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Research Article

Anti-Nutrient and Mineral Composition of Sweet Potato Garri and Cassava Garri Processed by Traditional Nigerian Methods

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ABSTRACT
Earlier research show that sweet potato garri is superior to cassava garri regarding their proximate composition. However, information regarding the anti-nutrients and minerals compositions of sweet potato garri compared to cassava garri is yet to be reported. This study aims to determine and compare the antinutrients (saponin, phytate, and oxalate) and minerals (zinc, calcium and iron) in 100% sweet potato garri and traditional cassava garri processed using similar traditional method. The preparation of sweet potato garri was done using controlled laboratory conditions, while that of cassava garri was bought from a commercial producer to capture a real-life dietary product. Both are examples of products of traditional garification process, but their history of preparation was not exactly the same. Thus, this research involves a descriptive comparison of the two samples. Analyses of saponin, phytate, and oxalate were done using standard AOAC methods. The analysis of mineral elements (Zn, Ca, Fe) were done by Atomic Absorption Spectrophotometric Analysis. Sweet potato garri had higher saponin (3.04 mg/100g) and higher oxalate (15.10 mg/100g) compared to cassava garri which contained 2.05 mg/100g and 6.00 mg/100g respectively. Sweet potato garri had lower phytate (1.11 mg/100g) compared to cassava garri with 3.92 mg/100g. Sweet potato garri has lower zinc (0.642 mg/100g), lower iron (0.070 mg/100g), but higher calcium (0.160 mg/100g) than cassava garri (0.685 mg/100g, 0.221 mg/100g, 0.001 mg/100g respectively). These findings inform dietary guidance and support fortification strategies for this widely consumed staple.

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1.0 INTRODUCTION

Garri is granular, fermented, and roasted flour mostly derived from cassava (Manihot esculenta Crantz). It is a staple food eaten on a daily basis by millions of Nigerians and provides substantial caloric intake, being responsible for 283 Calories per person per day in some areas (Akpoghelie et al., 2025). The conventional process of preparing cassava garri includes peeling, grating, fermenting in bags for 48-72 hours, de-watering, sifting and finally roasting in heated pots in what is known as the "garification" process (Slavics, 1989). This series of processes plays a crucial role in the formation of the granular consistency and the sour taste, besides lowering toxic compounds – cyanide - found naturally in cassava roots.

Cassava has cyanogenic glycosides (linamarin and lotaustralin), which may produce HCN during processing if the fermentation and roasting processes are not sufficient (Akpoghelie et al., 2025). The Codex Alimentarius Commission (FAO/WHO) has established a threshold limit for HCN at 10 mg/kg in cassava-containing foods (FAO/WHO, 2023). Nonetheless, the main health issues linked to garri consumption go beyond cyanide poisoning to the presence of other anti-nutrients that affect the absorption of minerals.

Other anti-nutritive elements present in garri include phytic acid, oxalic acid and saponins. The former forms insoluble complexes with divalent cations like iron (Fe), zinc (Zn), and calcium (Ca), making these minerals unavailable for the process of absorption (Gibson, Raboy, & King, 2018). The inability of the human body to absorb these minerals from cassava leads to iron-deficiency anemia and zinc deficiency due to the consumption of garri by people who cannot afford to diversify their diet (Okwuonu et al., 2021). Oxalates form complex structures with calcium that are also poorly absorbed and contribute to the development of kidney stones in cases of excessive ingestion (Mitchell 2019). Despite their hypocholesterolemic effect, saponins cause bitterness when present in high concentrations and can affect red blood cells.

The sweet potato (Ipomoea batatas Lam.), has been established as an attractive source material in garri processing. This is due to the fact that sweet potato is not only acyanogenic but also does not contain any cyanogenic glycosides; thus, it eliminates the danger of cyanide poisoning (Alam, 2021). In addition, the orange-fleshed sweet potatoes possess high quantities of provitamin A carotenoids and have a possibility to be used as a dietary approach in overcoming vitamin A deficiency (Neela et al., 2019). Sweet potato also contains higher concentrations of dietary fiber and certain micronutrients compared to cassava (Laveriano-Santos et al., 2022).

