

Awareness of gingival enlargement and pattern of dental care utilization amongst hypertensive patients in a Nigerian tertiary hospital

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Abstract

Background: Some antihypertensive drugs have been implicated in drug-induced gingival enlargement (DIGE), however, there is paucity in the literature on the level of awareness of DIGE among these patients. Hence, this study aims to assess the awareness, prevalence of DIGE, and the impact of dental care service (scaling and polishing) on the prevalence of DIGE among hypertensive patients at the University of Port Harcourt Teaching Hospital (UPTH).

Methodology: A cross-sectional study was conducted among hypertensive patients attending the Cardiology Outpatient Clinic at UPTH. Participants were selected using the convenience sampling method. Data collection was done using structured questionnaires, medical records and clinical oral examinations. Information on demographic variables, duration of antihypertensive medication use and dental care service utilization were also recorded. Data was analysed with significance set at $p < 0.05$.

Results: There were one hundred and fifty (150) respondents; 64 males and 86 females, with an M: F of 1:1.25. The prevalence of gingival enlargement was 29.3%, with higher prevalence in patients on calcium channel blockers (Amlodipine) in combination with Angiotensin II receptor blocker (Telmisartan). None of the subjects was aware of gingival enlargement in hypertensive patients. Level of education, type of antihypertensive medications and no scaling & polishing were significantly associated with increased prevalence of gingival enlargement ($p = 0.000$).

Conclusion: The prevalence of drug-induced gingival enlargement among the participants was 29.3%, with grade I (interdental) gingival enlargement being more common and among subjects on long-term use of CCBs in combination with ARBs. All subjects were unaware of drug-induced gingival enlargement in hypertensive patients. There was a negative association between oral hygiene status and drug-induced gingival enlargement.

Keywords: Awareness, gingival enlargement, oral hygiene, dental care service

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INTRODUCTION

Hypertension is a long-term medical condition, in which the blood pressure in the arteries is persistently elevated.¹ It is a prevalent cardiovascular condition, and the increasing burden of hypertension in Nigeria has led to long-term and widespread use of antihypertensive medications. Antihypertensive drugs are classified into seven different groups. They include diuretics, beta-blockers (BB), alpha-blockers, calcium channel blockers (CCB), angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II receptor blockers (ARBs) and central effect drugs.^{2, 3} However, the side effects of these drugs, including gingival enlargement, can significantly impact patients' oral health, leading to discomfort, difficulty in maintaining oral hygiene, aesthetic concerns and even periodontal complications.^{2, 4}

Gingival enlargement or gingival overgrowth is an increase in the size of the gingiva, because of the collagenous extracellular matrix that accumulates within the gingival connective tissue with various degrees of inflammation.⁵ It was reported that the disorders seem to be induced by the disruption of homeostasis of collagen synthesis and degradation in the gingival connective tissue, predominantly through the inhibition of collagen phagocytosis of gingival fibroblasts.⁶ Gingival enlargement may be idiopathic or associated with a variety of factors like congenital diseases, hormonal disturbances, long-term poor oral hygiene, inflammation, neoplastic conditions and adverse drug reactions. Gingival enlargements have been classified based on aetiology into five general groups; inflammatory enlargement, enlargement associated with systemic diseases or conditions, neoplastic enlargement, false enlargement, and drug induced enlargement.⁷

Drug Induced Gingival Enlargement (DIGE), also known as "Drug Influenced Gingival Overgrowth (DIGO) is defined as gingival enlargement as a result of adverse drug reaction,⁸ and typically occurs within 3-months after commencement of treatment for hypertension.⁴ DIGE appears to be more prevalent in younger age groups with a predilection for the anterior gingival tissue and is usually not associated with attachment loss or tooth mobility unless there is an existing

periodontal disease. It starts as an overgrowth in the interdental papilla and gradually extends coronally.^{4,9} Some medications currently associated with gingival enlargement are anticonvulsants (phenytoin), antihypertensive drugs like calcium channel blockers (nifedipine and amlodipine) and immunosuppressants (cyclosporine A and tacrolimus).^{2,5,10} Of all cases of DIGO, about 50% are attributed to phenytoin, 30% to cyclosporine and the remaining 10-20% to calcium channel blockers.¹¹

