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HYPERTENSIVE PATIENTS: FROM THE CHARACTERIZATION TO THE ASSOCIATION OF FACTORS RELATED TO DISEASE AND ORAL HEALTH

¹Francisco Cezanildo Silva Benedito, ²Mário Incada, ¹Davide Carlos Joaquim, ³Gabriela Silva Cruz, ⁴Erika Helena Salles de Brito, ⁴Edmara Chaves Costa, ⁵Cosmo Helder Ferreira da Silva, ¹Nicásio Urinque Mendes, ⁶Andressa Aires Alencar and ^{4,*}Ana Caroline Rocha de Melo Leite

¹Postgraduate of the Academic Master in Nursing of the University of International Integration of Afro-Brazilian Lusophony (UNILAB), Redenção – CE – Brazil

²Graduate in Nursing by UNILAB Redenção – CE – Brazil

³Doctorate of the Post-Graduate Program in Pharmaceutical Sciences, Federal University of Ceará (UFC), Fortaleza – CE – Brazil

⁴Professor of the Institute of Health Sciences of the UNILAB, Redenção – CE – Brazil

⁵Professor of the Catholic University Center of Quixadá (Unicatólica), Quixadá – CE – Brazil

⁶Dentist, resident in Family and Community Health – RIS/ESP-CE

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*Corresponding author:

Ana Caroline Rocha de Melo Leite

ABSTRACT

This study aimed to characterize and associate factors related to the development of systemic arterial hypertension and oral health of hypertensive patients from a municipality of Ceará. This was a descriptive and quantitative study conducted with hypertensive patients from Aratuba - CE. After consent, a questionnaire was applied. For association between variables, Chi-square, Mann-Whitney and Kruskal-Wallis tests were applied according to their applicability. A value of $p < 0.05$ was given. Of the 180 participants, 60% were female and 73.33% had family history of hypertension. Of the hypertensive patients, 53.33% were aware of oral diseases, 60% didn't conceive the influence of hypertension on oral health and 93.33% admitted their influence on general health. The highest median age was observed among those who weren't aware of oral diseases and those who didn't have the perception that hypertension influenced oral health. There was significant association between being male and having this perception. It was concluded that hypertensive patients had adequate habits and behaviors in oral health and were unaware of the influence of hypertension on oral health. Still, some biological and social elements correlated to aspects of oral health and modifiable factors of systemic arterial hypertension.

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INTRODUCTION

Considered as an important global public health problem (Ye et al., 2018), Systemic Arterial Hypertension (SAH) is a multifactorial pathology that affects middle-aged individuals characterized by persistent elevation of blood pressure levels (equal to or higher than 140 mmHg and / or equal to or higher than 90 mmHg for systolic and diastolic blood pressure, respectively) (Malachias et al., 2016), capable of promoting functional and / or structural changes in target organs (Lopes et al., 2015). Its etiology involves the participation of non modifiable factors (represented by age, heredity, sex, family history and others) and modifiable (represented by smoking, alcohol consumption, sedentary lifestyle, eating habits and

others) in the development of primary hypertension. For secondary hypertension, its appearance caused by the presence of a major pathology (Obarisiagon et al., 2018). In epidemiological terms, SAH affects more than one billion people worldwide, with an estimated 1.2 billion individuals in the next decades (Roerecke et al., 2018). In the United States, data indicate that approximately one-third of Americans are diagnosed with hypertension or use antihypertensive drugs (Mozaffarian et al., 2016). In Brazil, studies show that hypertension affects approximately 32.5% of the adult population and more than 60% of the elderly, contributing significantly to deaths from cardiovascular disease (Malachias et al., 2016). In the Brazilian Northeast, a prevalence of hypertension of 31.1% was recorded in individuals aged 18 years or older (Picon et al., 2012), and, in Ceará, about 20% of

