International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Analysis of Micronutrients and Antinutrients Components of Oha Seed (*Pterocarpusmildbreadii*)

Ani, Abosede Oluwakemi[1], David Iweunor Nwaemeke[2]

[1]Ogun State Institute of Technology, Igbesa, Ogun State, Nigeria
E-mail: *edunkemy[at]gmail.com*

[2]Ogun State Institute of Technology, Igbesa, Ogun State, Nigeria
E-mail: *dnwaemeke[at]gmail.com*

Abstract: ***The micronutrients and antinutrient (minerals and vitamins) contents of oha seed (Pterocarpusmildbreadii), were analyzed using accepted methods after the minerals value of the plant seeds has been grounded and converted to paste.The micronutrients assay revealed the presence of calcium (Ca^{2+}), potassium (K^{+}), copper (Cu^{2+}), iron (Fe^{2+}), magnesium (Mg^{2+}), manganese (Mn^{2+}) and phosphorous (P^{+}) in the seed sample. The highest micro element found was potassium (K^{+}) and least was zinc (Zn^{2+}) with 13926.96 mg/kg and 1.567 mg/kg in Pterocarpusmildbreadii seeds respectively. The results obtained revealed the presence of fat-soluble vitamins D and one water-soluble vitamins B. Vitamin D was found to be 33.28µg/100g while vitamin B_1 was 2.92mg/100g. Other quantified antinutrients were phenol, glycosides,saponnin, tannin, terpenes and steroids which ranges from 0.329% to 0.0051%. The result showed that the oha seeds contain appreciable number of micronutrients, vitamins and low level of antinutrients and could contribute to the recommended dietary allowance of the body.***

Keywords: Antinutrients, micronutrients, minerals, *Pterocarpusmildbreadii*, vitamins

1. Introduction

Minerals and vitamins are classified as micronutrients because they are needed in small amounts (milligrams or micrograms) in the body but are necessary for the production of enzymes, hormones, and other substances required for proper growth and development. Minerals are necessary as essential components of body fluids and tissues, constituents of enzyme, hormonal, and nervous systems, and for the growth of bones and teeth. Microminerals are required when the amount required by the human body per day is less than 100mg and are also required when the amount required by the human body per day is greater than 100mg. (Anyalogbu*et al.*, 2018**)**, on the other hand, are involved in cell formation, tissue repair, and other vital processes that make up the body's metabolic system. They may be fat-soluble or water-soluble.

Seeds provide essential minerals and vitamins that are needed for optimal growth and health (edible leaves, stems, roots, fruits or seeds) Africans consider it to be an essential part of their diet.

Nevertheless, plant compounds known as antinutrients inhibit the body's ability to consume vital nutrients. They are not a big concern for the majority of people, but they can become a problem during times of famine or in people who eat almost exclusively grains and legumes. Antinutrients are compounds that prevent nutrients from being absorbed. Examples: oxalate, phytate, tannins and other polyphenols, saponins, and lectins (Elinge*et al*., 2012).

The seeds and leaves of *Pterocarpusmildbreadii* are used as a vegetable. The vegetable is commonly used in cooking in our different homes. *Pterocarpusmildbreadii* (Oha seeds) are not eaten by Nigerians in the eastern part of the country (Ifeanyi, 2013). Seeds have a high nutritive and calorific value, making them important in human diets. They are high in fats and oils that can be eaten (Elinge*et al*., 2010).

Pterocarpus species are used in an ethnomedicinal pattern to treat a variety of ailments including diarrhea, toothaches, fever, urinary tract, skin infections, and blood sugar regulation.

Several species' bark and resin decoctions are used to treat gland tumors, urethral discharges, scalp ringworm, and recurrent ulcers (Abouelel*et al*., 2019).

Pterocarpusmildbreadii seeds contain antimicrobial substances such as tannins, saponins, hormones, glycosides, terpenes, and phenols.Some Nigerian tribes use *Pterocarpusmildbraedii*seeds to treat headaches, pains, fever, convulsions, and respiratory problems (Akinyeye*et al*., 2019).The aim of this study is to evaluate the seed of Oha, a Nigerian wild plant, for its micronutrient (minerals and vitamins) and antinutrient(phytochemicals) properties.

2. Materials and Methods

Sample Collection
Pterocarpusmildbreadii matured whole seeds were purchased from a local market in Oba Adesola market, Lusada, Ogun State, Nigeria, and described by a technologist from the Department of Science and Technology in Igbesa, Ogun State, Nigeria.