Drug-induced enlargement has been associated with a patient's genetic predisposition, and its association with inflammation is debated. Some investigators assert that underlying inflammation is necessary for the development of drug-induced enlargement, while others purport that the existing enlargement induced by the drug effect compounds plaque retention, thus furthering the tissue response. Careful attention to oral hygiene may reduce the severity of gingival enlargement; most times, discontinuing the culprit drug resolves the enlargement.¹²

Studies have been conducted in Nigeria, which reported an increased prevalence of gingival enlargement among patients on calcium channel blockers.^{13, 14} However, there is paucity in literature of the awareness and severity of gingival enlargement among hypertensive patients within the Nigerian population, particularly in Port Harcourt. Hence, this study aims to assess the awareness and prevalence of drug-induced gingival enlargement, the oral hygiene status of hypertensive participants on different antihypertensive medications. Also, to assess the association between dental care service (scaling and polishing) and drug-induced gingival enlargement amongst hypertensive patients attending the Cardiology Clinic, University of Port Harcourt Teaching Hospital (UPTH).

MATERIALS AND METHODS

This was a cross-sectional hospital-based study that was conducted among hypertensive patients who had been on antihypertensive drugs for at least 6 months attending the Cardiology unit of the University of Port Harcourt Teaching Hospital between May and June 2025. Ethical approval was obtained from

the UPTH Research Ethics Committee (UPTH/ADM/90/S.11/VOL.XI/1897), and informed consent was obtained from all participants before data collection. Confidentiality and anonymity of participants were maintained. Consecutive patient who met the inclusion criteria and gave consent were recruited into this study until the sample size was reached.

Inclusion criteria included patients diagnosed with hypertension and on antihypertensive drugs (CCB, ACEI, Beta blocker, combination therapy) for at least 6months, patients aged 18years and above, patients with existence of 10 or more anterior teeth and a minimum of 16 permanent teeth and who provided informed consent. Exclusion criteria included patients on immunosuppressants or anticonvulsants, which are also known to cause gingival enlargement. Patients with systemic diseases that could affect gingival health (diabetes mellitus), as well as patients on antihypertensive drugs, who did not give consent.

The sample size was determined using the formula; $N = \frac{Z^2 PQ}{d^2}$

Where; Z is confidence level = 1.96

P is proportion which is 10.5% (0.105)¹³

Q is equal to 1-P (0.895)

d is the degree of freedom = 0.05

The sample size is 150

An interviewer-administered questionnaire was used to get socio-demographic information as well as medical and drug histories, which were confirmed from patients' case records.

Greene and Vermillion Oral Hygiene Index was used to assess oral hygiene status¹⁵ and

Simplified Oral Hygiene Index (OHI-S) was calculated and recorded as: Good: 0 - 1.2, fair: 1.3-3.0, and poor: 3.1-6.0. The New Clinical Index for Gingival Enlargement¹⁶ was used to assess gingival enlargement and graded based on severity of gingival enlargement as: Grade 0: No gingival enlargement, Grade 1: enlargement confined to the interdental papilla or blunting of the gingival margin, Grade II: enlargement involving the papilla and the marginal gingiva or covers up to one-third of the clinical crown, Grade III: enlargement extends to and covers more than one-third of the clinical crown.

Data were collected by two examiners and the Cohen's kappa coefficient for Simplified Oral Hygiene Index (OHI-S) and New Clinical Index for gingival enlargement was 0.84.

Statistical analysis

Statistical analysis was done using the Statistical Product and Service Solution (SPSS) version 25.0 (IBM SPSS Inc., Chicago, Illinois). Continuous variables were expressed as means and standard deviations, while categorical variables were expressed as frequencies with accompanying percentages. Differences between groups were compared using the Chi-square tests for categorical variables. P value <0.05 was considered statistically significant.

