



Assessment of the Serum Levels of Creatinine, Urea and Glucose among Chronic Consumers of *Agbo* Herbal Medicine in Etsako West Local Government Area, Edo State

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Abstract

*This study investigated the serum levels of creatinine, urea, and glucose in chronic consumers of agbo herbal medicine in Etsako West Local Government Area, Edo State, Nigeria. A total of 181 participants, both male and female, were recruited and divided into two groups: a test group comprising chronic agbo consumers and a control group of non-consumers. Blood samples were collected intravenously and processed to obtain plasma for analysis. Serum creatinine, urea, and glucose levels were measured using the Randox reagent kit. The results revealed significantly elevated serum levels of creatinine (1.117 ± 0.5608 vs. 0.593 ± 0.3236 mg/dL), urea (58.66 ± 10.640 vs. 42.17 ± 13.244 mg/dL), and glucose (138.30 ± 84.467 vs. 113.03 ± 27.635 mg/dL) in the test group compared to the control group ($p < 0.05$). Independent *t*-tests confirmed significant differences between the groups for creatinine, urea, and glucose levels. Further analysis showed that daily consumers within the test group exhibited significantly higher glucose levels compared to the control group (mean difference = 75.749; $p < 0.05$). These findings suggest that chronic consumption of agbo herbal medicine may adversely affect kidney function and glucose regulation. While the data indicates a replicable impact of agbo on these parameters, further research with larger sample sizes is necessary to clarify the relationship and establish safe consumption guidelines. Until then, a reduced intake of agbo is recommended to mitigate potential health risks.*

Keywords: *Agbo, Herbal Medicine, Nephrotoxic, Glucose.*

INTRODUCTION

Agbo herbal medicine is a traditional medicinal preparation made from various plant parts, such as leaves, stems, roots, and barks, which are boiled in water to extract the active compounds and consumed as a tea or decoction [1]. *Agbo* herbal medicine has gained popularity due to its accessibility, affordability, and perceived efficacy in treating various health conditions. However, there is limited scientific evidence to support its safety and efficacy, and there is a concern about potential adverse effects due to the lack of regulation and standardization in its preparation [2]. Several studies have reported the presence of various bioactive compounds in *agbo* herbal medicine, including alkaloids, flavonoids, phenolics, and terpenoids, which have been shown to have potential therapeutic effects [3]. The use of herbal medicine has grown significantly worldwide, particularly in developing countries, where traditional remedies often serve as primary healthcare solutions [4]. In Nigeria, herbal concoctions, commonly referred to as *agbo*, are widely consumed for

the treatment and management of various ailments. These herbal mixtures are prepared using extracts from roots, leaves, bark, and other plant parts, often with minimal processing and no standardized dosages [5]. Despite their popularity, the safety and efficacy of *agbo* herbal medicine remain under-researched, raising concerns about its long-term health implications.

Kidney function and glucose metabolism are critical markers of overall health. Creatinine and urea are commonly used biomarkers for assessing renal function. Elevated serum creatinine and urea levels often indicate impaired kidney function, which can result from conditions such as chronic kidney disease, dehydration, or exposure to nephrotoxic substances [6]. Glucose levels, on the other hand, are essential for evaluating metabolic health and the risk of conditions such as diabetes mellitus. Prolonged consumption of unregulated herbal medicines has been linked to alterations in these parameters, potentially due to the presence of nephrotoxic or hyperglycemic compounds [7].

The pharmacological properties of *agbo* herbal medicine are attributed to its bioactive constituents, which can have both therapeutic and toxic effects. Studies have identified bioactive compounds such as alkaloids, flavonoids, and tannins in *agbo*, which may exert hepatotoxic and nephrotoxic effects when consumed in high doses or over extended periods [8]. Furthermore, the lack of quality control in the preparation and dosage of these herbal medicines exacerbates the risk of adverse health outcomes.

Etsako West Local Government Area in Edo State, Nigeria, is a region where *agbo* consumption is deeply ingrained in cultural practices. Many individuals consume these herbal concoctions for prolonged periods, often without medical supervision or awareness of the potential risks. While anecdotal evidence highlights the perceived benefits of *agbo*, there is a growing need for scientific studies to evaluate its impact on critical health parameters, including kidney function and glucose regulation.

This study aimed to assess the serum levels of creatinine, urea, and glucose among prolonged consumers of *agbo* herbal medicine in Etsako West LGA. By comparing these biomarkers between consumers and non-consumers, this research seeks to provide empirical evidence on the potential health risks associated with *agbo* consumption. The findings will contribute to the ongoing discourse on the safety of traditional herbal medicines and highlight the need for regulatory frameworks to standardize their preparation and use.

STATEMENT OF PROBLEM

The widespread consumption of *agbo* herbal medicine in Etsako West Local Government Area, Edo State, has raised significant public health concerns. While these traditional herbal concoctions are deeply rooted in cultural practices and are often perceived as safe and effective remedies, their preparation and dosage are largely unregulated. Many of the constituents in *agbo* lack thorough toxicological evaluation, increasing the potential for adverse effects on vital organs such as the kidneys and the metabolic system. Evidence suggests that certain bioactive compounds in herbal medicines, when consumed excessively or over long periods, can contribute to nephrotoxicity and hyperglycemia.