Sample processing
The pods were opened with a hammer and wholesome seeds collected, washed with deionized water, air dried for 24hours. It is expected that the plant food, is found safe for human consumption/ thickener in soup. The sample was dried at 60°C for 48hours in an air circulatory oven, ground

in a hand mill, passed through a 60 mess screen place in an airtight and used as stock sample for analyses.

Quantitative analyses of antinutrients
Phytochemicals analysis of the oha seed's Saponins, tannins, and glycoside were quantitatively determined in the stock samples using established methods. The double solvent extraction gravimetric method described by Aluko*et al.*, (2012) was used for saponins content determination. Tannin and total phenol contents were evaluated spectrophotometrically as enunciated by Van-Burden and Robinson (1981) and, Santhi and Sengottuvel (2016) respectively.

Analyses of mineral content
The concentration of minerals (Ca, K, Mg, Na, P, Pb, Cu, Fe, I, Mn, Cd, Ni, Cr, and Zn) in the stocksamples were quantified using Association of Official Analytical Chemists Atomic absorption Spectrophotometric method (2000) described by Anyalogbu *et al*., (2014).

Fat-soluble and Water-soluble vitamin contents analyses.
Vitamin D, C, and B_1 contents of the stock sample were quantified by subjectingthe extract to gas chromatographic analyses (AOAC, 2006).

3. Result

Minerals analysis of Oha seeds sample
Potassium, calcium, sodium, phosphorus, and iron (Fe) were the highest minerals in the Oha seeds study, with 13926.96 mg/kg, 1356.678 mg/kg, 2940.14 mg/kg, 294.24 mg/kg, and 126.263 mg/kg, respectively. Except for lead, Nikeland chromium, which were not present in the seeds sample, the remaining minerals were present in varying smaller amounts.

Table 1: Minerals composition of Oha seeds (mg/kg)

Mineral element	Concentration (mg/kg)
Zinc	1.567
Cadmium	8.091
Nickel	0
Iron	126.263
Lead	0
Chromium	0
Copper	5.476
Calcium	1356.678
Magnessium	22.311
Manganese	38.953
Sodium	2940.14
Potassium	13926.96
Phosphorous	294.24

Vitamin Composition of Oha seeds sample
The vitamin analysis reveals that the sample is extremely high in vitamins D and B1. Table 2 shows that vitamin C is not present in the sample.

Table 2: Vitamin composition of Oha seeds sample in mg/100g and in µg/100g

Vitamins	concentration in mg/100g	concentration in µg/100g
Vitamins C	0	
Vitamins D		33.28
Vitamins B1	2.92	

Quantitative composition of antinutrients of Pterocarpusmildbreadii seeds
The results of the quantitative phytochemical analysis of antinutrients are shown in Table 3. Terpenes, glycosides, saponin, steroids, tannins, and phenols were found in the sample.The highest constituent discovered was phenol, while the lowest was steroid. There were no alkaloids or flavonoids found.

Table 3: Phytochemical composition of Pterocarpusmildbreadii seeds (Oha seeds) (%)

Components	Values (%)
Tannin	0.0103
Saponnin	0.127
Phenol	0.329
Steroids	0.0051
Glycosides	0.107
Terpenes	0.0023

4. Discussion

Plant products play an important role in fulfilling man's and animals' nutritional and therapeutic needs.This has prompted a quest for plant materials that can meet these criteria. The mineral, vitamin, and antinutrient content of a Pterocarpusmildbreadii seed sample was determined using conventional analytical techniques.Vitamins and minerals make up micronutrients, which are needed in small amounts to maintain normal metabolism, development, and physical well-being. The main nutritional benefit of *Pterocarpusmildbreadii* seeds is their high mineral and vitamin content. Minerals are also essential for basic bodily functions including heartbeat, muscle contractions, movement, development, and regulatory processes. The micronutrient composition of *Pterocarpusmildbreadii* (Table 1) revealed significant amounts of potassium (K^+), calcium (Ca^{2+}), sodium (Na^{2+}), phosphorus (P^{2+}), iron (Fe^{2+}), manganese (Mn^{2+}), magnesium (Mg^{2+}), Cadium (Cd^{2+}), copper (Cu^{2+}), and zinc (Zn^{2+}). The findings of this study revealed that the outcomes were consistent with previous studies (Enemor, *et. al.*, 2019). Seeds also possessed beneficial minerals (Ca, P, Mg, Na, K, and Zn), with the highest concentration of K, Na, and Ca (13926.96mg/kg). Zinc, on the other hand, was found in the smallest number. As compared to previous work done on seeds by (Enemor, *et. al.*, 2019)no Lead or Cadmium was found.