Bello et al. (2026a) conducted the first direct proximate comparison of 100% cassava garri and 100% sweet potato garri processed under identical traditional conditions. Their study demonstrated that sweet potato garri has lower moisture content (6.24% ± 0.08% versus 8.22% ± 0.18%; $p < 0.05$), higher crude fiber (3.03% ± 0.02% versus 2.73% ± 0.20%; $p < 0.05$), and higher energy density (1506.37 ± 2.65 kJ/100g versus 1482.10 ± 6.46 kJ/100g; $p < 0.05$), with no significant differences in protein, fat, or ash content. These findings established sweet potato garri as a nutritionally comparable and superior to some extent as alternative to cassava garri.

However, a critical knowledge gap remains. While the proximate macronutrient composition of both garri types has been characterized, their anti-nutrient and mineral profiles have not been systematically compared under controlled processing conditions. Several studies have reported anti-nutrient concentrations in cassava garri. Oladipo and Adebayo (2024) documented phytate levels ranging from 2.11 to 301.21 mg/100g depending on processing methods, while Okafor (2025) reported oxalate concentrations between 0.18 and 46.23 mg/100g. Hydrogen cyanide levels in cassava garri have been extensively studied, with values ranging from below detectable limits to 19.37 mg/kg across different production regions (Okafor & Opara, 2023; Eze & Nwankwo, 2024). For sweet potato garri, anti-nutrient data are extremely limited. Studies on raw sweet potato tubers and sweet potato-based dishes have reported phytate levels of 0.57 to 9.93 mg/100g and oxalate levels of 126.93 to 178.27 mg/100g (Ogunlade, Adeyemi, & Ogunwale, 2025). However, no published study has reported anti-nutrient concentrations in 100% sweet potato garri after complete traditional processing (fermentation, dewatering, roasting). Similarly, a comparative analysis of mineral (iron, zinc, calcium) content between the two garri types processed through identical traditional methods has not been performed.

This gap has significant public health implications. If sweet potato garri contains lower phytate and oxalate levels compared to cassava garri, it would represent not only a safer alternative but also a nutritionally superior staple with enhanced mineral bioavailability. Conversely, if anti-nutrient levels are comparable or higher, this would inform targeted interventions such as fortification or processing modifications (Maziya-Dixon et al., 2021). Furthermore, understanding the comparative mineral composition is essential for evaluating the contribution of sweet potato garri to dietary micronutrient intake in populations at risk for deficiencies (Aremu et al., 2025).

Bello et al. (2026b) systematically reviewed scientific evidence on heavy metals in smoked fish products from Nigeria, elucidating their nutritional significance, health effects, and the public health issues that they cause. This current study is an expansion of this theoretical framework to analyze the content of anti-nutrients and minerals in processed staple foods by systematically analyzing scientific evidence for sweet potato garri.

The main objectives of this study are to quantify the levels of important anti-nutrients [phytate, oxalates and saponins] & essential minerals [iron, zinc, and calcium] in 100% sweet potato garri and cassava garri (ii) to compare the concentration of the findings from these staple foods produced via the same traditional method of fermentation, dewatering, and roasting. With the exploratory nature of this study, and because the samples were single production batches (100% sweet potato garri laboratory processed and cassava garri bought commercially), there is no formal statistical hypothesis tested here. The study objectives in this case are therefore to: (i) determine the amounts of important anti-nutrients (phytate, oxalates and saponins) and mineral elements (iron, zinc and calcium) in 100% sweet potato garri and the traditional cassava garri; and (ii) develop a comparative descriptive profile of the two samples to form the basis of future research. Acknowledging the fact that the two products came from different processing settings, results have been presented as a comparison between the two specific samples.

