The Effectiveness of Quitline Intervention on Knowledge of Harmful Effects of Smokeless Tobacco Use *among Residents of Ebonyi State, Nigeria*

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Abstract

Objective: Smokeless tobacco encompasses a range of products consumed without combustion, typically through chewing, dipping, or sniffing. Despite its various forms, it is often perceived as less harmful than smoked tobacco. In Ebonyi State, Nigeria, the use of smokeless tobacco remains prevalent, compounded by low public awareness of its associated health risks. This study aimed to evaluate the effectiveness of a telephone-based quitline intervention in enhancing knowledge about the harmful effects of smokeless tobacco among local residents.

Materials and Method: A quasi-experimental design was adopted to assess the impact of a quitline intervention on participants' knowledge levels. Participants were divided into intervention and control groups. Baseline and follow-up assessments were conducted using structured questionnaires. Knowledge scores were categorized as poor (<50%) or good (≥50%). Independent samples t-tests were used to analyze differences in mean scores between the two groups before and after the intervention.

Results: Following the intervention, a significant increase in awareness was observed in the intervention group. The number of participants recognizing the harmful effects of smokeless tobacco rose from 19 (31.7%) at baseline to 52 (86.7%) post-intervention ($p < 0.001$). Those with good knowledge increased from 0 (0.0%) to 36 (60.0%). In contrast, the control group showed a minimal improvement, with good knowledge increasing from 0 (0.0%) to 7 (11.7%).

Conclusion: The quitline intervention proved effective in significantly enhancing knowledge about the health risks of smokeless tobacco. Broader engagement with traditional leaders and community stakeholders is recommended to sustain and expand awareness efforts.

Keywords: Smokeless tobacco, Knowledge, harmful effects, Ebonyi State, traditional ruler

Introduction

Tobacco is a crop harvested from the fresh foliage of plants within the *Nicotiana* genus (1). It is processed and marketed in various forms, including dried, cured, and unprocessed states (1). The term “smokeless tobacco” (also referred to as “chew”) includes a range of tobacco products that are consumed without being burned. It broadly refers to products taken orally or through the nose (2),(3). These forms of tobacco are used by chewing, sniffing, placing the substance between the gum and teeth, or even applying it to the skin (2).

Smokeless tobacco products differ significantly across countries in terms of composition and associated health risks (2).
In Nigeria, tobacco consumption has become a key contributor to preventable diseases, particularly impacting working-age individuals in both urban and rural areas (4),(5),(6).
Data from the 2018 Nigerian Demographic and Health Survey indicates that smokeless tobacco usage stands at 1.2% among men and 0.2% among women, while the use of any form of tobacco is recorded at 6.6% for men and 0.5% for women (6). In the southeastern region of Nigeria—where smokeless tobacco use is most prevalent—the rate is 4.7% (ranging between 3.5% and 6.2%) (5). Key motivations for smokeless tobacco consumption in this region include stress relief, enhanced alertness, enjoyment, and social integration (7).

More than 300 million adults in over 115 countries consume smokeless tobacco in varying forms (8), with 89% of these users residing in South Asian nations (9),(10).
Smokeless tobacco contains nicotine and nitrosamines—both of which have been linked to oral and oropharyngeal cancers. These cancers collectively account for over 250,000 deaths worldwide (8). In Ebonyi State, the growing use of smokeless tobacco is alarming, considering that it contains at least 28 known carcinogens, particularly tobacco-specific nitrosamines, which are also associated with lung cancer (11). The juice from these products can lead to oral sores and white patches, known as leukoplakia, which may progress to cancer. Users of smokeless

tobacco are at an elevated risk for cancers of the mouth, throat, esophagus, stomach, and pancreas. Additional health effects include chronic halitosis, dental staining, gum infections, tooth decay, and bone loss in the jaw (11).

Research confirms that smokeless tobacco is not a safer substitute for smoking. Individuals who switch from smoking to chewing tobacco are over 2.5 times more likely to develop cancers of the mouth or throat than those who quit smoking altogether (11). In fact, they are 5–6 times more likely to develop cancer compared to non-smokers (11). As noted earlier, smokeless tobacco is used by over 300 million adults in more than 115 countries (8), with a heavy concentration—89%—in South Asia (9),(10).