RESULTS

Sociodemographic of subjects

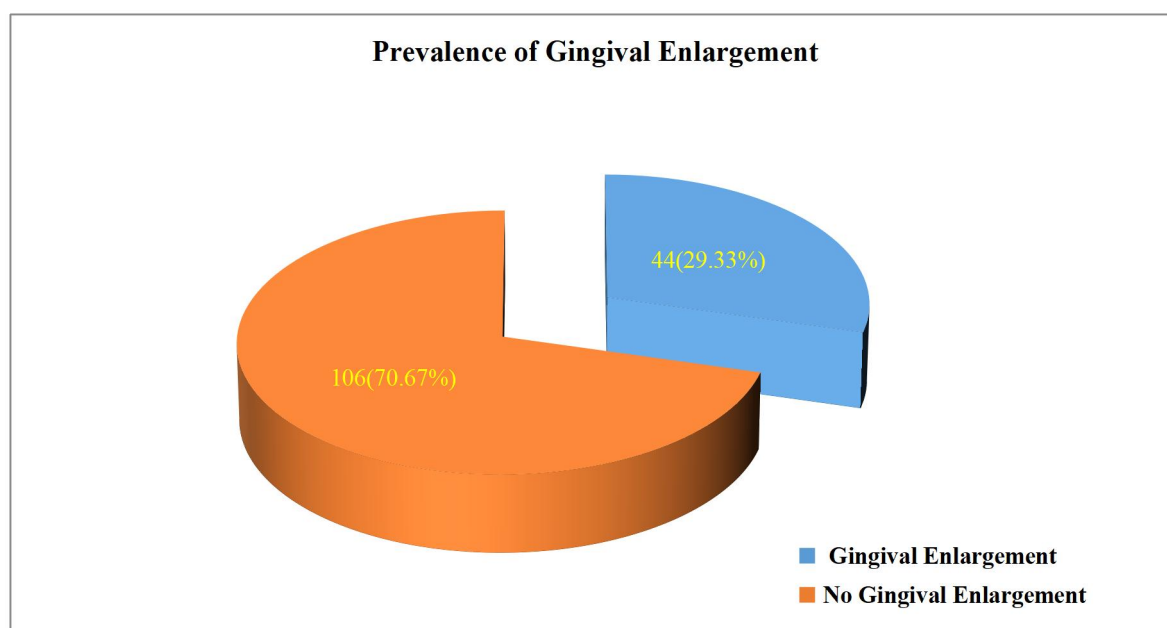
Table 1 shows one hundred and fifty (150) respondents; the age range of the population was 41-75 years. There were 64 males and 86 females, with an M: F of 1:1.25. Most of the males (67.2%) had tertiary education, while half of the females (50.0%) had primary school education. Most males (73.4%) were retirees, while more than half of the females (54.7%) were farmers.

Table 1: Sociodemographic of subjects

Variables		MALE n (%)	FEMALE n (%)
Age range	41-45	1 (1.6)	2 (2.3)
	46-50	1 (1.6)	1 (1.2)
	51-55	33 (51.6)	5 (5.8)
	56-60	7 (10.9)	34 (39.5)
	61-65	3 (4.7)	1 (1.2)
	66-70	3 (4.7)	2 (2.3)
	≥71	16 (25.0)	41 (47.7)
Educational Status	No Formal Education	0 (0.0)	2 (2.3)
	Primary	0 (0.0)	43 (50.0)
	Secondary	21 (32.8)	25 (29.1)
	Tertiary	43 (67.2)	16 (18.6)
Occupation	Unemployed	0 (0.0)	1 (1.2)
	Civil Service	11 (17.2)	3 (1.50)
	Business	3 (4.7)	32 (37.2)
	Farming	1 (1.6)	47 (54.7)
	Teaching	1 (1.6)	1 (1.2)
	Retiree	47 (73.4)	2 (2.3)
	Clergy	1 (1.6)	0 (0.0)
Marital Status	Single	0 (0.0)	3 (3.5)
	Married	63 (98.4)	23 (26.8)
	Divorced	1 (1.6)	1 (1.2)
	Widow/Widower	0 (0.0)	59 (68.6)
	Total	64 (100.0)	86 (100.0)

Prevalence of gingival enlargement amongst the participants

Figure 1 shows that the prevalence of gingival enlargement amongst the subjects was 29.3%.