The results will help in developing evidence-based dietary guidelines, establishing food safety regulations, and formulating agricultural diversity strategies, which will help to include sweet potatoes in the staple food basket in Nigeria, as recommended by the National Food Security and Nutrition Council (2024).

2. METHODOLOGY

2.1 Study Design and Rationale

The present study used the observational comparative research design in determining the content of anti-nutrients and minerals in two types of garri, namely; (i) the 100% sweet potato garri produced in the laboratory, and (ii) the 100% cassava garri purchased from commercial producers of typical available products.

An important factor to consider when analyzing the results is the processing environments of the two samples. The sweet potato garri was processed in an environment where the parameters were constant - fermentation for 48 hours, dewatering, and roasting at 120°C. The commercial cassava garri was bought from local processors, whose processing parameters in terms of fermentation period, type of equipment used and even environmental parameters like temperature and humidity were unknown.

Since the processes used were not similar, the differences cannot be attributed purely to the difference in the raw materials used. The results obtained thus indicate the effects of the combination of the material and processing process. Therefore, the results are presented in form of a descriptive report of the two products under study without intention of drawing statistical conclusions to other populations.

This research provides fundamental data regarding the presence of anti-nutritional factors and minerals in sweet potato garri, which have never before been analyzed. Direct comparison of the two raw materials will require future studies employing uniform processing conditions for both products.

2.2 Raw Material Sourcing

Fresh sweet potato tubers (*Ipomoea batatas* Lam., white-fleshed variety) were purchased from Tanke market, Ilorin, Kwara State, Nigeria. The tubers were visually inspected for absence of physical damage, insect infestation, or signs of spoilage; they were confirmed to be mature and disease-free. In addition, a representative sample of ready-to-eat cassava garri was purchased from Oke-odo market along University of Ilorin Road, Ilorin. This garri was produced by a commercial processor using traditional methods. Cassava garri of commercial importance was deliberately selected for this purpose in order to portray the true picture of how the product is consumed by the people in Nigeria because its history of preparation is likely to remain unknown.

2.3 Sweet Potato Garri Preparation

The sweet potato garri samples were made using the procedure described by Bello et al. (2026a). Sweet potatoes were stripped off their peels, rinsed well in water, and grated to make a smooth paste with a manual grater. The resulting paste was packed in a porous bag and left to ferment for 48 hours at ambient conditions. Upon fermentation, the paste was dried through squeezing in a mechanical press and then sieved to produce a fine granular consistency. The granules were dried further by roasting them in a heated pan at about 120°C for 15–20 minutes. The roasting process was done under constant stirring until a crispy, light brown-colored sample was achieved.

2.4 Proximate Pre-Analysis Confirmation

In order to check the consistency of processing, prior to analyzing for anti-nutrients and minerals, moisture content analysis was performed for both garri samples. Determination of moisture content was achieved using the gravimetric method, where 5.0 g samples were dried in a forced air oven at 105°C until constant weight, according to AOAC Official Method 925.10 (AOAC International, 2023). Values obtained for sweet potato garri (6.24% ± 0.08%) and purchased cassava garri (8.22% ± 0.18%) were comparable with those reported earlier (Bello et al., 2026a)

2.5 Anti-Nutrient Analysis

All anti-nutrient analyses were performed in duplicate at the Integrated Research Laboratory, Ilorin, using standard AOAC International official methods. Glassware and equipment were -acid-washed and rinsed with deionized water (resistivity ≥ 18 MΩ·cm) prior to use. Sample blanks and reagent blanks were included with each analytical batch.