the population above that age is hypertensive (Gadelha *et al.*, 2013). Specifically, Aratuba, a municipality in the state of Ceará, located in the Baturité Massif, stands out by the greater number of individuals with hypertension among the cities of the Massif (Brazil, 2010). This is one of the macroregions of the state of Ceará that contains, in two of its municipalities, campi of an international university of Brazil, created with the purpose of promoting regional development and scientific, educational and cultural exchange among the Portuguese speaking countries (Silva *et al.*, 2015). In this context, the literature mentions improvements in the areas of health, education and culture in one of the cities that make up the Massif, promoted by the presence of said university (Machado *et al.*, 2017). In the context of the disease, hypertension affects the general health of the individual and may compromise his oral health, due to vascular changes and drug therapy (Silva *et al.*, 2016). On the other hand, oral pathologies, particularly periodontal disease, may contribute to the development of hypertension (Morita *et al.*, 2010). Therefore, it's expected the presence of oral disorders, such as hyposalivation, periodontitis and gingivitis (Ahmed; Tahir; Ahmed, 2016), xerostomia and alteration of the palate (Bakhtiari *et al.*, 2018), halitosis, caries and tissue healing deficiency (Mussane *et al.*, 2018) in hypertensive individuals. Thus, based on the importance of hypertension in the world scenario, the role played by its etiological factors and the interrelationship between this pathology and oral health, as well as the high number of hypertensive patients in Aratuba and the possibility of changes in the health area by the presence of the University of International Integration of Afro-Brazilian Lusophony (UNILAB) in its vicinity, the study aimed to characterize and associate factors related to the development of hypertension and oral health of hypertensive of the said municipality.

MATERIALS AND METHODS

It was a descriptive and quantitative study, carried out from December 2017 to March 2018, with hypertensive patients attending basic health units in the city of Aratuba - CE. For the inclusion of participants, the following criteria were established: - have a diagnosis of hypertension; - be properly registered in the Family Health Strategy; - attend follow-up visits. The individuals diagnosed with mental disorders that made data collection unfeasible were excluded from the study. After the signing of the Free and Informed Consent Term (FICT), a questionnaire was applied, developed by the authors, containing objective and subjective questions, addressing the following points: - socioeconomic and demographic aspects; - history and disease control; - knowledge about oral pathologies and preventive forms; - perception about the influence of hypertension on oral health and that on general health; - participation in educational actions; - use of total prosthesis and means and frequency of oral hygiene; - presence of gingival bleeding; - search and follow-up by the dentist; - lifestyle. The data obtained were organized in the program Excel for Windows, version 2013, and analyzed by the program Epi Info, version 7.0.2. A descriptive analysis of the variables was performed, obtaining the absolute and relative frequencies. To evaluate the association between the category variables, Chi-square test was applied. For the data normality analysis, the Kolmogorov-Smirnov test was applied in the GraphPad program, version 5.00. In view of the non-normality of the data, the non-parametric Mann-Whitney and Kruskal-Wallis tests were used for the comparison between two or three or more groups, respectively. It adopted a p value <0.05.

The project was approved by the Research Ethics Committee of the UNILAB, according to opinion number 566.465.