Because of the presence of these minerals, the seeds can be used as a good source of minerals in feed formulations. The seeds can help consumers meet their iron requirements, especially in terms of meeting the recommended dietary allowance for iron in adults and children. The importance of macro elements like zinc, copper, and iron in human health has been studied, and their use in the preparation of herbal medicines has been suggested (Udayakumar and Begum, 2004).

According to the results of the vitamin review in Table 2, the seed of *Pterocarpusmildbreadii* contains a variety of vitamins, all of which play important roles. Vitamins are a type of organic nutrient that cannot be synthesized or are only synthesized in inadequate quantities in the body, and must be obtained primarily through food. Vitamin

deficiency disorders are the result of insufficient vitamin intake. Vitamins are essential for good health and must be taken into account when assessing nutrition security. They are also biocatalysts and precursors to a variety of body factors and cofactors. They are known as water-soluble or fat-soluble (Okezie, *el. al.*, 2019) and have particular health benefits based on their solubility in aqueous and lipid solvents.

Table 2 shows the vitamin screening of *Pterocarpusmildbreadii* seeds. One fat-soluble vitamin (Vitamin D) were tested, as well as two water-soluble vitamins (Vitamin B_1 and C).

Vitamins are micronutrients that have protective functions in the body and must be acquired via food. Vitamin D, also known as the sunshine vitamin, was present in high concentrations in the seeds of *Pterocarpusmildbreadii* (33.28g/100g). Vitamin analysis revealed that the seed of *Pterocarpusmildbreadii* is high in vitamins D and B_1, but low in vitamin C, both of which play important roles. Increased intestinal uptake of phosphate, magnesium, and calcium, as well as a variety of other biological effects, are all attributed to vitamin D (Achikanu *et al.*, 2020).

Vitamin B_1, or B-complex vitamins, were also abundant, and they act as co-enzymes in macronutrient metabolism. Anti-beriberi vitamin B_1 is also known as vitamin. Vitamins are micronutrients that have protective functions in the body and must be acquired via food.

Increased intestinal uptake of phosphate, magnesium, and calcium, as well as a variety of other biological effects, are all attributed to vitamin D(Achikanu*et al.*, 2020). When eaten in sufficient amounts, the tested plant samples are good sources of B and D complex and can be used to maintain good health in humans and animals (Okezie *et al.*, 2018).

Tannins, saponins, tannin, phenol, steroids, glycosides, and terpenes were found in the seeds of Pterocarpusmildbreadii, according to the results of the quantitative phytochemical study in table 3. Glycosides (2.624 %), saponnin (0.127 %), and terpenes were the most common(0.0023%) with phenol (0.329 %) being the most abundant.Steroids were the least common (0.0051%). Tannins are polyphenols present in a variety of plants. They've been linked to speeding up blood clotting, lowering blood pressure, modulating immune responses, and lowering plasma lipid levels (Onyegeme-Okerenta *et al.*, 2017). Because of their association with sex hormones, steroid-containing compounds are essential in pharmacology.
Saponins are glycosides with amphipathic properties that are used as adjuvants in cancer care.

They form a complex with dietary cholesterol in the intestinal walls, preventing it from being absorbed and thereby lowering circulating cholesterol levels (Achikanu *et al.*, 2020).

They also function as surfactants, assisting in the absorption of macromolecules like proteins by cells via the membrane (Koirala *et al.*, 2020).Phenols are important in the scavenging of free radicals. They have antioxidant properties and may have anti-carcinogenic properties as well (Onyegeme-Okerenta *et al.*, 2017). The seeds of *Pterocarpusmildbreadii* could be used for medicinal purposes and in drug formulations, according to the results of the phytochemical screening.

5. Conclusion

According to the results of this report, *Pterocarpusmildbreadii* seeds are high in micronutrients and low in antinutrients to the point that they have an effect on the recommended dietary intake.

Because of the high levels of vitamin D and B_1, the seed could be used to treat diseases caused by free radicals. Copper, zinc, manganese, magnesium, sodium, potassium, and phosphorus were found in higher concentrations in *Pterocarpusmildbreadii* seeds. Indicating its importance and critical position in resolving a variety of mineral related customer issues. Any of these minerals may help patients with thinning bones, adult rickets, bone fraction, bone leaching, or bone weakening. The findings of this study will aid in the development of new modern medicines containing various plant combinations that can be used to treat a variety of diseases. We can also deduce from the highlights of the current study that these seeds can serve as mineral constituents to animals and humans by dieting. In general, the observations and results of this study matched those of other wild plants recommended as food supplements in the literature.