The risk of lung cancer is strongly linked to the duration of smoking, and those who use both cigarettes and smokeless tobacco remain at high risk (12). Studies also reveal that individuals who combine both forms often find quitting tobacco more challenging than those who only smoke. Common risks associated with widespread smokeless tobacco use include:

Addiction – The nicotine content leads to dependency, similar to that seen with cigarettes (12). The body may actually absorb more nicotine from chewing tobacco than from smoking.
Cancer – These products contain 28 known carcinogens. Use raises the risk of cancers affecting the mouth, throat, lips, gums, tongue, and chin (12).
Tooth Decay – The sugar and abrasive ingredients in smokeless tobacco increase the likelihood of dental cavities (12).
Gum Disease – Irritants in the product can cause the gums to recede where the tobacco is placed (12).
Cardiovascular Risks – Nicotine from smokeless tobacco elevates heart rate and blood pressure, which contributes to heart disease, high blood pressure, stroke, and potentially fatal cardiac events (12).
Leukoplakia – Use is associated with the formation of white patches in the mouth, which can be precancerous (12).

Evidence from various studies supports the effectiveness of behavioral interventions—whether individual or group-based—in improving awareness of tobacco's harmful effects (13). However, no such intervention has yet been implemented in our local setting. The objective of this study was to evaluate how effective telephone quitlines are in increasing knowledge about the dangers of smokeless tobacco use among users in Izzi Local Government Area of Ebonyi State.

Methods

Study Area

The research was conducted in Izzi and Ohaozara Local Government Areas of Ebonyi State.

Study Participants

The participants consisted of adult males and females aged 18 years and above who reported using smokeless tobacco at least once per week. Eligible participants were those who had access to a mobile phone, had resided in the area for a minimum of one year, and gave informed consent to participate. Individuals who were pregnant or had terminal illnesses were excluded from the study.

Study Design

This was a quasi-experimental study aimed at assessing how effective telephone quitlines are in improving awareness of the health risks associated with smokeless tobacco use.

Sample Size Determination and Sampling

The sample size was calculated using the formula for comparing two independent proportions:

$$n = \frac{[Z\alpha + Z\beta]^2 \times [P_1(1-P_1) + P_2(1-P_2)]}{[P_1 - P_2]^2}$$

To account for potential non-response, a 10% buffer was added, leading to a final sample size of 60 participants in each study group.

Methods

Data Collection
Izzi LGA served as the intervention location, while Onicha LGA, which shares similar characteristics with Izzi, was selected as the control area. The LGAs are approximately 70 km apart, a distance chosen to minimize the risk of information contamination. Multi-stage sampling was used to select participants.

Stage1
Three wards were selected randomly from the 25 wards in Izzi LGA using simple random sampling via balloting. The same process was followed for Onicha LGA, which has 12 wards.

Stage2
From the selected wards, two communities were randomly chosen from the list of 27 communities in Izzi and 13 in Onicha, again using the balloting method.

Stage3
A list of households in the chosen communities was compiled, and 200 households were randomly selected in each LGA. In each household, one adult meeting the eligibility criteria was interviewed. If more than one person was eligible, one was randomly selected using balloting.

Stage4
All identified users of smokeless tobacco were invited to take part in the intervention. A total of 60 participants were enrolled in both the intervention and control groups.

The intervention involved structured telephone support. Trained tobacco cessation counselors made scheduled proactive calls to participants. Three dedicated quitline numbers were acquired from MTN for this purpose. Upon initial contact, counselors and participants agreed on suitable times for follow-up calls, which were scheduled for once every weekend over a six-month period.

Data Analysis
Data collected were entered and analyzed using IBM SPSS version 23. Independent variables included participants' socio-demographic factors such as age, gender, marital status, educational background, occupation, and religious affiliation. The dependent variable was tobacco-related knowledge. This was assessed, scored, and categorized—scores below 50% were considered poor knowledge, while scores of 50% and above were categorized as good knowledge. An independent samples t-test was used to compare the mean knowledge scores between the intervention and control groups.

Ethical Approval

Approval for the study was obtained from the Ethical Review Committee of the Ebonyi State Ministry of Health and the Alex Ekwueme Federal Teaching Hospital in Abakaliki.