Distribution of antihypertensive medications history and gingival enlargement among subjects

Table 2 shows that one participant (2.3%) who used calcium channel blockers and angiotensin II receptor blocker within 1 year, had gingival enlargement in the in interdental and marginal gingiva (grade 2), 21(47.7%) and 2 (4.5%) participants who used calcium channel blockers (CCB) and angiotensin II receptor blocker within 1 to 5 years presented with

gingival enlargement in the interdental gingiva (grade 1), and grade 2 gingival enlargement respectively. Fifteen (34.1%) of participants who used calcium channel blockers and angiotensin II receptor blocker within 6 – 10 years, had grade 1 gingival enlargement, while 1 (2.3%) participant each who used calcium channel blockers & angiotensin II receptor blocker, and calcium channel blocker & ACE inhibitor for > 10 years had grade 1 gingival enlargement.

Table 2: Distribution of antihypertensive medications history and gingival enlargement among subjects

Duration of antihypertensive medication use (years)	Type of antihypertensive medication	Site of gingival enlargement	Frequency (%)
< 1	Calcium channel blocker (Amlodipine), Angiotensin II receptor blocker (Telmisartan)	Interdental and Margin (Grade 2)	1 (2.3)
1-5	Calcium channel blocker (Amlodipine) alone	Interdental and marginal (Grade 2)	1 (2.3)
	Calcium channel blocker (Amlodipine), Angiotensin II receptor blocker (Telmisartan)	Interdental (Grade 1)	21 (47.7)
		Interdental and marginal (Grade 2)	2 (4.5)
	Angiotensin II receptor blocker (Telmisartan) alone	Interdental (Grade 1)	1 (2.3)
6-10	Calcium channel blocker (Amlodipine), Angiotensin II receptor blocker (Telmisartan)	Interdental (Grade 1)	15 (34.1)
>10	Calcium channel blocker (Amlodipine), Angiotensin II receptor blocker (Telmisartan)	Interdental (Grade 1)	1 (2.3)
		Interdental and marginal (Grade 2)	1 (2.3)
	Calcium channel blocker (Amlodipine) and ACE inhibitor (Lisinopril)	Interdental (Grade 1)	1 (2.3)
Total			44 (100.0)

Awareness of drug- induced gingival enlargement, oral hygiene status and scaling & polishing amongst subjects based on gender

Table 3 shows that none of the subjects was aware of drug-induced gingival enlargement among hypertensive patients ($p = 0.006$).

Considering the oral hygiene status, 43 (100.0%) of females had poor oral hygiene. Among participants with fair oral hygiene, 36

(73.5%) were males and 13 (26.5%) were females, while among those with good oral hygiene, 28 (48.3%) were males and 30 (51.7%) were females. This finding is statistically significant ($p = 0.000$).

Concerning scaling and polishing, 27 (24.8%) males and 82 (75.2%) females have not done scaling and polishing, while 37 (90.2%) males and 4 (9.8%) females had done scaling and polishing. This finding is statistically significant ($p = 0.000$).

Table 3: Awareness of drug- induced gingival enlargement, oral hygiene status and scaling & polishing amongst subjects based on gender

Variables		Gender		P values
		Males n (%)	Females n (%)	
Awareness of drug-induced gingival enlargement	Yes	0 (0.0)	0 (0.0)	0.006*
	No	64 (43.7)	86 (57.3)	
Simplified Oral Hygiene status (OHI-S)	Poor	0 (0.0)	43 (100.0)	0.000*
	Fair	36 (73.5)	13 (26.5)	
	Good	28 (48.3)	30 (51.7)	
Scaling and polishing	No	27 (24.8)	82 (75.2)	0.000*
	Yes	37 (90.2)	4 (9.8)	

*Significant

Relationships between gender, level of education, type of antihypertensive medications, awareness of drug-induced gingival enlargement, scaling & polishing and Oral Hygiene Status (OHI-S)