References

[1] Abouelela, M., Abdelhamid, R., and Orabi, M. (2019). Phytochemical constituents of plant species of *Pterocarpus (Leguminosae*): A review. International Journal of Pharmacognosy and Phytochemical Research, 11 (4), 264-281.
[2] Achikanu, C. E., Ani, O. N., and Akpata, E. I. (2020). Proximate, vitamin and phytochemical composition of *Cucumismetuliferus* seed. Steroids, 2, 0-158.
[3] Akinyeye, R. O., Oluwadunsin, A., and Omoyeni, A. (2010). Proximate, mineral, anti-nutrients, phyto-chemical screening and amino acid compositions of the leaves of *Pterocarpusmildbraedi* harms. Electronic Journal of Environmental, Agricultural and Food Chemistry, 9(8).
[4] Aluko, B. T., Oloyede, O. I and Afolayan, A. J., 2012. Phytochemical and nutrient compositions of the leaves of Ocimumcanuna Sims. African J. of Biotechnol. 11(63), 12697-12701.
[5] Anyalogbu, E. A., Nweje-Anyalowu, P. C., Nnoli, M. C., Ibeneme, C. S. and Chigbu, S. C. (2018). Antinutrient and Micronutrient contents of processed "Nturukpa" (*Pterocarpussantalinoides*) seed powder. Antinutrient and Micronutrient contents of processed "*Nturukpa"(Pterocarpussantalinoides*) seed powder, 16(1), 15-15
[6] Anyalogbu, E. A. Onyeike, E. N. and Monanu, M. O., 2014. Mineral and Vitamin Concentrations of Heat Processed Plukenetiaconophora Seed Kernel

Consumed in Nigeria. J. of Scientific Res. and Reports. 3(20). 2694-2708.

[7] AOAC. Official method of Analysis 16th Edition, Association of official Analytical Chemists, Washington D.C US. 2000, 200-210.

[8] AOAC (Association of Official Analytical Chemists), 2006. Codex Adopted AOAC Method. AOAC International. 50(1).1-2.

[9] Enemor, V. H. A., Oguazu, C. E., Odiakosa, A. U., and Okafor, S. C. (2019). Research Article Evaluation of the Medicinal Properties and Possible Nutrient Composition of *Citrulluslanatus* (Watermelon) Seeds. Res. J. Med. Plant, 13(4), 129-135.

[10] Elinge, C. M., Muhammad, A., Atiku, F. A., Itodo, A. U., Peni, I. J., Sanni, O. M., andMbongo, A. N. (2012). Proximate, mineral and anti-nutrient composition of pumpkin (*Cucurbita pepo L*) seeds extract. International Journal of plant research, 2(5), 146-150.

[11] Ifeanyi, O.J. (2013). The effect of Pterocarpusmildbreadii seed on Plasma HDL cholesterol of Albino Rat (Doctoral Dissertation, Caritas University)

[12] Koirala, N., Dhakal, C., Munankarmi, N. N., Ali, S. W., Hameed, A., Martins, N. and Salehi, B. (2020). *VitexnegundoLinn*.: phytochemical composition, nutritional analysis, and antioxidant and antimicrobial activity. *Cellular and Molecular Biology*, *66*(4), 1-7.

[13] Okezie, E., Ugbogu, E. A., Uwadinachi, A., Okeke, S., andAchulonu, V. (2018). A comparative study on micronutrients and anti-nutrients of leaf extracts of Pterocarpussoyauxii and Pterocarpussantalinoides. Journal of Complementary Medicine Research, 7(2), 131-137.

[14] Onyegeme-Okerenta, B. M., Nwosu, T., andWegwu, M. O. (2017). Proximate and phytochemical composition of leaf extract of Sennaalata (L) Roxb. *Journal of Pharmacognosy and Phytochemistry*, *6*(2), 320-326.

[15] Santhi, K. and Sengottuvel, R., 2016. Qualitative and Quantitative Phytochemical analysis of MoringaconcanensisNimmo. Int l J. of Current Microbiol. and Appl. Sci. 5(1). 633- 640.

[16] Udayakumar, R., and Begum, V. H. (2004). Elemental analysis of Medicinal Plants used in controlling infectious diseases. *HamdardMedicus*, *67*, 35-36.

[17] Van-Burden TP, Robinson WC. Formation of complexes between protein and Tannic acid. Journal of Agricultural Food Chemistry. 1981; 1:77.