Results

Table 1: Socio-demographic characteristics of the participants

Variable	Intervention (n=60) Freq. (%)	Control (n=60) Freq. (%)	χ^2	P-value
Age (yrs)				
21-30	12(20.0)	9 (15.0)	1.462	0.917
31-40	10(16.7)	14(23.3)		
41-50	11(18.3)	9 (15.0)		
51-60	9 (15.0)	10(16.7)		
61-70	10(16.7)	11(18.3)		
Above 70	8 (13.3)	7 (11.7)		
Mean ± SD	49.05±15.7	49.92±17.2	*t*=0.288	0.774

Sex				
Male	47(78.3)	45(75.0)	0.186	0.666
Female	13(21.7)	15(25.0)		
Marital status				
Single	6 (10.0)	5 (8.3)	1.199*	0.885
Married	50(83.3)	50(83.3)		
Divorced	2 (3.3)	1 (1.7)		
Widowed	2 (3.3)	4 (6.7)		
Religion				
Christian	57(95.0)	52(86.7)	2.502	0.114
Others	3 (5.0)	8 (13.3)		
Ethnicity				
Igbo	60(100)	59(98.3)	1.008*	1.000
Yoruba	0 (0.0)	1 (1.7)		
Employment status				
Yes	24(40.0)	23(38.3)	**0.035****	0.852
No	36(60.0)	37(61.7)		
Occupation				
Self-employed	14(58.3)	15(65.2)	0.527*	1.000
Govt employed	8 (33.3)	7 (30.4)		
Private employed	2 (8.3)	1 (4.3)		
Average monthly income (₦)				
Less than 20,000	17(70.8)	18(78.3)	0.578*	1.000
20,000-50,000	5 (20.8)	4 (17.4)		
51,000-100,000	2 (8.3)	1 (4.3)		
Level of Education				
No formal education	5 (8.3)	10(16.7)	2.146	0.542
Primary level	25(41.7)	22(36.7)		
Secondary level	20(33.3)	17(28.3)		
Tertiary	10(16.7)	11(18.3)		

* Fishers exact test used

**Statistically significant

Table 1 outlines the socio-demographic details of the study participants. The average age of participants in the intervention group was 49.05 ± 15 years, while those in the control group had a mean age of 49.92 ± 17.2 years. In the intervention group, 47 participants (78.3%) were male and 13 (21.7%) were female. Regarding marital status, 6 participants (10.0%) were single, 50 (83.3%) were married, 2 (3.3%) were divorced, and 2 (3.3%) were widowed. In terms of employment, 14 (58.3%) were self-employed, 8 (33.3%) were employed in the public sector, and 2 (8.3%) worked in the private sector. Income distribution showed that 17 (70.8%) earned less than ₦20,000, 5 (20.8%) earned between ₦20,000 and ₦50,000, while 2 (8.3%) earned between ₦51,000 and ₦100,000.

In the control group, 45 participants (75.0%) were male and 15 (25.0%) were female. Marital status distribution included 5 (8.3%) single individuals, 50 (83.3%) married, 1 (1.7%) divorced, and 4 (6.7%) widowed. Among those employed (n = 23; 38.3%), 15 (65.2%) were self-employed, 7 (30.4%) were in government service, and 1 (4.3%) worked in a private company. Of the employed participants, 18 (78.3%) earned less than ₦20,000, 4 (12.4%) earned between ₦21,000 and ₦50,000, and 1 (4.3%) earned between ₦51,000 and ₦100,000.

There was no statistically significant difference in socio-demographic characteristics between the intervention and control groups.

Table 2: Comparison of effectiveness of telephone quitlines in improving knowledge about harmful effect of smokeless tobacco use

Knowledge of smokeless tobacco	Intervention	Control

	Pre (n=60) Freq. (%)	Post (n=60) Freq. (%)	χ^2 (P-value)	Beginning of the study (n=60) Freq. (%)	End of the study (n=60) Freq. (%)	χ^2 (P-value)
Using smokeless tobacco is dangerous to health						
Yes	19(31.7)	52(86.7)	37.563	18(30.0)	20(33.3)	0.154
No	41(68.3)	8 (13.3)	**(<0.001)***	42(70.0)	40(66.7)	(0.695)
Using smokeless tobacco increases athletic performance						
Yes	23(38.3)	47(78.3)	19.749	20(33.3)	27(45.0)	1.714
No	37(61.7)	13(21.7)	(**<0.001**)*	40(66.7)	33(55.0)	(0.190)
Smokeless tobacco is safe if used only for a few years						
Yes	9 (15.0)	52(86.7)	61.560	12(20.0)	25(41.7)	6.604
No	51(85.0)	8 (13.3)	**(<0.001)***	48(80.0)	35(58.3)	(p=**0.010**) **
Smokeless tobacco is safer to use than cigarettes						
Yes	26(43.3)	44(73.3)	11.109	20(33.3)	34(56.7)	6.599
No	34(56.7)	16(26.7)	(**<0.001**)*	40(66.7)	26(43.3)	(p=**0.010**) **

