

Evaluation of changes in blood pressure in patients submitted to dental surgical procedures

Avaliação das alterações na pressão arterial em pacientes submetidos a procedimentos cirúrgicos odontológicos
Evaluación de alteraciones en la presión arterial en pacientes submetidos a procedimientos quirúrgicos odontológicos

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Abstract

The present study aimed to evaluate the occurrence of significant changes in systemic blood pressure (SBP) during surgical-dental procedures. A prospective study was performed with a sample of 135 randomly selected individuals who underwent surgical procedures at the Bucomaxillofacial Surgery Clinic of the Dentistry School of the ESFA (ES) between the second half of 2017 and April 2018. After consent, sociodemographic, lifestyle data, weight and height were obtained through a questionnaire, weighing and measurement, respectively. BP measurements were performed at three moments: preoperative (BP1), intraoperative (BP2) and postoperative (BP3) using a mercury column sphygmomanometer and stethoscope. Values <120/80 mmHg were used as normal values. When BP1 and BP2 were compared, 63.0% remained within normal values and 22.2% reached the stage of hypertension. In the comparison of BP1 and BP3, 66.7% remained normal, and only 7.4% reached the stage of hypertension. When BP2 and BP3 were compared, 53.6% remained within the normality stage and 12.2% reached the stage of hypertension. It was concluded that there were variations in blood pressure, being the largest variation found in BP2, and can be attributed to the stress caused by the surgical act, since no statistically significant connections were found between the changes in blood pressure and the anesthetics used in the research.

Descriptors: Surgery, Oral; Hypertension; Anxiety; Anesthetics.

Resumo

O presente estudo tem como objetivo avaliar a ocorrência de alterações significativas na pressão arterial sistêmica (PAS) durante procedimentos cirúrgicos-odontológicos. Estudo prospectivo com amostra correspondente a 135 indivíduos selecionados aleatoriamente, que foram submetidos a procedimentos cirúrgicos na clínica de Cirurgia Bucomaxilofacial do Curso de Odontologia da ESFA (ES) entre o segundo semestre de 2017 e abril de 2018. Após o consentimento, os dados sociodemográficos e de estilo de vida, peso e altura foram obtidos por meio de um questionário, pesagem e medição, respectivamente. Foram realizadas aferições da PA em três momentos: pré-operatório (PA1), transoperatório (PA2) e pós-operatório (PA3) utilizando esfigmomanômetro de coluna de mercúrio e estetoscópio. Utilizou-se como padrão de normalidade valores (<120/80 mmHg). Quando comparada a PA1 com a PA2, 63,0% se mantiveram dentro dos valores de normalidade e 22,2% atingiram o estágio de hipertensão. Na comparação da PA1 com a PA3, 66,7% mantiveram estágio de normalidade e apenas 7,4% chegaram ao estágio de hipertensão. Quando comparada a PA2 com a PA3, 53,6% mantiveram dentro do estágio de normalidade e 12,2% atingiram o estágio de hipertensão. Conclui-se que ocorreram variações na pressão arterial, sendo a maior variação encontrada na PA2, podendo ser atribuída ao estresse causado pelo ato cirúrgico, visto que, não foram encontradas relações estatisticamente significantes nos cruzamentos entre as alterações na pressão arterial com os anestésicos utilizados na pesquisa.

Descritores: Cirurgia Bucal; Hipertensão; Ansiedade; Anestésicos.