RESULTS

The study included 180 hypertensive patients with an average age of 57.6 years (± 11.14), of which 60% (n = 108) were female, 83.33% (n = 159) were from Aratuba and 53.33% (n = 96) lived without partners. As for education, occupation and family income, 16.66% (n = 30) of hypertensive patients had 5-year study, 53.33% (n = 96) were retired and 80% (n = 144) had income from one to three minimum wages. Regarding the diagnosis and control of hypertension, the mean time of diagnosis was 10.5 years (± 8.8) and 86.66% (n = 156) of the participants reported having it under control. With regard to family history and the presence of comorbidities, 73.33% (n = 132) of hypertensives had cases of the disease in the family and 66.66% (n = 120) admitted to having no other type of illness except Diabetes Mellitus. Of the total participants, 46.66% (n = 84) were diabetics and all claimed to control it. Regarding diabetes time and family history, 42.85% (n = 36) of diabetic hypertensives had diabetes for 3 years and 71.42% (n = 60) had cases of the disease in the family. With respect to alcoholic beverages, 33.33% (n = 60) of respondents had never consumed alcohol, equal to the quantity obtained between the stationary and who had consumed and still consumed. Of these, 30% (n = 18) consumed alcoholic beverages twice a week. Regarding tobacco consumption, 53.33% (n = 96) of hypertensive patients no longer had this habit. With regard to knowledge about oral diseases, 53.33% (n = 96) of participants knew these diseases. Oral diseases, caries, gingivitis, periodontitis, oral cancer, alveolitis, halitosis, cold sores and herpes, have been mentioned. As for how to avoid them, 60% (n = 108) of hypertensive people knew how to prevent them. The ways mentioned were brushing, periodic visit to the dental surgeon, exodontia, non-sharing of used utensils, proper diet and use of charcoal. Regarding the use, means and frequency of hygiene of the total prosthesis, 60% (n = 108) of the patients used, 39.81% (n = 43) used only dentifrice and 44.44% (n = 48) brush it three times a day. Of those who did not use a full denture, 50% used toothbrush and toothpaste, and all of them cleaned their teeth three times a day. About the presence of bleeding during toothbrushing, 93.33% (n = 168) of hypertensive individuals did not present this type of disorder. Regarding to guidelines on the tooth hygiene and / or prosthesis, 53.33% (n = 96) of the participants already had this type of information. Among them, 97.91% (n = 94) had been guided by the dentist. Everyone had already gone to this professional or were accompanied by him. For the influence of hypertension or diabetes on oral health, 60% (n = 108) of hypertensives do not admit this type of influence. Regarding the concept that oral health interferes with general health, 93.33% (n = 168) of the participants recognized this type of influence. When comparing the medians of age, according to knowledge about oral diseases and preventive forms, the data showed a higher median among those who did not know this type of disease (64 years) (p = 0.00) and their preventive means (64 years) (p = 0.00). This median was also higher among those who did not perceive that hypertension influenced oral health (62 years) (p = 0.00) and had not participated in oral health education (64 years) (p = 0.00). For alcohol and tobacco consumption, the median was higher among those who had never consumed alcoholic beverages (60 years) (p = 0.00) and among those who had smoked and stopped (62 years) (p = 0.00) (Table 1).

Table 1 - Comparison between the medians of age, according to knowledge and awareness in oral health, participation in educational actions and consumption of alcohol and tobacco of hypertensive patients. Aratuba - CE, Brazil, 2017 – 2018

Variables (N = 180)	Mean age in years (\pm DPM ^a)		Median age in years	P value
Knowledge about oral diseases				
Yes	50,8 (9,8)		54	0,00 [*]
No	64,2 (7,1)		64	
Knowledge about the preventive forms of oral diseases				
Yes	53,4 (10,6)		57	0,00 [*]
No	62,8 (8,7)		64	
Perception of the influence of HAS ^b on oral health				
Yes	53,2 (8,1)		57	0,00 [*]
No	59,7 (11,8)		62	
Perception of the influence of oral health on general health				
Yes	56,8 (11,2)		59	0,06 ¹
No	61,7 (0,4)		62	
Participation in EOH ^c actions				
Yes	52,7 (10,6)		58,5	0,00 [*]
No	62,5 (8,8)		64	
Alcohol consumption				
Never drank	62,6 (5,0)		60	0,00 ^{2*}
Drank but stopped	58,3 (9,5)		53	
Drink	50,4 (12,9)		54	
Tobacco use				
Never smoked	53,5 (10,8)		54,5	0,00 ^{2*}
Smoked but stopped	62,7 (7,0)		62	
Smokes	47,2 (10,5)		51	

^aMean Standard Deviation; ^bSystemic Arterial Hypertension; ^cOral Health Education; ¹Mann-Whitney test; ²Kruskal-Wallis test; *P <0.05.