Table 4 shows that 28 (43.8%) and 36 (56.3%) males had good and fair oral hygiene respectively, while 30 (34.9%), 13 (15.1%) and 43 (50.0) females presented with good, fair and poor oral hygiene, respectively. This finding is statistically significant ($p = 0.000$). Concerning type of antihypertensive medications used, among participants on combination therapy with no calcium channel blocker; 1 (2.1%), 4 (8.5%) and 42 (89.4%)

had good, fair and poor oral hygiene, respectively. Among participants on combination therapy of calcium channel blockers and angiotensin II receptor blockers; 48 (54.5%), 39 (44.3%) and 1 (1.1%) had good, fair and poor oral hygiene, respectively. This finding is statistically significant. ($p = 0.000$). Regarding scaling and polishing, among participants who had never done scaling and polishing; 53 (48.6%), 14 (12.8%) and 42 (38.5%) presented with good, fair and poor oral hygiene respectively, while among those who have done scaling and polishing; 5 (12.25%), 35 (85.4%) and 1 (2.4%) had good, fair and poor oral hygiene respectively. This finding is statistically significant. ($p = 0.000$).

Table 4: Relationships between gender, level of education, type of antihypertensive medications, awareness of drug-induced gingival enlargement, scaling & polishing and Simplified Oral Hygiene Status (OHI-S)

Variables		Oral Hygiene Status			P value
		Good n (%)	Fair n (%)	Poor n (%)	
Gender	Males	28 (43.8)	36 (56.3)	0 (0.0)	0.000*
	Females	30 (34.9)	13 (15.1)	43 (50.0)	
Level of Education	None	2 (100.0)	0 (0.0)	0 (0.0)	0.000**
	Primary	1 (2.3)	2 (4.5)	41 (93.2)	
	Secondary	43 (91.5)	4 (8.5)	0 (0.0)	
	Tertiary	12 (21.1)	43 (75.4)	2 (3.5)	
Type of antihypertensive medications	No CCB	1 (2.1)	4 (8.5)	42 (89.4)	0.000*
	CCB alone	6 (60.0)	4 (40.0)	0 (0.0)	
	CCB, ACEI, Diuretics	2 (66.7)	1 (33.3)	0 (0.0)	
	CCB, BB, Diuretics	1 (50.0)	1 (50.0)	0 (0.0)	
	CCB, ARB	48 (54.5)	39 (44.3)	1 (1.1)	
Awareness of drug-induced gingival enlargement	No	58 (38.7)	49 (32.7)	43 (28.7)	0.613 [#]
	Yes	0 (0.0)	0 (0.0)	0 (0.0)	
Scaling and polishing	No	53 (48.6)	14 (12.8)	42 (38.5)	0.000*
	Yes	5 (12.2)	35 (85.4)	1 (2.4)	

BB -Beta -blockers, CCB - Calcium channel blockers, ACEI - Angiotensin-converting enzyme inhibitors, ARB - Angiotensin II receptor blockers

*significant #Fisher's exact

Relationships between gender, level of education, type of antihypertensive medications, awareness of drug-induced gingival enlargement, scaling & polishing and new clinical index for gingival enlargement.

Table 5 shows that 60 (69.8%), 22 (25.6%) and 4 (4.7%) males had grade 0, grade 1 and grade 2 gingival enlargement respectively, while 46 (71.9%), 17 (26.6%) and 1 (1.6%) females presented with grade 0, grade 1, grade 2 gingival enlargement respectively. This finding is not statistically significant ($p = 0.581$).

Considering type of antihypertensive medication, among participants who use combination therapy with no calcium channel blockers; 46 (97.9%), 1 (2.1%) participants had grade 0 and grade 1 gingival enlargement respectively, among those on calcium channel

blocker alone; 9 (90.0%) and 1 (10.0%) participants had grade 0 and grade 2 gingival enlargement respectively, while among those on calcium channel blockers and angiotensin 11 receptor blockers; 47 (53.4%), 37 (47.0%) and 4 (4.5%) had grade 0, grade I and grade II gingival enlargement respectively. This finding is statistically significant ($p = 0.000$).