2.5.1 Phytate (Phytic Acid) Determination

The level of phytates was assayed through the spectrophotometric technique involving the color development of phytates and Wade reagent (0.03% $FeCl_3 \cdot 6H_2O$ and 0.3% sulfosalicylic acid). Determination of phytates was done following the protocol described in the AOAC Official Method 986.11 for phytic acid in foods (AOAC International, 2023). A portion of 5 g of garri (or flour) samples was extracted using 50 mL of 0.2 M hydrochloric acid (HCl). This extraction process involved shaking of the samples on an orbital shaker at 150 rpm for 2 hours at ambient temperature. The resulting extracts were subsequently centrifuged at 3,000 × g for 15 minutes, and the supernatants were isolated. Next, 2 mL of the supernatant was combined with 2 mL of Wade reagent. The mixture was allowed to rest for 15 minutes for complete color development at ambient temperature before taking the absorbance measurement at 500 nm using a UV Vis spectrophotometer (Shimadzu UV 1800, Kyoto, Japan). Standards used to create a calibration curve consisted of phytic acid dodecasodium salt (Sigma Aldrich, St. Louis, MO, USA), with concentrations of 10 to 200 µg/mL in 0.2 M HCl. The phytate content was calculated as mg/100 g dry weight. The limit of detection (LOD) was 0.8 mg/100 g, while the limit of quantification (LOQ) was 2.5 mg/100 g

2.5.2 Oxalate Determination

The levels of oxalates in the samples were determined using the permanganate titration method of AOAC Official Method 974.24 (AOAC International, 2023), which is appropriate for determining oxalates in starchy materials. To do this, 3 g of garri sample or raw flour was dissolved in a 250 mL conical flask together with 75 mL of 1.5 M sulfuric acid (H_2SO_4). This mixture was stirred for 1 hour before being filtered into a 100 mL volumetric flask using Whatman No. 1 filter paper. The filtrate was diluted to mark with distilled water. A 25 mL portion of this solution was introduced into a clean conical flask and brought to 80°C on a hot plate. Titration was conducted with 0.05 M $KMnO_4$ solution until a faint pink color that persisted for 30 seconds was obtained. This standard solution was standardized against $Na_2C_2O_4$ daily. Results were calculated as mg/100 g dry weight using the equation provided in AOAC 974.24. The LOD and LOQ values were 0.2 mg/100 g and 0.7 mg/100 g, respectively.

2.5.3 Saponin Determination

Determination of saponins was carried out using vanillin-sulfuric acid colorimetry, AOAC Official Method 945.36 (AOAC International, 2023), as modified by Odebunmi et al. (2023).

Two grams of garri sample or raw flour was extracted with 20 mL of 80% methanol aqueous solution, shaken for 4 hours at 150 rpm. The extract was filtered and the residue was extracted twice again with 10 mL of 80% methanol. All filtered extracts were dried under reduced pressure at 40 °C on a rotary evaporator (Buchi Rotavapor R 100, Switzerland). Residue was dissolved in 5 mL of distilled water. One milliliter of the re-dissolved extract was mixed with 1 mL of vanillin solution (8 g of vanillin dissolved in 100 mL of absolute ethanol). Mixture was cooled down to 0°C in ice-bath and 5 mL of conc. Sulfuric acid was added slowly drop-wise with constant mixing. The tubes were placed in a water bath at 60°C for 30 minutes. After cooling to room temperature, absorbance was measured at 544 nm. A standard curve was constructed using diosgenin (Sigma Aldrich).

The saponin content was quantified in mg diosgenin equivalent per 100g dry weight basis. The limit of detection (LOD) and limit of quantification (LOQ) were found to be 1.2 mg/100g and 3.8 mg/100g, respectively.

2.6 Mineral Analysis

Mineral (iron, zinc, calcium) analyses were performed at the Central Research Laboratory, University of Ilorin, using Atomic Absorption Spectrophotometry (AAS) according to AOAC Official Method 999.11 for trace elements in foods (AOAC International, 2023).

Sample Digestion: Garri sample (raw flour) (2 g) was digested by 10 ml of concentrated nitric acid (65%) and 2 ml of 30% hydrogen peroxide using a programmable block digester (DigiPREP MS, SCP Science, Canada) with a temperature ramp of up to 180°C. The digested samples were diluted to 25 ml with deionized water and filtered with Whatman No. 42 filter paper. Digestion blank and certified reference material (NIST 1568b rice flour) were digested simultaneously.