Justification of Study

The importance of this study lies in its potential to address a critical gap in the understanding of the health implications of *agbo* herbal medicine consumption. As herbal remedies continue to play a significant role in the healthcare system of Nigeria, assessing their safety is essential to safeguarding public health. This study focuses on key biomarkers—creatinine, urea, and glucose—which are reliable indicators of kidney function and metabolic health.

Inclusion Criteria

Participants must be between the ages of 18 and 65 years,

ensuring that they are adults and can provide informed consent. Participants in the test group must have consumed *agbo* herbal medicine consistently for at least six months prior to the study. Consumption must be at least three times a week to qualify as prolonged use. In addition, participants should not have been diagnosed with chronic kidney disease (CKD) or diabetes mellitus prior to the commencement of the study, to ensure that observed changes in biomarkers can be attributed to *agbo* consumption.

Exclusion Criteria

Individuals with a pre-existing diagnosis of kidney disease, diabetes mellitus, or other metabolic disorders that could independently affect serum creatinine, urea, or glucose levels. Pregnant or lactating women will be excluded due to potential physiological changes in kidney function and glucose metabolism that could confound results.

Study Design

This is a research involving chronic consumers of *agbo* herbal medicine both male and female in Etsako-West Local Government Area, Edo state of Nigeria. There will be two groups in this study; firstly the test group includes both male and female chronic/ prolonged consumers of *agbo* herbal medicine. While the second group would be the control group which will include both male and female non-consumers of *agbo* herbal medicine. Data will be collected from these groups through prescribed questionnaires which entail general questions on age, health conditions, and duration of *agbo* herbal medicine consumption.

Sample Size

The study population was selected from both male and female individuals in Etsako West Local Government Area for the assessment of serum creatinine, urea, and glucose. The sample size for sampling was calculated using Fisher's formula [9]. The prevalence of chronic *agbo* herbal medicine consumers was 13.7%, with an error margin (d) of 0.05 and a 95% confidence interval [10, 11].

$$\text{The sample size; } N = \frac{Z^2 P (1-P)}{d^2}$$

N = required minimum sample

Z = standard normal deviation (1.96)

P = prevalence of chronic *agbo* herbal medicine consumers (13.7%); $13.7/100 = 0.137$

D = 0.05 the inverse of 95% confidence limit.

$$N = \frac{Z^2 P (1-P)}{d^2} = \frac{1.96^2 \times 0.137(1- 0.137)}{0.05^2} = 181$$

Ethical Approval

All participants were adults and gave consent to this project.

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Participants were given the option to withdraw during the process of this study. Ethical approval was obtained from the ethical committee of Edo State University Uzairue, Edo State.

RESULT

Table 1. shows the age, serum levels of creatinine and urea of test and control participants.

The test group had a higher average age (~42 years ± 11 years) compared to the control group (~29 years ± 6 years), suggesting that *agbo* consumption is more prevalent among older individuals. Sex distribution revealed a male predominance in the test group (62.9% male, 37.1% female), while the control group had a near-equal distribution (48.6% male, 51.4% female). The serum creatinine levels were significantly higher in the test group (1.117 ± 0.5608 mg/dL) compared to the control group (0.593 ± 0.3236 mg/dL; $p < 0.05$). The serum urea levels were also significantly higher in the test group (58.66 ± 10.640 mg/dL) than in the control group (42.17 ± 13.244 mg/dL; $p < 0.05$). Serum glucose levels were higher in the test group (138.30 ± 84.467 mg/dL) than in the control group (113.03 ± 27.635 mg/dL).

Parameters	Control		Test	
Age (years)	~29 years ± 6 years		~42 years ± 11 years	
Sex	MALE	FEMALE	MALE	FEMALE
	48.6%	51.4%	62.9%	37.1%
Creatinine (mg/dL)	0.593 ± 0.3236		1.117 ± 0.5608 ^a	
Urea (mg/dL)	42.17 ± 13.244		58.66 ± 10.640 ^b	

a, b – Statistical Significant at $p < 0.05$

Data is presented as mean ± standard deviation.

Table 2 shows the age and serum levels of glucose of the participants based on the test and control group. The test group (prolonged consumers of *agbo* herbal medicine) had an average age of ~42 years ± 11 years, which was significantly older than the control group (~29 years ± 6 years). The serum glucose level in the control group was 113.03 ± 27.635 mg/dL, which falls within the normal range for fasting blood glucose (70–125 mg/dL). In the test group, males constituted a higher proportion (62.9%) compared to females (37.1%), whereas the control group had a near-equal male-to-female ratio (48.6% male, 51.4% female). The serum glucose level in the test group was significantly higher at 138.30 ± 84.467 mg/dL, with a much larger standard deviation indicating considerable variability among participants.