Concerning scaling and polishing, among participants who have not done scaling and polishing; 68 (62.4%), 38 (34.9%) and 3 (2.8%) participants had grade 0, grade I and grade II gingival enlargement respectively, while among those that have done scaling and polishing; 38 (92.7%), 1 (2.4%) and 2 (4.9%) participants presented with grade 0, grade I and grade II gingival enlargement respectively. This finding is statistically significant ($p = 0.000$).

Table 5: Relationships between gender, level of education, type of antihypertensive medications, awareness of drug-induced gingival enlargement, scaling & polishing and new clinical index for gingival enlargement.

Variables		Grade of Gingival Enlargement			P value
		Grade 0 n (%)	Grade I n (%)	Grade II n (%)	
Gender	Males	60 (69.8)	22 (25.6)	4 (4.7)	0.581
	Females	46 (71.9)	17 (26.6)	1 (1.6)	
Level of Education	None	2 (100.0)	0 (0.0)	0 (0.0)	0.000*#
	Primary	44 (100.0)	0 (0.0)	0 (0.0)	
	Secondary	8 (17.0)	37 (78.7)	2 (4.3)	
	Tertiary	56 (91.8)	2 (3.3)	3 (4.90)	
Type of antihypertensive medications	No CCB	46 (97.9)	1 (2.1)	0 (0.0)	0.000*#
	CCB alone	9 (90.0)	0 (0.0)	1 (10.0)	
	CCB, ACEI,	2 (66.6)	1 (33.3)	0 (0.0)	
	Diuretics				
	CCB, BB,	2 (100.0)	0 (0.0)	0 (0.0)	
	Diuretics				
Awareness of drug-induced gingival enlargement	CCB, ARB	47 (53.4)	37 (42.0)	4 (4.5)	0.923#
	No	106 (70.0)	39 (26.00)	5 (3.3)	
	Yes	0 (0.0)	0 (0.0)	0 (0.0)	
Scaling and polishing	No	68 (62.4)	38 (34.9)	3 (2.8)	0.000#
	Yes	38 (92.7)	1 (2.4)	2 (4.9)	

BB-Beta -blockers, CCB - Calcium channel blockers, ACEI - Angiotensin-converting enzyme inhibitors, ARB - Angiotensin II receptor blockers

*significant #Fisher's exact

Relationship between oral hygiene status and gingival enlargement

Table 6 shows that among participants with good oral hygiene, 37 (88.1%) and 5 (11.9%) participants had grade 1 and grade II gingival enlargement respectively, while among those with fair oral hygiene, 2 (100.0%) had grade I

gingival enlargement. The odds of the outcome (gingival enlargement) occurring were lower in those with good oral hygiene (OR = 0.881, 95% CI [0.788, 0.985]) (p = 0.783). Despite the 95% confidence interval not containing the null value of 1, the results did not achieve statistical significance at the conventional $\alpha = 0.05$ level.

Table 6: Relationship between oral hygiene status (ohi-s) and gingival enlargement

Variables		Gingival Enlargement				P value
		Grade I n (%)	Grade II n (%)	Total n (%)	Odds Ratio	Confident Interval (CI)
Oral Hygiene Status	Good	37 (88.1)	5 (11.9)	42 (95.5)	0.881	0.788 -0.985
	Fair	2 (100.0)	0 (0.0)	2 (4.5)		
	Total	39 (88.6)	5 (11.4)	44 (100.0)		

DISCUSSION

A closer look at the demographics shows an ageing population of hypertensive patients, with most females (47.67%) being over 71 years of age, whereas most males (51.56%) were within the age 51-55 range. This finding is in tandem with the report that below 60 years, men have a higher incidence of hypertension, while above 60 years, postmenopausal women have a higher incidence of hypertension, because of hormonal changes and increased risk factors such as hysterectomy or oophorectomy.^{17, 18}

The prevalence of gingival enlargement among participants was 29.3%. This finding is higher than that of another study, which reported a prevalence of 10.5%,¹³ but lower than another study, which reported a prevalence of 49.5%.¹⁴ These disparities may be because of differences in population demographics, oral hygiene habits, age distribution and genetic predisposition. It may also be because of the type and combination of antihypertensive drugs. Also, interdental enlargement was the most common form, and among participants that have on the medication for 1-5 years and 6-10 years. This could be because dental plaque starts in the interdental area,¹⁹ this points to a need for dental assessment among hypertensive patients on long-term medication.