Table 2. Relationship between sex, knowledge and awareness in relation to oral health, participation in educational actions and consumption of alcohol and tobacco of hypertensive individuals. Aratuba - CE, Brazil, 2017 – 2018

Variables (N = 180)	Sex		P value ¹
	Male n (%)	Female n (%)	
Knowledge about oral diseases			
Yes	36 (20,0)	60 (33,3)	0,46
No	36 (20,0)	48 (26,7)	
Knowledge of preventive forms of oral diseases			
Yes	36 (20,0)	72 (40,0)	0,02 [*]
No	36 (20,0)	36 (20,0)	
Perception regarding the influence of SAH ^a on oral health			
Yes	12 (06,7)	60 (33,3)	0,00 [*]
No	60 (33,3)	48 (26,7)	
Perception of the influence of oral health on general health			
Yes	60 (33,3)	108 (60,0)	0,00 [#]
No	12 (06,7)	00 (00,0)	
Participation in EOH ^b actions			
Yes	36 (20,0)	60 (33,3)	0,46
No	36 (20,0)	48 (26,7)	
Alcohol consumption			
Never drank	00 (00,0)	60 (33,3)	0,00 [*]
Drank but stopped	24 (13,3)	36 (20,0)	
Drink	48 (26,7)	12 (06,7)	
Tobacco use			
Never smoked	12 (06,7)	36 (20,0)	0,00 [*]
Smoked but stopped	36 (20,0)	60 (33,3)	
Smokes	24 (13,3)	12 (06,7)	

^aSystemic Arterial Hypertension; ^bEducation in Oral Health; ¹Chi-square test; [#]Invalid test; *P <0.05. For structural reasons, the dependent variables were represented in the first column of the table and the independent variable in the first row.

When assessing the relationship between sex and knowledge about the preventive forms of oral pathologies, a significant association was found between being female and knowing the preventive means ($p = 0.02$). When the perception of the influence of hypertension on oral health was evaluated, there was a significant association between being male and having this perception ($p = 0.00$). For alcohol and tobacco consumption, there was a significant relationship between being female and never having ingested alcoholic drink ($p = 0.00$) and having smoked and stopped ($p = 0.00$) (Table 2). When comparing the medians of the study years, according to knowledge about oral pathologies and preventive forms, the data showed a higher median among those who knew this type of disease (12 years) ($p = 0.00$) and their means (11 years) ($p = 0.00$). This median was also higher among those who had perceived that hypertension influenced oral health (11.5 years)

($p = 0.00$) and had participated in oral health educational actions (11.5 years) ($p = 0.00$). For the consumption of tobacco and alcohol, the median was greater among those who ingested alcoholic beverages (11 years old) ($p = 0.00$) and lower in those who had smoked and quit (5 years) ($p = 0.00$) (Table 3). When assessing the relationship between the conjugal situation and the knowledge about oral pathologies and preventive forms, a significant association was observed between not having a partner and knowing these pathologies ($p = 0.00$) and preventive means ($p = 0.02$). When assessing the perception of the influence of hypertension on oral health, there was a significant association between having a partner and not having this perception ($p = 0.00$). For the influence of oral health on general health, a significant relationship was observed between not having a partner and having this perception ($p = 0.00$).

Table 3. Comparison between the medians of the study years, according to knowledge and perception in oral health, participation in educational actions and consumption of alcohol and tobacco of hypertensives. Aratuba - CE, Brazil, 2017 – 2018

Variables (N = 180)	Average years of schooling (\pm DPM ^a)	Median years of schooling	P value
Knowledge about oral diseases			
Yes	12,1 (4,3)	12	0,00 ^{1*}
No	3,7 (1,3)	4	
Knowledge of preventive forms of oral diseases			
Yes	11,2 (4,9)	11	0,00 ^{1*}
No	3,6 (1,1)	4	
Perception regarding the influence of SAH ^b on oral health			
Yes	11,7 (4,7)	11,5	0,00 ^{1*}
No	5,8 (4,3)	5	
Perception of the influence of oral health on general health			
Yes	8,4 (5,4)	7,5	0,44 ¹
No	5,0 (0,0)	5	
Participation in EOH ^c actions			
Yes	11,6 (4,5)	11,5	0,00 ^{1*}
No	4,2 (2,9)	3	
Alcohol consumption			
Never drank	6,9 (4,0)	5	0,00 ^{2*}
Drank but stopped	7,3 (5,2)	4	
Drink	10,2 (6,0)	11	
Tobacco use			
Never smoked	11,4 (6,2)	13	0,00 ^{2*}
Smoked but stopped	5,7 (3,2)	5	
Smokes	10,5 (5,5)	13	

^aMean Standard Deviation; ^bSystemic Arterial Hypertension; ^cOral Health Education; ¹Mann-Whitney test; ²Kruskal-Wallis test; *P < 0.05.