Resumen

El presente estudio tiene como objetivo evaluar la ocurrencia de cambios significativos en la presión arterial sistémica (PAS) durante procedimientos quirúrgicos-odontológicos. Estudio prospectivo con muestra correspondiente a 135 individuos seleccionados aleatoriamente, que fueron sometidos a procedimientos quirúrgicos en la clínica de Cirugía Bucomaxilofacial del Curso de Odontología de la ESFA (ES) entre el segundo semestre de 2017 y abril de 2018. Después del consentimiento, los datos sociodemográficos y de estilo de vida, peso y altura fueron obtenidos por medio de un cuestionario, pesaje y medición, respectivamente. Se realizaron mediciones de la PA en tres momentos: preoperatorio (PA1), transoperatorio (PA2) y postoperatorio (PA3) utilizando esfigmomanómetro de columna de mercurio y estetoscopio. Se utilizó como patrón de normalidad valores (<120/80 mmHg). Cuando se comparó la PA1 con la PA2, el 63,0% se mantuvo dentro de los valores de normalidad y el 22,2% alcanzó la etapa de hipertensión. En la comparación de la PA1 con la PA3, el 66,7% mantuvieron una etapa de normalidad y sólo el 7,4% llegó a la etapa de hipertensión. Cuando se comparó la PA2 con la PA3, el 53,6% mantuvo dentro de la etapa de normalidad y el 12,2% alcanzó la etapa de hipertensión. Se concluye que ocurrieron variaciones en la presión arterial, siendo la mayor variación encontrada en la PA2, pudiendo ser atribuida al estrés causado por el acto quirúrgico, ya que no se encontraron relaciones estadísticamente significativas en los cruces entre los cambios en la presión arterial con los anestésicos utilizados en la intervención búsqueda.

Descriptores: Cirugía Bucal; Hipertensión; Ansiedad; Anestésicos.

INTRODUCTION

During clinical practice, the dental

surgeon routinely treats systemically compromised patients. Among them are the

hypertensive patients who need a differentiated attention due to several external factors that can influence their systemic condition¹.

Due to the high prevalence of Systemic Arterial Hypertension (SAH), which affects 30% of the Brazilian population, it is estimated that by 2025 this disease can affect 1.6 billion people worldwide².

Associated with SAH there are some risk factors such as smoking, alcoholism, sedentary lifestyle, age, gender, overweight and family history of hypertension, which in turn accompany the absence of symptoms for the hypertension leading to a late diagnosis, which proves to be essential to assessment of blood pressure (BP) by all health professionals³.

In order to obtain a control of the SAH that affects a large part of the population, the measurement of the blood pressures is performed using a manual sphygmomanometer, the most used among professionals. This step is indispensable for the best diagnosis⁴.

The evaluation of the BP change must be done in hand-held devices, since studies have shown that the automated gauging does not reach the level of accuracy of a manual device, making the manual blood pressure device a reference standard for its accuracy⁵⁻⁷.

Concerning the alteration of BP, local anesthetics present great relevance; its use in conjunction with vasoconstrictors is widely diffused in dentistry because it promotes improvement in pain control during dental procedures. However, some vasoconstrictors have the potential to increase BP values, leading to hypertensive spikes during dental procedures⁸.

In addition to the aforementioned factors, the anxiety experienced by many patients must be taken into attention, since it is one of the most frequent diseases worldwide, being the same, a risk factor for cardiovascular diseases⁹.

The objective of the present study was to evaluate the occurrence of significant changes in systemic arterial pressure of patients submitted to dental surgical procedures at the Bucomaxillofacial Surgery Clinic of the Escola Superior São Francisco de Assis – ESFA, Santa Teresa-ES, Dentistry school.

MATERIAL AND METHOD

For the research instrument, patients were randomly selected, without age restriction and gender/ethnicity predilection who attended the Bucomaxillofacial Surgery Clinic of the Escola Superior São Francisco de Assis – ESFA, Santa Teresa-ES, in the period between the second half of 2017 and April 2018 to perform surgical dental procedures. After the

patient agreement to participate in the research, he/she signed a free and informed consent form (Appendix A) authorizing the research. The patients were submitted to anamnesis (Appendix B), in which questions addressed the detection of risk factors related to Systemic Arterial Hypertension. Sociodemographic and lifestyle data were addressed. For the calculation of the Body Mass Index (BMI), the weight in kilograms was recorded by means of a digital scale and the height was measured with the aid of a tape measure, classified according to the Brazilian Association for the Study of Obesity - ABESO (Annex B). The BP measurements were performed after anamnesis by the same evaluator using the palpatory and auscultatory method using a mercury column apparatus and stethoscope, and a periodic preventive calibration was made for the accuracy of BP measurement.