Table 2. The age and serum levels of glucose of test and control participants.

Parameters	Control		Test	
Age (years)	~29 Years ± 6 Years		~42 Years ± 11 Years	
Sex	Male	Female	Male	Female
	48.6%	51.4%	62.9%	37.1%
Glucose(mg/dL)	113.03 ± 27.635		138.30 ± 84.467	

a, b – Statistical Significant at $p < 0.05$

Data is presented as mean ± standard deviation.

Table 3 shows the effects of the frequency of *agbo* herbal medicine consumption on serum levels of urea, creatinine, and glucose, compared to a control group of non-consumers. The urea level was 42.17 ± 13.244 mg/dL, within the normal range, indicating proper kidney function in non-consumers. For the test groups, Once a Week: Urea levels were significantly elevated (56.97 ± 11.224 mg/dL; $p < 0.05$ $p < 0.05$ $p < 0.05$).

2–4 Times a Week: Urea levels were higher (62.00 ± 8.991 mg/dL; $p < 0.05$ $p < 0.05$ $p < 0.05$) compared to the control and “Once a Week” groups. Everyday and 1–2 Times Daily: Both groups showed elevated urea levels (58.00 ± 11.113 mg/dL and 60.91 ± 10.044 mg/dL, respectively).

Table 3. The effect of the frequency of *agbo* herbal medicine consumption on the serum levels of creatinine, urea and glucose.

Parameters	Urea (mg/dL)	Creatinine (mg/dL)	Glucose (mg/dL)
None (Control)	42.17 ± 13.244	0.593 ± 0.3236	113.03 ± 27.635
Once A Week	56.97 ± 11.224 ^{a1}	1.095 ± 0.5696 ^{b1}	127.78 ± 81.832

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2-4 Times A Week	62.00 ± 8.991 ^{a2}	1.185 ± 0.5305 ^{b2}	120.77 ± 34.339
Everyday	58.00 ± 11.113 ^{a3}	0.978 ± 0.6797 ^{b3}	188.78 ± 143.398
1-2 Times Daily	60.91 ± 10.044 ^{a4}	1.227 ± 0.5061 ^{b4}	153.09 ± 62.561

a¹ a², a³, a⁴, b¹, b², b³, b⁴ – Statistically significant at p<0.05

DISCUSSION

Agbo herbal medicine is a form of Nigerian traditional medicine. Many therapeutic effects have been documented from the various types of *agbo* herbal medicine and their uses [12]. The findings from the research collectively highlight the impact of *agbo* herbal medicine consumption on kidney function and glucose metabolism, as reflected in serum levels of urea, creatinine, and glucose. Significant elevations in serum urea and creatinine levels were observed among *agbo* consumers across all frequencies of use when compared to non-consumers (control group). The results suggest that *agbo* consumption, particularly at higher frequencies (2–4 times a week and 1–2 times daily), may impair renal function due to potential nephrotoxic effects of its bioactive components. The bioactive compounds in *agbo*, such as alkaloids and tannins, may accumulate in the body over time and contribute to renal stress or damage. This aligns with previous research indicating that unregulated herbal medicine use can lead to kidney damage [13].

The serum glucose levels of *agbo* consumers were significantly higher than those of the control group, with the “Everyday” and “1–2 Times Daily” groups showing pronounced hyperglycemia and increased variability. This suggests that *agbo* may disrupt glucose homeostasis, possibly through effects on insulin secretion or action. Such findings are consistent with studies that have linked certain phytochemicals to altered glycemic control [14]. The higher glucose levels observed in the test group may indicate a potential impact of *agbo* on glucose metabolism. Certain herbal components can influence insulin secretion or glucose utilization, either enhancing or impairing glycemic control. The variability in glucose levels may reflect differences in the composition of *agbo*, preparation methods, or individual metabolic responses. Similarly, the hyperglycemic effects observed in frequent *agbo* users may stem from interference with insulin signaling, glucose uptake, or hepatic glucose release.

Finally, the test group had an older average age (~42 years) compared to the control group (~29 years), and frequent *agbo* use was more prevalent among males. Older individuals might be more inclined toward *agbo* use due to cultural beliefs or chronic health conditions requiring frequent treatment. However, the observed effects on kidney and glucose parameters appear to be independent of age and are likely due to the composition and dosage of *agbo*.

CONCLUSION

While *agbo* herbal medicine holds cultural and therapeutic

significance, its unregulated use poses measurable health risks. Until its safety and efficacy are rigorously evaluated, moderation in its consumption is strongly recommended, alongside efforts to educate the public on safer practices and encourage evidence-based use of traditional medicine.

Recommendation

The study underscores the need for caution in *agbo* consumption due to its potential adverse effects on renal and metabolic health. Public health initiatives should focus on educating consumers about the risks and promoting standardized herbal medicine practices to mitigate these issues. Further research is required to isolate and characterize the compounds responsible for these effects and to establish safe consumption guidelines.

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