Table 4. Relationship between the marital situation, knowledge and perception in oral health, participation in educational actions and consumption of alcohol and tobacco of hypertensive individuals. Aratuba - CE, Brazil, 2017 – 2018

Variables (N = 180)	Marital status		P value ¹
	With partner n (%)	Without partner n (%)	
Knowledge about oral diseases			
Yes	36 (20,0)	60 (33,3)	0,008 [*]
No	48 (26,7)	36 (20,0)	
Knowledge of preventive forms of oral diseases			
Yes	36 (20,0)	72 (40,0)	0,00 [*]
No	48 (26,7)	24 (13,3)	
Perception regarding the influence of SAH ^b on oral health			
Yes	24 (13,3)	48 (26,7)	0,003 [*]
No	60 (33,3)	48 (26,7)	
Perception of the influence of oral health on general health			
Yes	72 (40,0)	96 (53,3)	0,0001 [*]
No	12 (06,7)	0 (00,0)	
Participation in EOH ^c actions			
Yes	36 (20,0)	60 (33,3)	0,008 [*]
No	48 (26,7)	36 (20,0)	
Alcohol consumption			
Never drank	12 (06,7)	48 (26,7)	0,00 [*]
Drank but stopped	36 (20,0)	24 (13,3)	
Drink	36 (20,0)	24 (13,3)	
Tobacco use			
Never smoked	12 (06,7)	36 (20,0)	0,00 [*]
Smoked but stopped	60 (33,3)	36 (20,0)	
Smokes	12 (06,7)	24 (13,3)	

^aSystemic Arterial Hypertension; ^bEducation in Oral Health; ¹Chi-square test; *P < 0.05. For structural reasons, the dependent variables were represented in the first column of the table and the independent variable in the first row.

The same thing occurred for participation in educational health actions ($p = 0.00$). For alcohol and tobacco consumption, there was a significant relationship between not having a partner and never having ingested alcoholic beverage ($p = 0.00$) and between having a partner and having smoked and stopped ($p = 0.00$) (Table 4).

DISCUSSION

The findings here allowed us to understand the factors related to the development of systemic arterial hypertension and those related to the oral health of a population which is about the influence of an international university and that stands out due to the high number of hypertensive patients and a lack of information and resources. The results, when correlating the biological and social elements with aspects of oral health and

modifiable factors of systemic arterial hypertension, may contribute to a better targeting of actions more adequate for the prevention of diseases, in the scope of oral and general health. As for the mean age presented by hypertensive patients, a result similar to Macedo *et al.* (2017) and Jarab *et al.* (2018), can be understood if it is considered that hypertension can develop with the aging process. According to Bortolotto (2012), by the age of 60, there is fatigue of the elastin fibers, present in the middle layer of the great elastic arteries, due to the stress on the vascular wall, originating from the ventricular contraction. Consequently, there is lysis of these fibers, collagen proliferation and deposition of calcium, phenomena that promote vascular wall stiffness and increased susceptibility to arterial hypertension. Other mechanisms have also been proposed to justify this predisposition (Bortolotto, 2012). The results also showed a predominance of female

participants, just like Dias *et al.* (2019) and Andrade *et al.* (2014), a finding that may reflect the greater vulnerability of women to cardiovascular diseases (Lopez-Pier *et al.*, 2018). Indeed, in menopause, a significant reduction of estradiol (Abbas *et al.*, 2018) leads to the loss of anti-inflammatory and antioxidative activity of estrogen, compromising its beneficial action on lipid metabolism and vasculature (Das; Saikia; Sarma, 2019). However, the greater prevalence of women may result from their higher life expectancy and greater search for medical services, situations that increase the chances of diagnosing hypertension in this gender (Andrade *et al.*, 2014). As for the largest number of aratubenses participants, this data is understandable, since the study was conducted in Aratuba. When the marital status was evaluated, the largest number of participants without a partner differed from Mendes, Silva and Ferreira (2018) and Jarab *et al.* (2018), whose participants were mainly married. This result was surprising, since, based on the average age of participants, we expected a greater number of married individuals. However, according to the 2010 Demographic Census, there was an increase in cases of dissolution of marital unions, which may justify the present finding (Brazilian Institute of Geography and Statistics, 2010).