Three BP measurements were performed before the surgical procedure (BP1), 5 minutes after infiltration of the local anesthetic (BP2) and 5 minutes after suture (BP3). Systolic pressure was determined at the time of appearance of the first sound (korotkoff phase I), which intensified with increasing deflation velocity. The diastolic pressure was determined in the disappearance of the sound (phase V of Korotkoff). Approximately 20 mmHg was heard at 30 mmHg below the last sound to confirm its disappearance and then rapid and complete deflation proceeded. All data collected were recorded, tabulated and submitted to statistical analysis.

o Type of Study and Research Design

This is a prospective research and a comparison study of data obtained through clinical research performed at the Bucomaxillofacial Surgery Clinic of the Escola Superior São Francisco de Assis – ESFA, Santa Teresa-ES.

o Research and Sample Universe

The research universe was all the patients who attended the dental clinic of the ESFA to perform the surgical procedure. The sample comprised 135 (n) patients who underwent dental surgical procedures.

o Inclusion and Exclusion Criteria

Patients submitted to dental surgical procedures at the clinic of oral and maxillofacial surgery of the ESFA between the second half of 2017 and April 2018 were included in the study. Pregnant patients and patients who presented initial blood pressure above 160/100 mmHg, due to the impossibility of performing the procedure, following the clinical protocol of the institution, were excluded.

○ *Data analysis*

For cross-checking between categorical variables, the statistical technique used for analysis was cross-tables with chi-square test. A cross-table shows the number of cases in each category, defined by two or more groups of categorical variables. The chi-square test tests the hypothesis that the variables in a cross-table are independent and there is no relation between them. When we have a significant p-value (<0.050) we reject this hypothesis, that is, there is some relation between these variables. The chi-square test is not performed when there are cells with expected results of less than five for the null hypothesis, in which situation Fisher's Exact test (for 2x2 tables) or the maximum likelihood ratio will be used if the variable more than two categories. BP1 was used as a parameter among the variables due to the lower interference of external factors. The value used as a parameter of normality for blood pressure classification was: <120/80mmHg.

○ *Ethical aspects*

This study was conducted after approval of the Research Ethics Committee - Hospital Meridional S/A (ANNEX A) under the number of CAAE: 79238017.9.0000.5070. Patient identities were preserved at all stages of the study.

All volunteers received a copy of the Free and Informed Consent Form in accordance with the Directives and Norms Regulating the National Health Council (Resolution 466/2012 CNS), and for those under 18, the term was signed by their parents or legal guardians.

RESULTS

The results of the present study are presented in Tables 1, 2, 3, 4, 5 and 6. When analyzing the age range of the sample studied those individuals with 50 years of age or older represented the highest percentage for stage II hypertension status (38.9%), when compared to the other age groups. Cheng et al.¹⁰ report that in their sample, participants over 60 years of age (27.8%) had elevated BP. Other studies, such as: Zhang et al.¹¹; Xing et al.¹²; Shang et al.¹³; Zhang et al.¹⁴; Thomas et al.¹⁵, agree that hypertension is interrelated with increasing age.

Regarding smoking habits, of the interviewed patients, 14.8% answered that they were smokers and 36.1% of them reached the stage of hypertension, which is corroborated by a study by Ahmad Jamalzadeh et al.¹⁶ who report a prevalence of smoking of 11.2%. Torlasco et al.¹⁷, argue that smoking was the main cause of hypertension in the population. Raposeiras-Roubin et al.¹⁸ affirm that the constant use of tobacco has the potential to

raise blood pressure and cardiovascular complications can still occur. Zingg et al.¹⁹, Cymerys et al.²⁰, Yanbaeva et al.²¹, Burke et al.²², Shen et al.²³, Madika e Mounier-Vehier²⁴, Tan et al.²⁵ in epidemiological and genetic studies where they evaluated the role of smoking and the possible interaction of genes and the environmental factor in the initiation and development of cardiovascular diseases such as hypertension, revealed that hypertension can be induced by smoking.