*Statistically significant

The table above indicates that, within the intervention group, there was a statistically significant improvement in participants' knowledge regarding the health risks of smokeless tobacco. Specifically, awareness that smokeless tobacco is harmful to health increased from 19 participants (31.7%) before the intervention to 52 participants (86.7%) afterward ($\mathbf{p} < 0.001$). Similarly, the number of participants who believed that smokeless tobacco enhances athletic performance rose from 23 (38.3%) to 47 (78.3%) ($\mathbf{p} < 0.001$). The proportion of those who believed that smokeless tobacco is safe if used for only a few years increased significantly from 9 (15.0%) to 52 (86.7%)

(**p** < 0.001), and those who thought smokeless tobacco is safer than cigarettes increased from 26 (43.3%) to 44 (73.3%) (**p** < 0.001).

In the control group, there were also statistically significant changes, though more limited. The number of participants who believed smokeless tobacco is safe if used for only a short period rose from 12 (20.0%) to 25 (41.7%) (**p** = 0.010), and those who considered it safer than cigarettes increased from 20 (33.3%) to 34 (56.7%) (**p** = 0.010).

Table 3: Analysis of the effectiveness of telephone quitlines in improving participants` knowledge of specific health risks associated with smokeless tobacco

Specific Health Risk	Intervention			Control		
	Pre (n=60) Freq. (%)	**Post (n=60) Freq. (%)**	**χ^2 (P-value)**	**Beginning of the study (n=60) Freq. (%)**	**End of the study (n=60) Freq. (%)**	**χ^2 (P-value)**
Throat cancer						
Yes	2 (3.3)	41(68.3)	55.125	5 (8.3)	10(16.7)	1.905
No	58(96.7)	19(31.7)	(**<0.001**)**	55(91.7)	50(83.3)	(0.168)
Stroke						
Yes	1 (1.7)	46(76.7)	70.825	2 (3.3)	15(25.0)	11.582
No	59(98.3)	14(23.3)	(**<0.001**)**	58(96.7)	45(75.0)	(**0.001**)**
Heart attack						
Yes	2 (3.3)	45(75.0)	64.669	1 (1.7)	10(16.7)	8.107
No	58(96.7)	15(25.0)	(**<0.001**)**	59(98.3)	50(83.3)	(**0.004**)**
Lung cancer						
Yes	2 (3.3)	31(51.7)	35.152	1 (1.7)	9 (15.0)	6.982
No	58(96.7)	29(48.3)	(**<0.001**)**	59(98.3)	51(85.0)	(**0.008**)**
Bladder cancer						
Yes	0 (0.0%)	21(35.0)	33.601*	0 (0.0)	3 (5.0)	4.236*
No	60(100%)	39(65.0)	(<**0.001**)**	60(100)	57(95.0)	(0.244)

Low birth weight in infants of mothers who use smokeless tobacco						
Yes	1 (1.7)	34(56.7)	43.926	2 (3.3)	8 (13.3)	3.927
No	59(98.3)	26(43.3)	(**<0.001**)**	58(96.7)	52(86.7)	(**0.048**)**
Mouth cancer						
Yes	0 (0.0)	31(51.7)	54.003*	4 (6.7)	9 (15.0)	2.157
No	60(100)	29(48.3)	(<**0.001**)**	56(93.3)	51(85.0)	(0.142)
Stomach cancer						
Yes	1 (1.7)	34(56.7)	43.926	1 (1.7)	5 (8.3)	2.807
No	59(98.3)	26(43.3)	(**<0.01**)**	59(98.3)	55(91.7)	(0.094)
Tooth decay						
Yes	1 (1.7)	57(95.0)	104.650	8 (13.3)	25(41.7)	12.079
No	59(98.3)	3 (5.0)	(**<0.001**)**	52(86.7)	35(58.3)	(**<0.00**1)**
Diabetes						
Yes	1 (1.7)	35(58.3)	45.873	2 (3.3)	9 (15.0)	4.904
No	59(98.3)	25(41.7)	(**<0.001**)**	58(96.7)	51(85.0)	(**0.027**)**
Peptic ulcer						
Yes	4 (6.7%)	35(58.3%)	36.505	2 (3.3%)	10(16.7%)	5.926
No	56(93.3%)	25(41.7%)	(**<0.001**)**	58(96.7%)	50(83.3%)	(**0.015**)**