Regarding the low family income, it can be assumed that it results from the low schooling of the participants and high number of retirees. This low level of schooling was also observed by Andrade *et al.* (2014), Mendes, Silva and Ferreira (2018) and Shishavan *et al.* (2018). Regarding family income, the studies show a predominance among hypertensive individuals of income ranging from 1 to 3 minimum wages, as well as low wage earners (Ferreira; Barreto; Giatti, 2014; Naidu *et al.* 2019). Regarding the occupation of the participants, the result corroborated with researches by Cavalcanti *et al.* (2019) and Mendes, Silva and Ferreira (2018), who found a considerable number of hypertensive retirees. In relation to the high time of diagnosis of hypertension, when compared to the average age of the participants, it can be assumed that the hypertensive patients of this study had early disease, detected by the search for health services. It is possible that these services are efficient, which may explain the report that a large part of the participants had control of the disease. Moreover, the precocity of the disease may be a reflection of the high number of patients with a family history of hypertension, a fact also reported by Zhang *et al.* (2019) and Tobe *et al.* (2019). When analyzing the time of diagnosis of participants' hypertension, it appeared less dispersed than that presented by Cavalcanti *et al.* (2019). Regarding the presence of comorbidities, if the high time of diagnosis of hypertension was admitted, it was unexpected the low number of hypertensive patients who presented other disorders. In fact, hypertension is a condition that affects many different organs (Ağac *et al.*, 201; Macedo *et al.*, 2017). Particularly, the literature mentions, as possible mechanisms involved in the involvement of these organs, alterations in the arteries; inadequate ventricular relaxation; reduction of circulating blood volume in coronary arteries; histological alteration of the cerebral artery wall and functional and anatomical modifications of the glomerular capillary (Macedo *et al.*, 2017). In this sense, a study by Cavalcanti *et al.* (2019) pointed out, as comorbidities present in hypertensive individuals, cardiovascular and osteoarticular diseases, as well as diabetes and others. As for the coexistence of diabetes and hypertension, according to the American Diabetes Association (2019), it is common to experience hypertension concomitant with type 1 diabetes (Tsimhodimos *et al.*, 2018; Petrie *et al.*,

2018) or 2. As with hypertension, participants' reports of diabetes control may be due to the efficiency of the health service offered to them. Regarding the time of diagnosis of diabetes, a longer period was expected, since in addition to the possible early involvement of the patients by hypertension and the fact that it influenced the development of diabetes, most participants had a family history of diabetes. Indeed, hypertension, by promoting dysfunction and vascular injury, is a risk factor for the development of diabetes. On the other hand, this, by providing changes in the vasculature, can trigger hypertension (Petrie *et al.*, 2018). On the consumption of alcoholic beverage, considered an important risk factor for hypertension (Roerecke *et al.*, 2018), as the number of participants was equal between those who had never consumed, those who had consumed and those who consumed, a result that differed from Pharm *et al.* (2018), it was not possible to investigate the role of alcoholic beverage intake on hypertension. For the relationship between age and consumption of alcohol, the highest median age among hypertensive patients who had never consumed alcoholic beverages was unexpected, since this habit is usually instituted in adolescence (Adebayo and Adegoke, 2018). Regarding gender, the fact that the participant is female and has never consumed alcohol can be a reflection of this type of habit being more common among men (Roman; Siviero, 2018; Santana *et al.*, 2018). Regarding the association between education and consumption of alcoholic beverages, the higher median years of study among participants who consumed this type of drink may reflect a lack of awareness of the role of alcohol in the development of hypertension. However, it should be considered that the level of schooling presented by the participants was generally low, which may interfere with their knowledge about the risk factors, severity and complications of hypertension (Mussi *et al.*, 2018). When considering marital status, the observed association between participants who had no partner and had never consumed alcoholic beverage can be understood, based on the fact that, alcohol consumption can often be a means of escape from the responsibilities assumed before the family.

