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Original Research

Effects of Diovan Hypertensive Medication on Oral manifestations (with and without smoker)

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Abstract

High blood pressure is recognized as a prevalent cardiovascular condition. Certain medications used to treat hypertension can lead to various oral side effects. Hypertension is a chronic medical condition, particularly common among aging individuals. In a study involving 90 cases, the ratio of male to female participants was 1.19:1, with a mean age of 47.58 years. The most prevalent condition observed was a combination of periodontitis and dry mouth, occurring in 28 cases (46.70%), followed by periodontitis alone in 14 cases (23.3%). Oral side effects are often unavoidable in hypertensive patients prescribed Diovan, and many patients are unable to switch to lower doses or different medications. Consequently, comprehensive dental assessments and gentle treatments could play a crucial role in improving the quality of life for these patients. Furthermore, among hypertensive patients, periodontitis emerges as a chief oral manifestation. The study aimed to analyse the effects of Diovan and its oral manifestations in both smokers and Non-smokers.

Keywords: High blood pressure, Cardiovascular Disease, Hypertensive Medications, Side effects

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Introduction

Hypertension is associated with a myriad of multifactorial complications, among which the risk of periodontitis, gingivitis, oral candidiasis, and other related side effects in hypertensive individuals.[1] As a chronic disease, hypertension presents a significant global health challenge, affecting billions of people worldwide.[2] Consequently, the widespread occurrence of this disease demands attention, especially when treating dental patients. Early symptoms may be subtle before the disease escalates into a life-threatening condition. Dental practitioners often find themselves at the forefront of hypertension prevention, conducting preoperative blood pressure assessments for dental patients, evaluating risk factors, and knowing when to refer hypertensive patients for medical consultation in a dental setting.[3]

Oral health plays a pivotal role in overall health conditions; maintaining optimal oral health not only benefits the oral cavity but also impacts the entire body.[4] Conversely, deteriorating oral health may adversely affect blood pressure control in hypertensive individuals.[5] While specific oral findings of hypertension remain

undetermined, certain antihypertensive medications frequently cause side effects such as gingival overgrowth, salivary gland swelling, and xerostomia.[6] Some dental diseases present challenging oral manifestations indicative of underlying systemic and chronic conditions.[7] Studies suggest that routine dental visits can sometimes reveal underlying disorders like diabetes, heart disease, multiple sclerosis, stroke, and hypertension.[8] Among these, periodontitis stands out as a common chronic infectious disease.[9] The oral cavity serves as an ideal breeding ground for bacteria, and individuals affected by periodontal disease face an increased risk of potentially deadly bacteria entering the bloodstream through diseased oral tissues.[10]

Individuals with periodontitis are at heightened risk for serious health complications, including premature births, low birth weight infants, heart disease, and other conditions resulting from bacterial infiltration, such as the formation of bacterial plaques on the walls of the heart's mitral valve.[11] Smoking habits significantly exacerbate the impact of oral diseases on hypertensive individuals. Previous studies have demonstrated that exposure to tobacco smoke can temporarily increase blood pressure, with effects lasting for up to a day. The cumulative impact of smoking, including vasoconstriction, endothelial dysfunction, and reduced nitric oxide production, further complicates the management of hypertension.[12] This study aims to analyze the effects of Diovan and its oral manifestations in both smokers and non-smokers, shedding light on the interplay between hypertension, oral health, and smoking habits.

Materials and Methods

A cross-sectional observational study was conducted involving 90 cases, categorized into three groups: Group 1 (G1) comprised 30 patients with hypertension who were smokers and taking Diovan medication (single daily dose), Group 2 (G2) consisted of 30 patients with hypertension who were non-smokers and taking Diovan medication (single daily dose), and Group 3 (G3) included 30 healthy individuals. Of the total participants, 49 were male and 41 were female, with ages ranging from 30 to 72 years. These cases were recruited from Baquba Teaching Hospital in Diyala Governorate between February and June 2022. Patients with heavy alcohol consumption, head and neck cancer, undergoing chemotherapy or radiotherapy, and diabetes were excluded from the study. Detailed questionnaires regarding smoking habits, dental hygiene practices, and other relevant information were administered to the participants. Approval for the study was obtained from the Ministry of Health, College of Dentistry, University of Karbala, through the scientific committee.

Data analysis was performed using SPSS version 26. A comparison of oral manifestations among hypertensive patients who were smokers, non-smokers, and healthy individuals was conducted using the one-way analysis of variance (ANOVA) test, with significance set at $P < 0.05$. This statistical approach allowed for the examination of differences in oral health outcomes between the various groups, providing insights into the potential impact of smoking and hypertension on oral health.

Results

Data analysis categorization by gender

In our study comprising a total of 90 patients, males accounted for approximately 54.4% of the sample, constituting 49 individuals, whereas females made up about 45.6%, totaling 41 patients. This resulted in a male-to-female ratio of 1.19:1, as outlined in Table 1. Notably, the number of male participants surpassed that of females in our study.

Table 1:- Gender distribution of (90) patients.