* Fisher's exact test used

**Statistically significant

The table above reveals that, in the intervention group, there was a statistically significant improvement in participants' knowledge of the health risks linked to smokeless tobacco use. Specifically, awareness of throat cancer as a risk increased from 2 participants (3.3%) before the intervention to 41 (68.3%) after the intervention (**p** < 0.001). Recognition of stroke as a risk factor rose from 1 participant (1.7%) to 46 (76.7%) (**p** < 0.001), while awareness of heart attack increased

from 2 (3.3%) to 45 (75.0%) ($\mathbf{p} < 0.001$). Additionally, knowledge of lung cancer as a possible consequence rose from 2 participants (3.3%) to 31 (51.7%) ($\mathbf{p} < 0.001$).

In the control group, there were also statistically significant changes, though less pronounced. Awareness of stroke as a risk increased from 2 participants (3.3%) at baseline to 15 (25.0%) at the study's end ($\mathbf{p} < 0.001$). Knowledge of heart attack as a risk factor rose from 1 (1.7%) to 10 (16.7%) ($\mathbf{p} = 0.004$), while recognition of lung cancer increased from 1 (1.7%) to 9 (15.0%) ($\mathbf{p} = 0.008$).

Table 4: Analysis of the overall effectiveness of telephone quitlines in improving knowledge of the harmful effects of smokeless tobacco use.

Group	Pre	Post	Difference in Difference	%DD	P-value
Control	0	7			
Treatment	0	36	29	48.3	<0.001**

*Statistically significant
**Poor knowledge is knowledge score below 50 % while good knowledge is knowledge score of 50% and above.

The table demonstrates that, within the intervention group, there was a statistically significant increase in the proportion of participants who had good knowledge about the harmful effects of smokeless tobacco—rising from 0 participants (0.0%) before the intervention to 36 participants (60.0%) after the intervention. In the control group, the proportion increased modestly from 0 (0.0%) at baseline to 7 participants (11.7%) at the end of the study. This difference was statistically significant ($\mathbf{p} < 0.001$).

Table 5: Relationship between socio-demographic factors and knowledge at the end of the study

Characteristics	Intervention (n=60)			Control (n=60)		
	Poor (n=24) Freq. (%)	Good (n=36) Freq. (%)	χ^2 (P-value)	Poor (n=53) Freq. (%)	Good (n=7)	χ^2 (P-value)

					Freq. (%)	
Age (yrs)						
≤50	12(50.0)	21(58.3)	0.404	27(50.9)	5(71.4)	1.080*
Above 50	12(50.0)	15(41.7)	(0.525)	26(49.1)	2(28.6)	(0.432)
Sex						
Male	17(70.8)	30(83.3)	1.326	10(75.5)	5(71.4)	0.053*
Female	7 (29.2)	6 (16.7)	(0.250)	13(24.5)	2(28.6)	(0.819)
Marital status						
Without spouse	5 (20.8)	5 (13.9%)	0.500	8 (15.1)	2(28.6)	0.711*
With spouse	19(79.2)	31(86.1)	(0.480)	45(84.9)	5(71.4)	(0.330)
Religion						
Christian	24(100)	33(91.7)	3.170*	47(88.7)	5(71.4)	1.309*
Others	0 (0.0)	3 (8.3)	(0.268)	6 (11.3)	2(28.6)	(0.232)
Employment status						
No	19(79.2%)	17(47.2)	6.123	33(62.3%)	4(57.1)	0.068
Yes	5 (20.8%)	19(52.8)	(0.013)	20(37.7)	3(42.9)	(0.795)
Level of Education						
Below secondary	16(66.7)	14(38.9)	4.444	26(49.1)	6(85.7)	3.714
Secondary level & above	8 (33.3)	22(61.1)	(0.035)	27(50.9)	1(14.3)	(0.054)