Iron (Fe): Detected at wavelength of 248.33 nm using an air acetylene flame (PerkinElmer PinAAcle 900F). Limit of detection: 0.03 mg/L.

Zinc (Zn): Detected at wavelength of 213.86 nm using an air acetylene flame. Limit of detection: 0.01 mg/L.

Calcium (Ca): Detected at wavelength of 422.67 nm using a nitrous oxide acetylene flame. 1% w/v lanthanum chloride was added to prevent phosphate interference. Limit of detection: 0.3 mg/L.

Results were reported as mg/100g dry matter. Spike recoveries for the mineral determinations were between 92% and 104%, which is indicative of adequate accuracy of the analyses. Within-batch relative standard deviations (RSD) were <5%, showing acceptable precision.

2.7 Quality Assurance and Quality Control

Quality assurance procedures included analyzing certified reference materials (NIST) together with each set (recoveries 90% – 108%); processing reagent blanks; analyzing all samples in duplicate (RSD >10% repeats); Spike recovery: mineral spikes were added to sample digests to assess accuracy. The target acceptance criterion was 85% - 115% recovery. All samples met this criterion with actual recoveries ranging from 92% - 104% (as detailed in Section 2.6); verification of calibration after every ten samples; and acid washing of all glassware and equipment prior to use to prevent trace metal contamination

2.8 Data Analysis

All anti-nutrient and mineral analyses were performed in duplicate and the mean values of the duplicate readings are reported. For minerals (zinc, calcium, iron), the average of the two readings generated from the atomic absorption spectrophotometer was converted from ppm (mg/L) to mg/100g dry weight using the formula: Concentration (mg/100g) = (ppm reading × 0.025 L × 100) / 2 g = ppm × 1.25

2.9 Ethical Considerations

No human or animal subjects were involved. All raw materials were purchased from open markets and processed under standard food safety protocols.

3.0 RESULTS

3.1 Anti-Nutrient Composition

The concentrations of Saponin, Phytate and Oxalate in cassava garri and sweet potato garri are presented in Table 1. Sweet potato garri contained higher saponin (3.04 mg/100g) compared to cassava garri (2.05 mg/100g). Phytate was lower in sweet potato garri (1.11 mg/100g) than in cassava garri (3.92 mg/100g). Oxalate was more than twice as high in sweet potato garri (15.10 mg/100g) compared to cassava garri (6.00 mg/100g).

Table 1: Anti-Nutrient Concentrations (mg/100g dry weight)

Sample	Saponin	Phytate	Oxalate
GA	2.05	3.92	6.00
GB	3.04	1.11	15.10

GA: Commercial cassava garri; GB: Laboratory-proceed sweet potato garri
Note: Values are means of duplicate determinations

3.2 Mineral Composition

The concentrations of zinc, calcium and iron in cassava garri and sweet potato garri are shown in Table 2. Cassava garri had slightly higher zinc (0.685 mg/100g) compared to sweet potato garri (0.642 mg/100g). Calcium was quantifiable in sweet potato garri (0.160 mg/100g). In cassava garri, the calcium concentration fell below the analytical limit of detection (< 0.38 mg/100g) and is therefore reported as non-quantifiable (BDL)

Table 2: Mineral Concentrations (mg/100g dry weight)

Sample	Zinc (Zn)	Calcium (Ca)	Iron (Fe)
GA	0.685	<0.38 (BDL)*	0.221
GB	0.642	0.160	0.070

GA: Commercial cassava garri; GB: Laboratory-proceed sweet potato garri
Note: Values are means of duplicate determinations
*BDL = Below Detection Limit (< 0.38 mg/100g dry weight). Values are reported as non-quantifiable; the LOD was calculated from the instrument's 0.3 mg/L detection limit converted to dry weight basis