Gender	No	Percentage (%)
Male	49	54.4
Female	41	45.6
Total	90	100.0

The relative frequency of three groups by gender

In our study, which encompassed a total of 90 patients, participants were divided into three distinct groups denoted as G1, G2, and G3, each comprising 30 individuals. Among male participants, 49 individuals were included, with 27 belonging to G1, 9 to G2, and 13 to G3. Similarly, among female participants, there

were 41 individuals, with 3 in G1, 21 in G2, and 17 in G3.

Upon statistical analysis, it was observed that there was no significant difference in gender distribution across all groups (P=0.158), as delineated in Table 2. This suggests that the distribution of male and female participants was fairly balanced among the various study groups, ensuring that gender did not exert a significant influence on the outcomes assessed in our study.

Table 2:- The relative frequency of three groups with respect to gender.

		Groups								P
		G1		G2		G3		Total		
		N	%	N	%	N	%	N	%	
Gender	Female	3	0.10	21	0.70	17	0.57	41	0.46	0.158
	Male	27	0.90	9	0.30	13	0.43	49	0.54	
Total		30	100 %	30	100 %	30	100 %	90	100 %	

Data analysis categorization by age group

The average age of hypertensive patients receiving treatment with Diovan and who were also smokers (G1) was calculated to be 53.27 years, whereas the average age of hypertensive patients receiving Diovan treatment without smoking (G2) was slightly lower at 50.93 years. In comparison, the average age of the control group (G3) was notably younger at 44 years. To facilitate analysis, the age parameter was categorized into three main groups: (30-44), (45-59), and 60+ years, aiming for ease of interpretation.

Among these age groups, the most heavily affected was 40-59 years category, comprising 57 patients, which accounted for 63.33% of the total sample. Following closely behind, 30-44 years age group consisted of 20 subjects, constituting 22.22% of the population. Conversely, 60+ years age group exhibited the lowest representation, with only 13 patients, making up 14.45% of the cohort, as illustrated in Table 3. This distribution underscores a predominance of hypertensive patients within the middle-aged to late middle-aged demographic, with a notable drop-off in representation among older individuals. Such insights into age distribution are crucial for understanding the demographic characteristics of the study population and can inform targeted interventions and treatments tailored to specific age groups.

Table 3:The frequency by age group.

Groups (years)	No	Percentage (%)
(30-44)	20	22.22
(45-59)	57	63.33
60+	13	14.45
Total	90	100.00

The relative frequency of three groups by gender and age group

In our study, a total of 90 patients participated, with 49 being male and 41 females. Subjects were categorized into three distinct age groups: 30-44 years, 45-59 years, and 60+ years. Among these groups, 45-59 years age emerged as the most affected, comprising 20 patients, representing 66.67% of male participants in G1. Following closely behind, the 30-44 years age group included 16 female patients in G3, constituting 53.33% of that group, while in G2, 45-59 years age group comprised 15 female subjects, accounting for 50% of the group.

Statistical analysis revealed no significant differences in age distribution among the three groups, with P-values of 0.065, 0.094, and 0.077 for the respective age groups. These findings, as presented in Table 4, underscore the similarity in age demographics across all study groups, suggesting that age did not exert a significant influence on the characteristics of the participants. This uniformity in age distribution ensures a balanced representation of different age groups, enhancing the reliability and generalizability of our study results.

Table 2:- The relative frequency of three groups by gender and age group.

Groups	Gender	Age group (yrs)						P-value
		(30-44)		(45-59)		60+		
		No.	%	No.	%	No.	%	
Group 1	Male	3	10	20	66.67	4	13.33	0.065

	Female	0	0	2	6.67	1	3.33	
Group 2	Male	0	0	5	16.66	4	13.33	0.094
	Female	2	6.67	15	50	4	13.33	
Group 3	Male	6	20	7	23.33	0	0	0.077
	Female	16	53.33	1	3.33	0	0	

Oral manifestations

All subjects in this study were examined if there are any oral findings for each subject like periodontitis disease, dry mouth, lichenoid drug reaction and gingival enlargement for each group.

Data analysis categorization according to oral manifestations

Among the 90 patients included in our study, the most prevalent oral manifestation observed was periodontitis and dry mouth, with a frequency of 28 cases, representing 45.7% of the total sample. Following closely behind was periodontitis alone, documented in 14 cases, constituting 23.3% of the cohort. Conversely, the least frequently observed oral manifestation was a lichenoid drug reaction, present in only one case, accounting for 1.7% of the total sample. These findings, outlined in Figure 1 depicting pie charts of oral manifestation types, provide valuable insights into the prevalence and distribution of various oral health conditions among the study population. Such detailed analysis enables a comprehensive understanding of the oral health profile of patients with hypertension, aiding in the development of targeted interventions and treatment Strategies.

The relative frequency of three groups by oral findings

In our study involving a total of 90 patients, we observed a notable discrepancy in the occurrence of periodontitis among different individuals, with a statistically significant difference noted (P=0.037). However, upon further analysis, no significant differences were detected in the prevalence of other oral manifestation types across the entire study population, with all P-values exceeding 0.05.