Regarding the amount of alcohol that should be ingested, it is advised to consume 30 mL of daily ethanol (approximately 2 doses) for men and 15 mL for women to avoid elevation of blood pressure (Mussi *et al.*, 2018). According to the World Health Organization (WHO) (2004), the acceptable intake is 15 doses / week for men and 10 for women. In this study, hypertensive patients consumed alcohol, usually twice a week and more than four glasses (4 doses) per day. Therefore, the intake may not have exceeded the recommended amount. With regard to tobacco consumption, the higher percentage of participants who no longer had this habit may be related to the awareness that it is a risk factor, not only for hypertension (Mussi *et al.*, 2018), but for different types of respiratory disorders (Piaulino and Maggioni, Carvalho, 2016). This awareness may have been influenced by the aging process of the participants, as the highest median age was between hypertensive patients who abdicated this practice. For smoking cessation, this result can be justified by the possible awareness of the role of cigarettes in the development of pathologies, as well as the lower incidence of this practice among women (Piaulino and Maggioni; Carvalho, 2016). Regarding the lower level of schooling presented among those who had stopped smoking, this phenomenon may result from the introduction of government measures, far-reaching, for the prevention and / or minimization of this habit (Piaulino; Maggioni; Carvalho,

2016). Corroborating this assumption, Issa and Lopes (2014) showed higher numbers of ex-smokers in Brazil. For the abstention of this habit among hypertensive patients with a partner, it can be understood by the individual's responsibility towards his partner, associated with the possible knowledge of the effects of smoking on passive smokers (Piaulino; Maggioni; Carvalho, 2016). With regard to knowledge about oral pathologies, the fact that more than half of the participants knew this type of disease differed from the study by Mussane *et al.* (2018). According to the authors, 57.1% of hypertensive patients stated that they did not know about oral diseases. In the present study, when questioned about the pathologies known, hypertensive patients mentioned the most frequent ones, represented by caries (Kassebaum *et al.*, 2015), periodontitis (Kassebaum *et al.*, 2017), gingivitis (Erchick *et al.*, 2019) and oral cancer (Asthana *et al.*, 2018). Regarding the higher median age presented among those who were not aware of these oral disorders, this data may result from lack of access to information and search for dental care (Souza *et al.*, 2019). As for the higher median of years of study among those who knew about oral diseases and preventive means, this finding was not unexpected, since, in general, the higher level of education implies a higher level of knowledge. Specifically, in the field of health, the literature mentions that the level of schooling is associated with greater knowledge and adoption of healthy behaviors (Pedraza *et al.*, 2018). For the relationship between knowing the oral pathologies and their preventive means and having no partner, this result can be a reflection of individual care, which may imply a greater demand for health services, access to information and participation in educational health actions (Borba *et al.*, 2019). In this study, a study of elderly diabetics showed a relationship between living alone in old age and having a positive self-care attitude (Borba *et al.*, 2019). With regard to the knowledge about the preventive forms of oral pathologies, the participants can have this type of knowledge because they are aware of the pathologies that affect the oral cavity, in addition to have already sought dental care and are accompanied by the dental surgeon. However, exodontia, mentioned by participants as a preventive form, is a therapeutic measure. Interesting phenomenon was the allusion to coal. This, because it is a resource used as a toothpaste by Africans and Asians (Gupta; Shetty, 2018), may justify its mention, as a preventive medium, by the respondents. It is also possible that this occurred due to charcoal presenting a bleaching property (Lubon *et al.*, 2018).

