Selected Phytochemical Assessment of Sprouted Gworo (Cola nitida) And Ojigbo (Cola Acuminata) Kola Nuts

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Abstract: This study investigated the effect of sprouting on the phytochemical properties of Gworo (cola nitida) and Ojigbo (Cola acuminata) kola nuts. The two varieties of kola nuts were sprouted separately in a regularly moistened serviette wrapped with black polyethylene and allowed to sprout (germinate) at ambient temperature (23 to 32°C) for 4 weeks. Phytochemical properties were conducted on both varieties of kola nuts before and after sprouting. Results obtained revealed that kola nut phytochemicals decreased with sprouting in both varieties. For Gworo, tannin decreased from 3.27 to 2.58%, phenol from 0.71 to 0.38%, saponin from 4.50 to 2.00% and caffeine from 5.15 to 2.60%. For Ojigbo, tannin decreased from 2.91 to 2.04%, phenol from 1.77 to 0.93%, saponin from 2.75 to 1.50%, and caffeine from 3.98 to 2.00%.

Keywords: Sprouting, kola nut, phytochemical properties.

I. Introduction

Kola nut belongs to the plant family sterculiaeceae, with about 125 species of trees native to the tropical rainforests of Africa [1]. Kola nut is scientifically known as KOLA which is widely used in Africa and Nigeria as part of cultural and social ceremonies. The fruits are large and oval in shape which contains dozens of square shaped kola nuts [2]. Two species are particularly very common among the Yorubas of South Western Nigeria which are cola nitida and Cola acuminata (Oluwaniyi et al, 2009). Cola nitida is called Gworo by the Hausas which is more abundant and of commercial variety consumed in ECOWAS region. Cola acuminata is called Ojigbo by the Igbos which it is the species grown exclusively in Igbo land with four or more disease- resistant cotyledons that comes in four basic interwoven types [3].

Kola nuts contain large amounts of caffeine and theobromine and are used as a stimulant [4]. Both kola nuts species contains about 1.5 to 2% caffeine along with kolanin and theobromines which are the three chemicals that work in synergy as stimulants. The chemical stimulants produce a strong state of euphoria and well being, enhance alertness, used as an aphrodisiac, boost cerebral circulation and feeling of alertness and wellbeing [5, 6]. The caffeine in the nuts also acts as a bronchodilator, expanding the bronchial air passages; hence kola nut is often used to treat whooping cough and asthma [7, 1]. Other medicinal use of kola nut include natural remedy for chest cold which modern research has prove its efficacy, increases body metabolism, prevents prostrate cancer in men [8], [9], Kola nut is one of the best medicines for dysentery, diarrhea and anorexia (loss of appetite) [2]. Kola nuts have been reported to help ‘drive’ other herbs into the blood that is why it is incorporated into men and women formula to increase their effects [6]. Kola nut prevents ulcer, stimulate blood circulation and offers potentiating effect to oral analgesics such as aspirin [10].

Despite numerous health benefits associated with kola nuts, it may have deleterious health effects when consumed indiscriminately and excessively. Accumulated excess caffeine will be poisonous (worsen the ailment) to pregnant women, nursing mothers, and those suffering from high blood pressure, cardiovascular diseases, insomnia, anxiety problem, high cholesterol level and palpitation. Excess caffeine will cause osteoporosis in adult and perturbed bone deformation in adolescent [1]. Other side effects include production of gastric acids which will contribute to ulcer, can cause sleeping disorders, nervousness, stomach upset, vomiting, jitteriness, headache, and irregular hearth beat [10, 2].