Shockingly, none of the participants was aware that antihypertensive medications could cause gingival enlargement, this reflects a glaring knowledge gap, understanding the need for better patient education, as well as poor utilization of preventive dental care, which is a consistent barrier in low- and middle-income country (LMIC) populations.²⁰ This may be because of low health literacy and accessibility issues; also, many correspondents are retirees and farmers. This calls for better patient education, as it has also been reported that unchecked gingival enlargement impairs oral hygiene practices, speech, mastication, aesthetics, self-esteem, and can eventually lead to periodontal degradation and tooth loss.²¹

In terms of oral hygiene status among gender, more females presented with poor oral hygiene, while more males had fair oral hygiene, which correlates with the prevalence of gingival enlargement. This aligns with the consensus in the literature that poor plaque control is a

strong modifying factor in drug-induced gingival enlargement, as plaque acts as a local irritant, augmenting the tissue's response to medications that cause fibroblast proliferation.²² More of the females never had scaling and polishing done, while majority of the males had done scaling and polishing. This finding is contrary to what is known, as females are known to visit the dental clinic more than males,²³ however, the finding in this study could be because the majority of females in this study are mainly farmers, who could not afford dental treatment, as out-of-pocket payment for dental care could affect their finances leading to further impoverishment. Hence, policy makers should include dental care as part of universal health care and advocate for the inclusion of dental care coverage in health insurance packages.²⁴

Comparing oral hygiene status with other variables, there was a statistically significant difference between gender, level of education, type of antihypertensive medication and scaling and polishing, and oral hygiene status, however, level of awareness was not statistically associated with oral hygiene status; this suggests that knowledge alone may not translate into action without an enabling system (e.g. access, affordability). Regarding the New Clinical Index for Gingival Enlargement, there was a statistically significant difference between level of education, type of antihypertensive medication, scaling and polishing, and grading of gingival enlargement. These findings suggest that better-educated individuals might either experience better oral hygiene status and less severe gingival enlargement or better manage it. These results echo the report in a study by Chen et al.²⁵ where educational level strongly predicted oral hygiene awareness and practices. Hence, hypertensive patients should be educated on the importance of regular preventive dental care.

Considering the association between oral hygiene status and drug-induced gingival enlargement, there was a higher prevalence of grade 1 (interdental) gingival enlargement among participants with good oral hygiene. This could be because of the limitation of simplified oral hygiene index, which examines only 6 surfaces of 6 selected teeth but does not assess the interproximal/ interdental areas.²⁶

Considering the odds ratio and confidential intervals, there was an odds ratio of 0.881 (95% CI 0.788-0.985). An odd ratio of 0.881 indicates a negative association and a 11.9% decrease in odds. Though the p value for the odd ratio was greater than 0.05, the confidence interval is less than 1, suggesting a consistent trend towards reduced odds of the outcome. This indicates a statistically non-significant negative association between oral hygiene status and drug-induced gingival enlargement. However, this finding should be interpreted with caution, as a larger sample size could have produced a smaller p-value and a narrower CI.

CONCLUSION

The prevalence of drug-induced gingival enlargement among the participants was 29.3%, with grade I (interdental) gingival enlargement being more common and among subjects on long-term use of CCBs in combination with ARBs. All subjects were unaware of drug-induced gingival enlargement in hypertensive patients. There was a negative association between oral hygiene status and drug-induced gingival enlargement.

Limitations of this study

The study was limited to individuals attending a single tertiary hospital in Nigeria, which may have introduced selection bias and limited the generalizability of the findings to other populations. Also, periodontal disease was not examined.

Recommendations

A longitudinal study with a larger sample size is recommended, with the assessment of periodontal indices included.

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Conflicts of interest

The authors declare no conflict of interest.

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