Table 1. Characterization of the sample in absolute and percentage numbers

Variables	n	%
Sex		
Male	53	39,3
Female	82	60,7
Age group		
14 to 29 years	66	48,9
30 to 39 years	27	20,0
40 to 49 years	19	14,1
50 years or beyond	23	17,0
Race / Color		
Leucoderma	85	63,0
Feoderma	4	3,0
Melanoderma	45	33,3
Xanthoderma	1	0,7
BMI		
Normal	60	44,4
Overweight	47	34,8
Obesity	28	20,7
Sedentary		
Yes	121	89,6
No	14	10,4
Addiction		
Yes	44	32,6
No	91	67,4
Alcoholism		
Yes	30	22,2
No	105	77,8
Tabagism		
Yes	20	14,8
No	115	85,2
Family history		
Yes	40	29,6
No	95	70,4
Diabetes		
Yes	7	5,2
No	128	94,8
Cardiovascular diseases		
Yes	3	2,2
No	132	97,8
Anesthetics		
Yes	121	89,6
No	14	10,4
Clinical status 1		
Normal	27	20,0
High	45	33,3
Hypertension I	27	20,0
Hypertension II	36	26,7
Clinical status 2		
Normal	27	20,0
High	31	23,0
Hypertension I	37	27,4
Hypertension II	40	29,6
Clinical status 3		
Normal	28	20,7
High	40	29,6
Hypertension I	39	28,9
Hypertension II	28	20,7
BP Alteration 1-2		
Continued Normal BP	17	12,6
Hypertension continued at the same stage	56	41,5
Improved BP	25	18,5
Worsened BP	37	27,4
BP Alteration 2-3		
Continued Normal BP	15	11,1
Hypertension continued at the same stage	50	37,0
Improved BP	41	30,4
Worsened BP	29	21,5
BP Alteration 1-3		
Continued Normal BP	18	13,3
Hypertension continued at the same stage	57	42,2
Improved BP	28	20,7
Worsened BP	32	23,7
Total	135	100,0

About 89.6% of the patients were sedentary and 97.25% of the patients with hypertension reached the stage II hypertension, being these sedentary. Gorostegi-Anduaga et al.²⁶ affirm that the population class with physical inactivity along with the negative eating habits presents a strong influence and risk factor for the increase of the blood pressure. Cristi-Montero et al.²⁷; Knaeps et al.²⁸; Sacilotto et al.²⁹; Masala et al.³⁰; Wang et al.³¹; Beyer et al.³²; Ferrario et al.³³, reported that the population that is more likely to be physically active and healthy may have improvements in hypertension.

Table 2. Results of crosses between variables with BP1

Variables	Normal		High		Hypertension I		Hypertension II		p-value
	n	%	n	%	n	%	n	%	
Sex									
Male	7	25,9	18	40,0	12	44,4	16	44,4	0,435
Female	20	74,1	27	60,0	15	55,6	20	55,6	
Age group									
14 to 29 years	15	55,6	26	57,8	13	48,1	12	33,3	0,036**
30 to 39 years	4	14,8	10	22,2	8	29,6	5	13,9	
40 to 49 years	5	18,5	5	11,1	4	14,8	5	13,9	
50 years or more	3	11,1	4	8,9	2	7,4	14	38,9	
Etnia									
Leucoderma/Xanthoderma	15	55,6	30	66,7	14	51,9	27	75,0	0,206
Feoderma/Melanoderma	12	44,4	15	33,3	13	48,1	9	25,0	
BMI									
Normal	14	51,9	24	53,3	11	40,7	11	30,6	0,025
Overweight	5	18,5	15	33,3	14	51,9	13	36,1	
Obesity	8	29,6	6	13,3	2	7,4	12	33,3	
Sedentary									
Yes	24	88,9	39	86,7	23	85,2	35	97,2	0,264**
No	3	11,1	6	13,3	4	14,8	1	2,8	
Addiction									
Yes	6	22,2	16	35,6	7	25,9	15	41,7	0,334
No	21	77,8	29	64,4	20	74,1	21	58,3	
Alcoholism									
Yes	5	18,5	12	26,7	5	18,5	8	22,2	0,815
No	22	81,5	33	73,3	22	81,5	28	77,8	
Tabagism									
Yes	2	7,4	6	13,3	3	11,1	9	25,0	0,227**
No	25	92,6	39	86,7	24	88,9	27	75,0	
Family History									
Yes	9	33,3	11	24,4	11	40,7	9	25,0	0,436
No	18	66,7	34	75,6	16	59,3	27	75,0	
Diabetes									
Yes	1	3,7	-	-	2	7,4	4	11,1	0,068**
No	26	96,3	45	100,0	25	92,6	32	88,9	
Cardiovascular Diseases									
Yes	-	-	-	-	-	-	3	8,3	***
No	27	100,0	45	100,0	27	100,0	33	91,7	
Anesthetics									
Epinephrine	24	88,9	43	95,6	26	96,3	28	77,8	0,045**
Felypressin	3	11,1	2	4,4	1	3,7	8	22,2	
Total	27	100,0	45	100,0	27	100,0	36	100,0	