Phytochemicals come from Greek word ‘phyto’ which means plant and are chemical compounds produced by plants, generally to help them thrive or thwart competitors, predators, or pathogens. Some phytochemicals have been used as poison and others as traditional medicine [11, 12]. Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. They are natural bioactive compounds found in plant food; leaves or other parts of plants that interplay with nutrients and dietary fiber to protect them. Recent research demonstrates that they can protect humans against diseases as well as risk reduction for a variety of chronic or inflammatory conditions [13]. Some of the well-known most beneficial phytochemicals among others include lycopene found in tomatoes, isoflavones in soy, flavonoids in fruits, beta carotene and polyphenolic compounds find ubiquitously from plants [11]. Some phytochemicals binds physiologically to cell walls interfering with the ability of pathogens to bind to cell receptors.
Sprouting is the practice of germinating seed to be eaten raw or cooked. A variety of health and nutritional benefits can be obtained from sprouting. Numerous and touted health benefits of sprouting include high levels of dietary fiber, B complex vitamins and protein [14]. Sprouts also contain digestive enzymes and some of the highest known levels of certain antioxidants. Kola nut sprouting is primarily for propagation by sprouting in a pot and transplant to plain field [15], but can be considered as one kind of pre-digestion that help to breakdown the high molecular complex materials into their building blocks. Besides, germination can lead to the development of such functional foods that have a positive effect on the human organs which in turn helps to maintain good health. Compared to un-sprouted seeds, sprouted seeds are richer in phytochemicals, vitamins, minerals, enzymes and amino acids which are of the most important and useful to human health. [16,17]. This study aims at determining the effect of sprouting on the phytochemical properties of Gworo and Ojigbo kola nuts.

II. Materials And Methods

The two varieties of kola nuts, Gworo (cola nitida) and Ojigbo (Cola acuminata) used in this study were purchased from urban market Umuahia.

2.1 Sprouting of kola nut

The kola nuts varieties were separately wrapped in a regularly moistened serviette, wrapped in black polyethylene and allowed at ambient temperature (23 to 33°C) for 4 weeks to germinate or sprout (Figure 1). The sprouted kola nuts were crushed with mortar and pestle into kola nut mash which was subjected to analysis. Un-sprouted kola nuts were prepared according to the flow chart in Figure 2.

![Figure 1: Flow chart for the preparation of sprouted kola nuts](image1)

![Figure 2: Flow chart for the preparation of un-sprouted kola nut](image2)
2.2 Experimental analysis;
2.2.1 Determination of saponin
This was done by the double solvent extraction gravimetric method of [18].
2.2.2 Determination of tannin
Tannin content was determined by Folin Denis Colometric method reported by 19].
2.2.3 Determination of phenol
This was determined by [20] folin-ciospteam spectrometer method.
2.2.4 Determination of caffeine
This was carried out according to [19].

2.3 Statistical Analysis
The statistical difference between sprouted and un-sprouted results of both varieties were determined using one way analysis of variance (ANOVA) SPSS Version 16.0. The experimental design used was complete randomized design (CRD).

III. Results And Discussion

The results of phytochemicals composition of sprouted and un-sprouted kola nuts of both varieties were presented in Table 1. Both varieties showed decrease in phytochemical composition with sprouting. Tannin decreased from 3.27 to 2.58% in Gworo, phenol from 0.71 to 0.38%, saponin from 4.50 to 2.00% and caffeine from 5.15 to 2.60%. Tannin decreased from 2.91 to 2.04% in Ojigbo, phenol from 1.77 to 0.93%, saponin from 2.75 to 1.50%, and caffeine from 3.98 to 2.00%.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Tannin (%)</th>
<th>Phenol (%)</th>
<th>Saponin (%)</th>
<th>Caffeine (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>2.91±0.08</td>
<td>1.77±0.10</td>
<td>2.75±0.35</td>
<td>3.98±0.11</td>
</tr>
<tr>
<td>SG</td>
<td>2.58±0.17</td>
<td>0.38±0.08</td>
<td>2.00±0.14</td>
<td>2.60±0.00</td>
</tr>
<tr>
<td>SL</td>
<td>2.03±0.04</td>
<td>0.93±0.04</td>
<td>1.50±0.00</td>
<td>2.00±0.14</td>
</tr>
</tbody>
</table>