4.0 DISCUSSION

4.1 Anti-Nutrient Profiles: Comparison with Literature

The above levels of antinutrients in 100% sweet potato garri have never been recorded before. Phytate levels in sweet potato garri were 1.11 mg/100g. This value falls within the range of 0.57 – 9.93 mg/100g of the raw sweet potato tubers reported by Ogunlade et al. (2025). Notably, the value observed in the fermented garri sample is much lower than the upper limit of the raw sweet potato tuber's range (9.93 mg/100g), thus showing the efficacy of fermentation, dewatering, and roasting processes in the reduction of phytate levels. Also, it was observed that the final level (1.11 mg/100g) was not below the lower range of naturally occurring level in the raw tuber (0.57 mg/100g). Phytate reduction depends on context, as Oladipo & Adebayo (2024) reported a reduction from 301.21 mg/100g to 64.38 mg/100g after 120 hours of fermentation in cassava garri – more extensive absolute reduction due to higher initial values in cassava. In the current case, 48 hours of fermentation time was enough to get a significant reduction of phytate from the upper range of raw sweet potato to a biologically low level (1.11 mg/100g) that compares favorably with the lower limits of processed cassava (2.11 – 301.21 mg/100g; Oladipo & Adebayo, 2024). The amount of saponin was more in sweet potato garri (3.04 mg/100g) than in cassava garri (2.05 mg/100g). Saponin can be hypolipidemic if it is present in low concentration, but it becomes bitter and causes hemolysis in high concentration. These amounts do not show any acute toxicity, but may be responsible for taste characteristics in sweet potato garri. There is no literature regarding saponin content in sweet potato garri. However, its value is close to that of some fermented cassava preparations (Odebunmi et al., 2023).

4.2 Mineral Composition: Implications for Nutritional Quality

The mineral concentrations in both garri types are very low relative to daily requirements. The recommended dietary allowance (RDA) for zinc is 8–11 mg/day for adults. A 100g serving of cassava garri provides only 0.685 mg (6–8% of RDA), while sweet potato garri provides 0.642 mg (5–8% of RDA). Both are poor sources of zinc. Iron intake is similarly inadequate. The RDA for iron is 8–18 mg/day depending on sex and age. A 100g serving of cassava garri provides 0.221 mg (1–2.5% of RDA), and sweet potato garri provides only 0.070 mg (0.4–0.9% of RDA). These values are consistent with the well-known fact that garri is an energy-dense but micronutrient-poor food. Calcium content in sweet potato garri was low at 0.160 mg/100g. In the case of cassava garri, calcium content was not quantifiable, being less than the detection limit (<0.38 mg/100g). The Recommended Daily Allowance of calcium is 1000-1200 mg/day for adults. Consumption of 100g of sweet potato garri will give about 0.013-0.016% of RDA of calcium while in cassava garri, it will be negligible as there is no quantifiable amount of calcium. The marginally high level of zinc and iron in cassava garri than sweet potato garri could be attributed to the absorption of minerals from the soil or contamination of the processing equipment. However, the differences are trivial in terms of nutrition.

4.3 Public Health Implications

The findings of this study have several public health implications. Garri – both sweet potato and cassava garri - cannot be considered a significant source of iron, zinc, or calcium. Consumers who rely on either of them as a staple food must obtain these essential minerals from other dietary sources such as meat, fish, eggs, legumes, and green leafy vegetables. This ensures the need for dietary diversification as emphasized by Nigerian nutritionists (Aremu et al., 2025). Further, the high levels of oxalates in sweet potato garri (15.10 mg/100g) might lower calcium availability. This is because oxalates form an insoluble calcium oxalate compound in the gut that is not absorbed. Therefore, people consuming large amounts of sweet potato garri on a daily basis (200-300g/day) will take in 30-45mg/day of oxalate content. While this might not cause kidney stones (generally above 100 mg/day for individuals without underlying conditions) in healthy individuals, it might exacerbate calcium deficiencies in vulnerable groups. Finally, the absence of phytate in sweet potato garri is another advantage. The reduction in phytate content during the process of fermentation helps in freeing up minerals for possible uptake. Nevertheless, the mineral contents are still very minimal hence no benefits. Fortifying sweet potato garri with iron, zinc, and calcium is recommended. Fortification in Nigeria has been successfully carried out by adding these nutrients to wheat flour, maize flour, and vegetable oils (Maziya Dixon et al., 2021).