** Maximum Likelihood Ratio.

*** Test not performed due to large number of zero cells.

In the Hypertension I and II groups there is a lower percentage of normal BMI when compared to the Normal and High BP groups. In the Hypertension I group there is a higher percentage of overweight individuals. These results corroborate with Jung et al.³⁴ and Fonseca³⁵ where they reported that the prevalence of systemic arterial hypertension is 3 times higher in overweight individuals. Similarly, Stenehjerm, Hjerkind e Nilsen³⁶ showed that a large part of their sample had body mass index associated with hypertension in both sexes (P <0.001). Buscot et al.³⁷ using BMI methods to identify increased cardiovascular risk in individuals who were overweight and obese by

identifying an increase in cardiovascular risk, thus, participants who had high BMI had a greater risk of developing hypertension. Someya et al.³⁸; Wu et al.³⁹ and Colangelo et al.⁴⁰ confirms that the risk of developing hypertension grows along with increased obesity and BMI.

Table 3. Results of crosses between BP1 and BP2

BP-2	BP-1								p-value
	Normal		High		Hypertension I		Hypertension II		
	n	%	n	%	n	%	n	%	
Normal	17	63,0	5	11,1	5	18,5	-	-	0,000
High	4	14,8	20	44,4	4	14,8	3	8,3	
Hypertension I	4	14,8	14	31,1	11	40,7	8	22,2	
Hypertension II	2	7,4	6	13,3	7	25,9	25	69,4	
Total	27	100,0	45	100,0	27	100,0	36	100,0	-

Considering that the p-value was <0.050, a statistically significant relationship was observed in the cross-referencing of BP1 and BP2 in BP1 patients with normal BP, 63.0% continued with normal BP in BP2, 14.8% progressed to Elevated, 14.8% progressed to Hypertension I and 7.4% to Hypertension II.

When BP 2 was evaluated, no individual achieved normal BP. On the other hand, individuals who were in stage I in BP1, 18.5% improved to reach the normal BP level. These results corroborate with Rodrigues et al.⁴¹ who found similar results when analyzing hypertensive and normotensive individuals at three moments, where, respectively, 80% and 97.7% of subjects maintained blood pressure within the normal range. Barbosa e Assis⁴² in a study that assessed blood pressure during exodontia reported an increase in blood pressure after anesthesia, as well as Tolentino et al.⁴³ in a similar study 11.5% of subjects had increased blood pressure during the clinical procedure. Ferraz et al.⁴⁴ reported that the highest values of systolic arterial hypertension were identified prior to anesthesia, which may be suggestive of a strong influence of anxiety, since the same study shows that the highest values of diastolic arterial hypertension were observed in the at the moment of the extraction, which is explained by the influence of the surgical technique that is sensitive to the operator.

Table 4. Results of crosses between BP1 and BP3

BP-3	BP-1								p-value
	Normal		High		Hypertension I		Hypertension II		
	n	%	n	%	n	%	n	%	
Normal	18	66,7	3	6,7	3	11,1	4	11,1	0,000
High	7	25,9	23	51,1	6	22,2	4	11,1	
Hypertension I	2	7,4	15	33,3	14	51,9	8	22,2	
Hypertension II	-	-	4	8,9	4	14,8	20	55,6	
Total	27	100,0	45	100,0	27	100,0	36	100,0	-

The results of the cross-over between BP1 and BP3 were statistically significant because they obtained a p-value = 0.000. Of the patients with BP classified as normal in BP1,

66.7% continued with normal BP in BP 3, 25.9% evolved to elevated, 7.4% progressed to Hypertension I and none to Hypertension II.

When stage II was evaluated, 55.6% remained at the same stage of BP and 11.1% of subjects achieved BP. On the other hand, individuals who were in stage I in BP1, 11.1% improved to normal BP level and 51.9% remained in the same stage of BP.