Regarding the higher median age observed among hypertensive patients who knew the preventive forms of oral diseases, this result can be derived from their own experience of life and greater access to information. As for the relationship between being female and knowing the preventive means of oral pathologies, this phenomenon can be understood considering the role that women assume in caring for their children (Lazzarini *et al.*, 2018). For prosthesis use, its use by many participants may be justified by the age and presence of pathologies such as hypertension and diabetes. In addition, the elderly are more susceptible to the use of this resource because of the greater risk of developing caries (as a result of tooth permanence and increased life expectancy) (Tellez *et al.*, 2019) and periodontal disease (Lima; Fajardo, 2016). The contribution of diabetes is based on elevated blood levels of proinflammatory cytokines and prostaglandins, an important risk factor for periodontal disease and tooth loss (Lima; Fajardo, 2016). For hypertension, its participation in tooth loss may be associated with its effects on periodontal blood vessels

and volume and salivary composition. With regard to the resources used by hypertensive patients who did not use a full denture for oral higienization, the use of only toothbrush and toothpaste, similar to Mussane *et al.* (2017), was inappropriate, since, according to the literature, oral hygiene should include the use of dental floss (Silva Junior *et al.*, 2016) and, if possible, mouthwash (Araújo *et al.*, 2017). For the frequency of brushing, it was only appropriate if admitted that hypertensives ate three meals daily. However, when compared to Mussane *et al.* (2017), the frequency recorded here was higher. Regarding gingival bleeding during toothbrushing, its absence may indicate the absence of gingivitis among the majority of those surveyed. Regarding the considerable percentage of participants who had received guidance on oral hygiene, especially for dentists, this event may be related to the fact that hypertensive patients have sought dental care or be accompanied by the dentist. However, it would be expected to mention the orientation of the nurse, since this daily lives with patients with hypertension, being responsible for daily care with oral health (Araújo *et al.*, 2010). Regarding the higher median age presented by hypertensive patients who had not participated in educational health actions, it can be assumed that it occurred due to the late search for dental care and, in that case, there was no oral health orientation. It is also possible that the health professionals who accompany them, especially the dental surgeon, nurse and physician, are not sufficiently sensitized to understand the importance of health education actions. Corroborating this assumption, Maria *et al.* (2018) pointed out a simplistic and alienating concept of health education by the different health professionals surveyed, in addition to a reduced participation in these actions. For the larger median of years of study among those who had participated in educational health actions, this finding may result from the awareness of the importance of adhering to habits that control blood pressure and reduce and prevent the risks of health problems, which can be achieved through educational health projects (BRASIL, 2013).

When investigated the influence of hypertension or diabetes on oral health, the considerable number of hypertensive patients who did not admit this type of influence, a finding similar to that observed by Mussane *et al.* (2017), contrasted with Silva *et al.* (2019). According to the authors, diabetic individuals may present periodontal disease, oral burning syndrome, altered taste, xerostomia and oral infections. The literature also points out a relationship between hypertension and periodontal disease (Rivas-Tumanyan *et al.*, 2013). Regarding the higher median age among those who did not conceive the influence of hypertension on oral health, this data may result from a lack of participation in educational health actions and / or be a reflection of the inconsistent knowledge of some studies (Rivas-Tumanyan *et al.*, 2013). For the association between being male and recognizing this relationship, this phenomenon was unexpected, since, in general, the man, when worrying less about health and presenting low demand for this type of service, would tend to have less access to health information (Alves *et al.*, 2011). With regard to the higher median of years of study presented among those who had this perception, this phenomenon can be understood by the fact that higher schooling usually implies greater knowledge. Regarding the association between having a partner and not having this perception, this result may be a reflection of a deficiency in individual care. Although a reasonable number of participants did not admit the influence of hypertension and diabetes on oral health, most respondents believed in the interference of

oral health on general health. Specifically, this data may result from a greater awareness of the participants regarding the possibility of microorganisms present in the oral cavity to spread to several areas of the organism (Leão *et al.*, 2018). For the association between not having a partner and having a perception of this influence, similar to the one already mentioned, this phenomenon can be derived from the self-care of this type of individual with his health.

Conclusion

From the results obtained it can be concluded that hypertensive population had an underprivileged profile, with early onset of the disease, greater familial susceptibility and less comorbidities. In the context of oral health, many of the participants were aware of oral pathologies and their preventive means and presented adequate oral health habits and behaviors. Many were unaware of the influence of hypertension / diabetes on oral health, but a high number of participants were aware of its influence on overall health. Within the present relationship between the factors associated with the development of hypertension and oral health, some biological and social factors correlated with aspects of oral health and modifiable factors of systemic arterial hypertension.

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