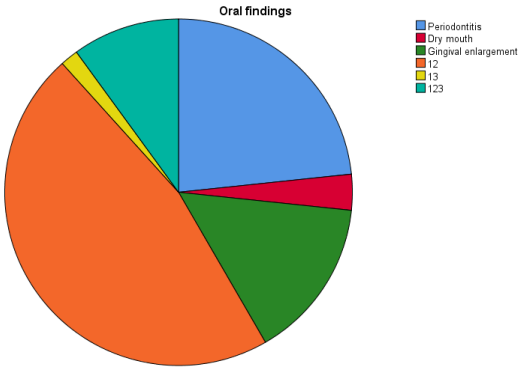

Figure 1. The pie charts illustrate the distribution of oral manifestation types along with their respective percentages. Note: Oral manifestation types is defined as: 1= Periodontitis, 2= Dry mouth, 3= Lichenoid drug reaction and 4= Gingival enlargement.

These findings, as delineated in Table 6, underscore the importance of periodontitis as a distinct oral health concern within the context of hypertension, warranting further investigation and targeted interventions.

Table 3:- The relative frequency distribution of three groups according to oral manifestation

Oral Findings type	Groups G1	G2	Total	P-Value
Periodontitis	20	22	42	0.037
Dry mouth	6	2	8	0.137
Lichenoid drug reaction	1	0	1	0.389
Gingival enlargement	3	6	9	0.272
Total	30	30	60	

Discussion

The current study demonstrated that hypertensive individuals undergoing medical treatment but without smoking habits exhibit a lower susceptibility to oral diseases compared to smokers. The role of oral medicine specialists in identifying oral manifestations of hypertension is firmly established. Among the various oral changes observed in hypertension patients, periodontitis emerged as the primary concern. Although oral manifestations in hypertensive patients may go unrecognized, antihypertensive medications often trigger side effects such as xerostomia, salivary gland

enlargement, salivary gland pain, altered taste sensation, and lichenoid drug reactions within patient groups.[11]

Periodontitis, characterized by chronic inflammatory changes in the oral cavity, poses a significant risk as the mouth serves as an ideal breeding ground for bacteria, potentially leading to fatal bacterial infiltration into the bloodstream through diseased oral tissues. [8] Our study revealed that hypertensive individuals who smoke exhibited the most statistically significant prevalence of periodontitis, contrasting with previous findings that suggested a higher significance of gingival enlargement.[11]

Arterial hypertensive patients with an inflammatory tendency demonstrated widened lymphatic vessels compared to controls, suggesting a potential lymphogenic mechanism underlying inflammation.[13,14] Moreover, inflammatory gingival pathology in arterial hypertension was associated with significantly elevated absolute neutrophil counts, indicating intense inflammatory processes and increased tissue volume.[15] This suggests that the development of periodontitis in hypertension may be influenced by these inflammatory mechanisms.[16]

Dry mouth did not exhibit statistically significant differences between groups with and without smoking, consistent with previous research indicating that Diovan does not induce xerostomia, though it may occur in combination with other medications such as metoprolol.[17,18] Conversely, lichenoid drug reactions, characterized by white lesions with linear patterns on buccal mucosal cells, were infrequently observed in our study, primarily induced by medications like ACE inhibitors rather than Diovan, as in our study.[19]

Gingival enlargement, a common feature of oral diseases, did not show significant differences between hypertensive patients with and without smoking, aligning with findings regarding side effects of hypertensive drugs like Nifedipine or Amlodipine, though our study employed Diovan medication.[20] Some authors suggest that differential control of systolic and diastolic hypertension may be associated with certain oral findings, while others propose that initial tissue damage by increased blood pressure triggers local immune responses.[21] Additionally, abnormalities in microcirculation may contribute to or exacerbate elevated blood pressure levels.[22,23] Limitations of our study includes our study included a total of 90 patients, the relatively small sample size might limit the generalizability of our findings to broader populations. Despite efforts to ensure gender balance within the study groups, the unequal distribution of male and female participants may introduce bias into our results. Longitudinal studies tracking participants over time would offer insights into the progression of oral manifestations in hypertensive individuals and the efficacy of interventions.

Conclusion

The study was compared between hypertension taking Diovan drug in Smokers and Non-smokers. Nevertheless, the results unsuccessful are to know the periodontitis is generated by the hypertension patient in Smokers and Non-smokers. The only complication was periodontitis for the three groups and their side effects that was increased with age. The mucosal variations were mainly because of the antihypertensive medications (Diovan). Oral complications with chronic diseases such as hypertension patients that need long-term medication treatment are inevitable, and it is not potential to change the treatment or reduce the dosage for the most cases. Consequently, fixed dental investigations and the use of empirical treatment may show a crucial key in enhancing their value of human life. Furthermore, some human revealing augmented occurrence of dental caries due to the related to the hypertension medications with smoker. The most frequent of oral manifestation was periodontitis for hypertension in Smokers and Non-smokers.

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