The results found corroborate with Rodrigues et al.⁴¹ who reported that 82% of normotensive individuals remained within the limits of normality and among hypertensive individuals 40% remained within normal limits. As well as the study by Barbosa⁴² who described that there was similarity between the initial and final stages in the comparison between BP I and BP III and Oliveira et al.⁴⁵ who reported that there was no statistical difference in pressure values when compared to the beginning and end of the dental procedure.

Table 5. Results of crosses between BP2 and BP3

BP-3	BP-2								p-value
	Normal		High		Hypertension I		Hypertension II		
	n	%	n	%	n	%	n	%	
Normal	15	53,6	4	14,3	4	14,3	5	17,9	0,000
High	8	20	18	45	8	20	6	15,0	
Hypertension I	2	5,1	6	15,4	17	43,6	14	35,9	
Hypertension II	2	7,1	3	10,7	8	28,6	15	53,6	
Total	27	100,0	45	100,0	27	100,0	36	100,0	-

Of the patients with BP classified as normal in BP2, 53.6% continued with normal BP in BP 3, 20.0% evolved to elevated, 5.1% progressed to Hypertension I and 7.1% to Hypertension II.

When stage II was evaluated, 53.6% remained at the same stage of BP and 17.9% of subjects achieved BP. On the other hand, individuals who were in stage I in BP 1, 14.3% improved to normal BP level and 43.6% remained in the same stage of BP.

Salim et al.⁴⁶ in a study that sought to identify arterial hypertension in patients who were to undergo dental treatment, found that 76.6% of the patients with BP classified as normal in BP II continued with normal BP at the moment of BP III measurement. Ganhoto et al.⁴⁷ reported that the intraoperative moment presented significantly higher blood pressure elevation than in the pre and postoperative moments. This corroborates with the present study, where the intraoperative moment (BP2) was the one that presented the highest elevation of the arterial pressure and this variation of the BP after the anesthesia is associated with the previous psychological factor of the patient in relation to the anesthesia and still attributed to the stress and the pain due to non-accuracy of

the anesthetic technique applied during the surgical procedure^{44,48-52}.

Annibelli et al.⁵³ observed that in the postoperative period the systolic blood pressure presented higher values, however, statistically there were no significant differences between the preoperative, intraoperative and postoperative moments, which can be explained by the low number of the sample that was limited to 22 individuals, whereas in the present study the sample consisted of 135 individuals.

Table 6. Results of the crosses between some variables of the study with the Groups

Variables	Anesthetics				p-value
	Epinephrine		Felypressin		
	n	%	n	%	
BP Alteration 1-2					
Continued Normal BP	16	13,2	1	7,1	0,726**
Hypertension continued at the same stage	51	42,1	5	35,7	
Improved BP	21	17,4	4	28,6	
Worsened BP	33	27,3	4	28,6	
BP Alteration 2-3					
Continued Normal BP	14	11,6	1	7,1	0,455**
Hypertension continued at the same stage	42	34,7	8	57,1	
Improved BP	38	31,4	3	21,4	
Worsened BP	27	22,3	2	14,3	
BP Alteration 1-3					
Continued Normal BP	16	13,2	2	14,3	0,890**
Hypertension continued at the same stage	52	43,0	5	35,7	
Improved BP	24	19,8	4	28,6	
Worsened BP	29	24,0	3	21,4	
Total	121	100,0	14	100,0	-

** Maximum Likelihood Ratio

*** Test not performed due to large number of zero cells.

DISCUSSION

An important concern during clinical practice among dental surgeons is about the use of local anesthetics with or without vasoconstrictors, since this procedure could further increase the patient's blood pressure, which according to Silvestre et al.⁵⁴ did not observe hemodynamic changes between the groups that used vasoconstrictor and those that did not use.

Regarding anesthetics, when there was an elevation in the patients blood pressure, regardless of whether they were hypertensive or not, no statistically significant relations were found between the changes in BP and anesthetics. This is corroborated by the studies of Goulart et al.⁵⁵; Ogunlewe et al.⁵⁶; Gungormus e Buyukkurt⁵⁷; where there was no significant change in blood pressure in relation to the type of anesthetic solution used.