* Fisher's exact test used

The table shows that in the intervention group, factors significantly associated with better knowledge of harmful effect of smokeless tobacco use were; employment status p=0.013,level of education p=0.035 and in the control group, level of education p=0.054

Table 6: Binary logistic regression of associated socio-demographic factors and knowledge at post intervention

Socio-demographic Factors	Intervention			Control		
	OR	**P-value**	**95% C.I. of OR**	**OR**	**P-value**	**95% C.I. of OR**
Employment status						
No (*ref.*)						

Yes	3.209	0.070	0.910-11.318			
Level of Education						
Below secondary (*ref.*)						
Secondary level & above	2.113	0.212	0.653-6.833	3.143	0.038	1.066-9.267

OR – Odd Ratio C.I. – Confidence Interval

Logistic regression showed that level of education above secondary predicted better knowledge of harmful effects of smokeless tobacco use, OR 3.143 CI 1.066-9.267.

Discussion

Awareness of the health risks associated with smokeless tobacco (SLT) use remains low in Nigeria, and until now, no quitline-based intervention aimed at improving this knowledge has been implemented in our local context (14). This study assessed the impact of a telephone-based quitline intervention on increasing knowledge about the dangers of SLT use among residents in a local government area of Ebonyi State.

In this research, the average age of participants in the intervention group was 49.05 ± 15.7 years, while in the control group it was 49.92 ± 17.2 years. This is notably higher than the mean age of 37.9 years reported in a U.S.-based study, likely due to demographic differences, as the U.S. study targeted a younger population.

Our findings revealed a statistically significant improvement in awareness of specific health risks related to SLT use among the intervention group, compared to the control. One possible reason for the initial low level of awareness may be the widespread use of unbranded, locally ground tobacco products, which are commonly sold in markets without health warnings. Consequently, users may lack access to information on the health risks. Post-intervention, a significantly higher proportion of participants were able to identify SLT-related health risks such as throat cancer ($\mathbf{p} < 0.001$), stroke ($\mathbf{p} < 0.001$), heart attack ($\mathbf{p} < 0.001$), and lung cancer ($\mathbf{p} < 0.001$).

These results are consistent with a study from Pakistan, which reported a significant improvement in knowledge scores among the intervention group compared to the control ($\mathbf{p} < 0.01$). Similar findings have also been observed in various intervention studies focused on tobacco use, although many were conducted in school settings (15–18). Additionally, our findings align with results from

a U.S. study that demonstrated improved quit rates after re-engaging tobacco users through Quitlines, particularly among participants who had initially failed to quit (19). That study involved three groups and found a greater likelihood of tobacco abstinence at 12 months among those who had already quit at three months, compared to those re-engaged (19).

Furthermore, our findings agree with another study in Pakistan, where a notable improvement in knowledge was seen post-intervention ($\mathbf{p} < 0.01$) (20). However, our results differ from findings in India, where only a small percentage of SLT users recognized warning labels on ghutka (a smokeless tobacco product), and just 26.19% were aware that SLT use could cause cancer (21). That Indian study was cross-sectional, possibly explaining the lower awareness levels. The widespread use of local tobacco products without proper labeling in such contexts may limit user awareness of associated health risks.

Conclusion

By the end of the study, a significantly higher proportion of participants recognized that smokeless tobacco poses health risks. There was also a marked increase in the number of individuals with good knowledge regarding its harmful effects. These results support the inclusion of quitlines as part of health promotion strategies. Specifically, health education content should be designed to reach users at the community level, as telephone-based quitlines have proven effective in increasing awareness about the dangers of smokeless tobacco.

Declarations

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Ethics Approval and Consent to Participate
Ethical approval for this research was granted by the Research and Ethics Committee of Alex

Ekwueme Federal University Teaching Hospital, Abakaliki, Ebonyi State, Nigeria. All participants provided written informed consent, and confidentiality was strictly maintained.

Competing Interests
The authors declare no conflicts of interest.

Consent for Publication
Not applicable.

Availability of Data and Materials
The data used and analyzed in this study are available from the corresponding author upon reasonable request via: **druzochukwu01@gmail.com**.

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Authors' Contributions
All authors made substantial contributions to the conception, design, data collection, analysis, and interpretation of the study. They participated in drafting and revising the manuscript, approved the final version, agreed on the target journal, and take full responsibility for all aspects of the work.

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