg/day; adolescent, 10-18 years; adults, pregnant women and lactating women is 0.005mg/day. Also, for elderly adult of 65+ years it is 0.015mg/day. The result of analysis of vitamin D content in *Pterocarpussantalinoide*s showed that it contains high level of vitamin D 450 ± 4.95 mg/l. As such, a good source of vitamin D and can help to protect children against rickets. Children constitute a population at risk for vitamin D deficiency, because of relatively large vitamin D needs brought about by their high rate of skeletal growth (Zeghunakket al., 1997).

Vitamin K is an essential fat-soluble micronutrient which is needed for a unique post-translational chemical modification in a small group of protein with calcium binding properties, collectively known as vitamin K-dependent proteins (Ezeet al., 2012). Thus, the only unequivocal role of vitamin K in health is in the maintenance of normal coagulation. In adults, primary vitamin K-deficient state manifest as bleeding and are almost unknown, expect when the absorption of the vitamin is impaired as a result of an underlying pathology (Suttie, 1985). The result of vitamin K analysis in *Pterocarpussantalinoide*s leaves showed an encouraging level of 10.13 ± 0.33 mg/l against the recommended nutrient in takes for vitamin K by World Health Organization (WHO) for different age groups, as 0-6years is 0.005mg/day, adolescent, adult, pregnant women and lactating women are 0.055mg/day. This means that *Pterocarpussantalinoide*s leave is a good source of Vitamin K.

Conclusion:

The present study on the vitamins composition of *Pterocarpussantalinoide*s leaf showed that *Pterocarpussantalinoide*s leaf is a good source of vitamins. However, the need to explore and develop *Pterocarpussantalinoide*s leaves should be encouraged especially because of its immense importance in medicine, pharmaceuticals and dietary industries since it contains bioactive compounds.

References:

1. Adetuji, J. A. (2007). Reviewing *Pterocarpus* species and their distribution. *African Journal of Traditional Complementary and Alternative Medicine*, 4: 23-36.
2. Baker, E. M., Hodges, R. E., Hood, J., Sauberlich, H. E. and March, S. C. (1969). Metabolism of ascorbic acid in experimental human scurvy. *American Journal of Clinical Nutrition*, 22: 549-558.
3. Carino, C., Pastorelli, G., Pantaleo, L., Oriani, G. and Salvatori, G. (1999). Improvement of dietary supplementation with vitamins. *Journal of Dietary Science*, 52: 285-289.
4. Dhellot, J. R., Matouba, E., Maloumbi, M. G., Nzikou, J. M., Safou-Ngoma, D. G., Linder, M., Desobry, S. and Parmetier, M. (2006). Extraction, chemical composition and nutritional characterization of vegetable oils. *African Journal of Biotechnology*, 5: 1095-1101.
5. Eze, S.O., Cornelius, C and Okereke H.C (2012). Phytochemical and antimicrobial analysis of
6. the stem Bark of *pterocarpussantalinoide*s, (nturuukpa). *Asian Journal of Natural &*

7. Applied Sciences. 1(3);27-30
8. Ezeagu, I. E., Metges, C. C., Proll, J., Petzke, K. J. and Akinsoyinu, A. O. (1998). Chemical composition and nutritive value of some wild-gathered tropical plant seeds. *African Journal of food science and Technology*, 7: 235-239.
9. Gallant, M. S. (1972). *Handwork on Chemical Ecology*, part 2, 1st edition, New York. p. 80-95.
10. Igwenyi, I. O. & Elekwa, A. E. (2014). Phytochemical Analysis and Determination of Vitamin Contents of *Geranium Robertianum*, *IOSR Journal of Dental and Medical Sciences* Volume 13, Issue 6 PP 44-47
11. Jethro, H., Appidi, J. R. Grierson, D. S. and Afolayan, A. J. (1997). Ethno botanical study of plants used for the treatment of diarrhea in the Eastern Cape, South African and Pakistan. *Journal of Biological Sciences*, 11: 1961-1963.
12. Krebs, H. A. and Vitamin S. (1948). Subcommittee of the Accessory Food Factors Committee. Vitamin C requirement for human adult. *Journal of Dietary*, 254: 853-858.
13. Lebas, F. (1969). Mammary transfer of vitamin in rabbit. *International Journal of Vitamin Nutrition Research*, 55: 35-39.
14. Mateos, G. G. and Blas, D. C. (1998). The nutrition of rabbit, mineral, vitamin and additives in rabbit feed. *Handbook on Nutrition*, 2nd edition. Oxon Press, 145-175.
15. Offor, C. E., Obasi, A., Ibiyam, U.A., Igwenyi, I.O. and Aja, P. M (2015). Comparative Analysis of Some Vitamins in Fresh Leaves of *Cucurbitalamoschata* and *Amaranthushybridus* l. *World Journal of Alternative Medicine* 1 (2): 09-11
16. Ogan, M. T. (2004). Trees of Nigeria. *Journal of Complementary and Integration Medicine*, 123: 125-129.
17. Okafor, J. C. (1983). Varietal delimitation in *Pterocarpussantalinoides* leaves. *International Journal of Tree Crops*, 2: 87-95.
18. Okafor, J. C., Okolo, H. C. and Ejiofor, M. A. N. (1997). Strategies for enhancement of utilization potentials of edible woody forest species of South-Eastern Nigeria. *Journal of Biodiversity of African Plants*.
19. Osuagwu, G. G., Okwulechie, E. and Emenike, J. O. (2007). Phytochemical and mineral content of leaves of four Nigerian *Pterocarpus* species. *International Journal of Molecular and Advanced Sciences*, 3: 6-11.
21. Sheela, K., Kamal, G. N., Viyayalakshi, D., Geeta, M. Y. and Roopa, B. P. (2004). Proximate analysis of underutilized green leafy vegetables. *Journal of Human Ecology*, 15: 227-229.
22. Sofowora, L. A. (1993). *Medicinal Plant and Traditional Medicine in Africa*. Spectrum Books Limited, Ibadan, p. 55-71.
23. Sultie, J. W. (1985). *Vitamin K as Fat-Soluble Vitamins and their Biochemistry*. Diplock, A. D. London Press Edition, 225-311.
24. Tian, G., Knag, B. and Buisard, L. (1992). Chemical composition on N, Ca and Mg release during incubation of leaves from selected Agro-forestry fallow plant species. *Journal of Biogeochemistry*, 6(2):13-19.
25. Zeghunak, F., Vervel, C., Guillozo, H., Walrant-Debray, O., Boutignon, H. and Garabedian, M. (1997). Subclinical vitamin D deficiency in neonates. *American Journal of Clinical Nutrition*. 65: 771-778

Authors and Affiliations

Aja P. M¹, Nweke E. C¹, UgwuOkechukwu P.C¹, Offor C. E¹, Ogbu Patience N², Ogo I¹ and Nweke O. L³.

1. Department of Biochemistry, Faculty of Science, Ebonyi State University, Abakaliki, Nigeria

2. Department of Medical Biochemistry, Federal University Ndufu-Alike Ikwo, Ebonyi State, Nigeria.

3. Department of Medical Biochemistry, Faculty of Basic Medicine, Ebonyi State University Abakaliki, Nigeria.