About the use of epinephrine in hypertensive patients, Perusse, Goulet & Turcotte (1992)⁵⁸; Carvalho et al.⁵⁹, recommend that the maximum safe dose may be 2 2% lidocaine tubes with epinephrine 1:100,000. Niwa et al.⁶⁰ and Bader et al.⁶¹ showed a small increase in BP when associated with the use of epinephrine in controlled hypertensive patients; however, authors such as Bronzo⁶²; Perusse et

al.⁵⁸; Soares et al.⁶³; Cáceres et al.⁶⁴ recommend the use of vasoconstrictors without compromising the patient, provided that the maximum recommended dose is respected. Niwa et al.⁶⁰ emphasize that the vasoconstrictor promotes adequate, long-lasting anesthesia, furthermore promotes homeostasis, leading to reduction of patient pain and release of catecholamines.

Aleman et al.⁶⁵; Santos⁶⁶; Rios et al.⁶⁷ argue that stress attenuation associated with anxiolytics or sedation, when well indicated, produce beneficial effects in reducing the cardiovascular response associated with preoperative anxiety of the patient. Although the first technique to be used in these cases is the behavioral control of the patient mediated by the dentist, as previous explanations about how the dental procedure will be performed, improving the anxiety and allowing a better conduction of the procedure.

Authors such as Medeiros et al.⁶⁸; Carvalho et al.⁶⁹; Loggia et al.⁶⁹; Tanno e Marcondes⁷⁰; reported the physiological action of anxiety on blood pressure change and stated that fear and anxiety directly influence the pressure measurement. The change in blood pressure can be explained by the stress caused in the outpatient setting, causing the main mediators of the stress reaction, the catecholamines released by the sympathetic nervous system and the medulla of the adrenal gland, and the glucocorticoids released by adrenal cortex, where both provide cellular events that enable adaptive changes in cells and tissues, with the role of protecting the organism and ensuring its survival. On the central nervous system, the endogenous release of adrenaline produces an excitatory effect. In response to these actions, there is an increase in blood pressure, in addition to an eventual alteration of potentiation of local anesthesia.

Oliveira et al.⁴⁵ and Goulart et al.⁵⁵ stated that anxiety, fear and pain were not able to significantly alter blood pressure, contrary to the authors previously cited. This can be explained by the type of procedure performed, since the study by Oliveira et al.⁴⁵ deals with endodontic treatment, considered less stressful than dental extractions. Another explanation is the fact that the authors worked with a different sample in quantitative terms than the one used in this study (n=135).

In the study by Goulart et al.⁵⁵ a n of 60 was used. Other factors studied, such as sex, ethnicity, alcoholism and family history, did not show a significant p-value significance (> 0.050) when related to the state of SAH, despite of its

proven correlation in several studies, therefore, more detailed studies should be performed to better prove this relationship.

Changes in systolic and diastolic BP are observed in patients before and during clinical dental procedures. These changes may be associated with pain, stress due to fear and anxiety during the surgical procedure, and also by individual factors such as age, hypertension, previous traumatic experience in dental treatment, psychological response, poor eating habits, sedentary lifestyle, BMI and tobacco, where a large part of these patients who undergo dental procedures can observe the increase in BP throughout the clinical procedure performed.

CONCLUSION

It can be concluded from this study that there was variation of BP throughout the dental surgical procedure, the moment where there was a major alteration was after BP2 anesthesia, corroborating with the literature data. These variations can be attributed to anxiety and stress caused by the surgical act; the reduction of stress, as well as the control of anxiety and fear of a dental treatment are beneficial in the care of hypertensive patients. It is worth mentioning that the measurement of preoperative BP (BP1) and its monitoring throughout the length of the surgical procedure is of fundamental importance for the best conducts to be taken

The sedentary lifestyle was the most prevalent comorbidity among the individuals in the sample, since the hypertensive patients are asymptomatic, routine control is fundamental. When precociously diagnosed and well controlled, it makes dental procedures safer. Local anesthetics associated with vasoconstrictors, such as adrenaline and felypressin, may be used to treat patients with stage I or II controlled hypertension in dentistry. It is important to emphasize that the present study did not intend to diagnose Systemic Arterial Hypertension, since for the diagnosis another methodology should be used. Therefore, we suggest other studies that may diagnose Systemic Arterial Hypertension.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interests.

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