4.4 Strengths and Limitations

This study provides the first reported data on anti-nutrient and mineral content in 100% sweet potato garri. However, several limitations should be considered when interpreting the findings.

Processing Differences: The two garri samples were produced under distinctly different conditions. The sweet potato garri was processed under laboratory conditions with all parameters clearly defined: 48 hours of fermentation, standard dewatering, and roasting to approximately 120 degrees centigrade. The commercial cassava garri sample, on the other hand, was sourced from the local processors whose processing conditions, including fermentation period (which could be anywhere between 48 to 72 hours, as per industrial practice), equipment used, and environmental conditions (temperature, humidity and microbial succession) remain unknown. It thus follows that the results showing variation in the levels of anti-nutrients and minerals are not only influenced by the raw material (cassava and sweet potato), but also by the process conditions. These results must therefore be taken as preliminary observations rather than a comparison of the two raw materials. Future studies must therefore be conducted under controlled processing conditions for both samples using the same equipment and environment conditions.

Analytical Gaps: Hydrogen cyanide (HCN) concentration was not determined in the two garri samples. While this may be due to the fact that the introduction states that sweet potato does not produce HCN (a key advantage over cassava) (Alam, 2021) and cites the maximum HCN content level in cassava products set by the Codex Alimentarius (FAO/WHO, 2023), this parameter could not be analyzed in the current work due to lack of funds. Specifically, this study was limited to the determination of the concentrations of antinutrients (saponin, phytate, oxalate) and minerals (zinc, calcium, iron).

Sample Limitations: Only one batch of each garri type was analyzed, which prevents assessment of batch-to-batch variability and precludes statistical generalization. The testing for minerals was limited to iron, zinc, and calcium because of budget restrictions; it would help future experiments to test more elements. Only one kind of white-fleshed sweet potato was used, but orange-fleshed sweet potatoes may have different chemical contents. Lastly, fermentation time was not varied, and one may wonder if longer fermentation would lower the content of anti-nutrients. Despite these limitations, this study establishes a foundational dataset for sweet potato garri and provides a basis for future research with controlled processing, multiple batches and expanded analytical parameters.

5.0 CONCLUSION

In the specific samples analyzed for the anti-nutrient and mineral content of 100% sweet potato garri prepared traditionally in Nigeria compared with regular cassava garri. It showed that 100% sweet potato garri has more oxalates (15.10mg/100g), more saponins (3.04mg/100g), and less phytates (1.11mg/100g). While the presence of little phytates is good news regarding the availability of minerals, the presence of more oxalates in the product can limit the absorption of calcium from it. 100% sweet potato garri and cassava garri lack iron, zinc, and calcium; hence, it cannot be recommended as a good source of these nutrients. Fortification of these two products with iron, zinc, and calcium should be considered.

RECOMMENDATIONS

1. NAFDAC and SON should consider mandatory fortification of garri (both cassava and sweet potato) with iron, zinc and calcium following the model of wheat flour fortification.
2. Food processors should explore blending sweet potato with cassava to reduce oxalate content while maintaining acceptable sensory properties
3. Public health education should emphasize that garri alone does not meet daily mineral requirements and should be consumed with protein-rich and vegetable-based accompaniments.
4. Future research should analyze orange-fleshed sweet potato garri for provitamin A carotenoids and compare anti-nutrient profiles with white-fleshed varieties.
5. A randomized controlled trial should evaluate the effect of regular consumption of fortified sweet potato garri on iron and zinc status in children and women of reproductive age.
6. Sensory acceptability is another critical research gap for researchers before recommending sweet potato garri over cassava garri.

ETHICAL CLEARANCE

No ethical clearance needed for this research.

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CONFLICT OF INTEREST

The Author Declares No Conflict of Interest.

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