Table 1: Phytochemical composition of the sprouted and un-sprouted Gworo and Ojigbo kola nuts

a-d means with the same superscripts within the column are not significantly different (P>0.05), but means without the same superscripts within each column are significantly different (P<0.05). UG=Un-sprouted Gworo kola nut, UL= Un-sprouted Local kola nut, SG= Sprouted Gworo kola nut, SL= Sprouted Local kola nut. Un-sprouted Gworo (UG) kola nut had the highest content of tannin (3.27%) whereas sprouted Ojigbo (SL) kola nut had the lowest content (2.03%). However, these values were lower than 6.46% tannin content obtained by [21].This implied significant difference (P<0.05) between the tannin content of both kola nut varieties. This difference could be attributed in part to varietal differences and condition of the kola nuts prior to sprouting. Decreased tannin with sprouting may be attributed its interactions with hydrolyzed proteins. Tannin binds and precipitates proteins and other organic compounds including amino acids and alkaloids [22]. Tannins are water soluble phenolic compounds with reported anti-nutritional effects and ability to form complex with proteins. Also, tannins may form a less digestible complex with dietary protein and may bind and inhibit the endogenous protein, such as digestive enzymes [23].

The phenolic content of un-sprouted Ojigbo (UL) was the highest (1.77%) while that of sprouted Gworo (SG) was the least (0.38%). Therefore, phenol content of both kola nut varieties varied significantly (P>0.05) probably as a result of varietal differences as well. However, all the values except that of SG were within the range (0.68 – 2.44%) obtained by [24], who also reported that phenols can play an important role in absorbing and neutralizing free radicals, quenching oxygen, or decomposing peroxide.

Saponin content of un-sprouted Gworo (UG) kola nuts was the highest (4.50%) while that of sprouted Ojigbo (SL) was the least (1.50%). There was significant difference (P<0.05) between the saponin content of un-sprouted Gworo and Ojigbo kola nuts while there is no significant different (P >0.05) between sprouted Gworo and Ojigbi. This could be attributed to macronutrient hydrolysis during sprouting which depends on condition of the kola nuts prior to sprouting and variety as well. Saponin has a cleansing effect and is mainly used as a tonic for the liver as it enhances the function of the liver and gall bladder [25]. Thus, Kola nuts could be an important cleansing agent to the body.

The caffeine content of un-sprouted Gworo (UG) was the highest (5.15%) while that of sprouted Ojigbo (SL) was the least (2.00%). Thus, there was significant difference (P<0.05) between the caffeine content of the two kola nut varieties which could be due to the condition of the kola nuts before sprouting and variety. Caffeine occurs partly free and partly combined in an unstable complex known as kolate (tannin) and caffeine glycosides in kola. Pure caffeine is colourless and has a distinctively bitter taste at the temperature, pH and salt concentrations normally encountered in food processing [26]. Thus, caffeine is also known to produce a variety...
of biological effects and is widely used for its stimulant properties among others in dietary beverages, self-medication with over the counter drugs.

IV. Conclusion

As we consume our kola nuts raw, sprouted kola nuts will offer solution to mineral deficiencies especially among the Hausa community in Nigeria that relish much on grains, kola nuts and legumes as the amount of anti-nutritive materials (trypsin inhibitors, phytic acid, pentosan, and tannin) in them decreases with sprouting. Sprouted kola nuts will have tremendous benefits to human health (protective or disease preventive) by improving the nutritional, physicochemical and phytochemical properties of the nuts and enhances mineral bioavailability. Consumption of Sprouted kola nuts will reduce excessive intake of caffeine which in turn eliminates the side effects associated with excess caffeine in the body due to indiscriminate and excessive consumption of un-sprouted kola nuts. Such side effects include among others bone loss in adults as well as inhibition of bone development in adolescents. Sprouted kola huts may offer pregnant women numerous health benefits associated with kola nuts. Various extracts of sprouted kola nuts can be made and use in our pharmaceutical industries. This study recommends sprouted Ojigbo for its low caffeine content to avoid excess caffeine in take.

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References
