Ansiedade dentária em pacientes submetidos à cirurgia oral e seus efeitos na pressão arterial e na frequência cardíaca

Dental anxiety in patients undergoing oral surgery and its effects on blood pressure and heart rate

Ansiedad dental en pacientes sometidos a cirugía oral y sus efectos sobre la presión arterial y la frecuencia cardíaca

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Resumo

Objetivo: Avaliar a ansiedade dental em pacientes submetidos à cirurgia oral, bem como seu impacto na pressão arterial e na frequência cardíaca. Material e Métodos: um total de 233 pacientes submetidos a cirurgia oral responderam a um questionário sociodemográfico e outro baseado na escala de ansiedade dental Corah. A pressão arterial e a frequência cardíaca foram avaliadas em três momentos distintos, enquanto os pacientes estavam na sala de espera, imediatamente antes e após o procedimento. Resultados: esse estudo revelou uma prevalência de ansiedade de 77,3%. Foi observada diferença estatisticamente significante na pressão arterial sistólica média e na frequência cardíaca nos três momentos da avaliação. A ansiedade foi prevalente na amostra e foi observada desde a permanência na sala de espera até o momento em que foi realizada a anestesia local, causando variações na pressão arterial sistólica e na frequência cardíaca. Os níveis de ansiedade diminuíram após a finalização do atendimento. Em conclusão, observamos que a cirurgia oral está diretamente relacionada com

o aumento ansiedade, e a ansiedade está relacionada principalmente com a alteração da frequência cardíaca.

Palavras-chave: Cirurgia oral; Ansiedade dental; Pressão arterial; Frequência cardíaca.

Abstract

Objective: To assess dental anxiety in patients undergoing oral surgery, as well as its impact on blood pressure and heart rate. Material and Methods: A total of 233 patients answered a socio-demographic questionnaire and another one based on the Corah dental anxiety scale. Blood pressure and heart rate were assessed at three moments while: patients were in the waiting room, immediately before and after the procedure. Results: This study revealed a prevalence of anxiety of 77.3%. There was a statistically significant difference in mean systolic blood pressure and heart rate at the three moments of the evaluation. Anxiety was prevalent in the sample and was observed from the time in the waiting room until the time when local anesthesia was performed, causing variations in systolic blood pressure and heart rate, anxiety levels decreased after the end of the service. In conclusion, we observed that oral surgery is directly related to increased anxiety, and anxiety is mainly related to the change in heart rate.

Keywords: Oral surgery; Dental anxiety; Blood pressure; Heart rate.

Resumen

Objetivo: evaluar la ansiedad dental en pacientes sometidos a cirugía oral, así como su impacto en la presión arterial y la frecuencia cardíaca. Material y métodos: Un total de 233 pacientes que se sometieron a cirugía oral respondieron un cuestionario sociodemográfico y otro basado en la escala de ansiedad dental de Corah. La presión arterial y la frecuencia cardíaca se evaluaron en tres momentos diferentes, mientras los pacientes estaban en la sala de espera, inmediatamente antes y después del procedimiento. Resultados: Este estudio reveló una prevalencia de ansiedad del 77,3%. Hubo una diferencia estadísticamente significativa en la presión arterial sistólica media y la frecuencia cardíaca en los tres momentos de la evaluación. La ansiedad prevaleció en la muestra y se observó desde el momento en la sala de espera hasta el momento en que se realizó la anestesia local, causando variaciones en la presión arterial sistólica y la frecuencia cardíaca, los niveles de ansiedad disminuyeron después del final del servicio. En conclusión, observamos que la cirugía oral está directamente relacionada con el aumento de la ansiedad, y la ansiedad está relacionada principalmente con el cambio en la frecuencia cardíaca.

Palabras clave: Cirugía oral; Ansiedad dental; Presión arterial; Frecuencia cardíaca.

1. Introduction

Dental anxiety is defined as an anticipation of suffering, which can result in dental treatment-related-distressing experiences. Surgical procedures are usually the most feared dental treatments in part of the population because they are usually associated with pain. High levels of anxiety during surgery are related with non-collaborative behavior or avoidance, as well as dissatisfaction with postoperative results, which subsequently affects oral health.(Armfield & Ketting, 2015; Wilson, McNeil, Kyle, Weaver, & Graves, 2014)

This psychological disorder is easily recognized through some signs ranging from physical expressions, such as restlessness or crying, to physiological imbalance, such as increased heart rate and blood pressure.(Mento et al., 2014) According to (Matsumura, Miura, Kurokawa, Abe, & Takata, 2001) the elevation in blood pressure and heart rate during oral surgery modifies physiological and hemodynamic balance of the body and may trigger clinical emergencies.(Matsumura et al., 2001)

Thus, the aim of this study was to evaluate dental anxiety in patients undergoing minor oral surgery in a Brazilian sample and its implications on blood pressure and heart rate.

2. Material and Methods

This was a cross-sectional, observational, quantitative study, with a convenience sample of 233 recruited patients who underwent closed or open dental extractions with osteotomy and, tooth section was performed when necessary. All surgical procedures were done under local anesthesia with a vasoconstrictor, for more than one operator in the Department of Dentistry, Clinical School of Dentistry, Federal University of Campina Grande, both located in Patos, PB, Brazil. The research was designed according to Resolution 466/2012 of the National Health Council, Ministry of Health and approved by the Committee for Ethics in Research on Human Beings of the Integrated Faculties of Patos (FIP), Patos, Paraíba, Brazil (opinion number: 1.760.263). All patients in the study voluntarily accepted to participate by signing an Informed Consent Form (ICF).

In order to prevent surgical complications, all surgical procedures were performed on healthy patients, over than 18 years old, of both genders. The pressure of patients should be a maximum of 160mmHg for systolic pressure and 100mmHg for diastolic pressure.(Malachias,

2016) Patients who attained this pressure were referred for cardiac evaluation, and only those with diagnosis of anxiety were included in the study. Subjects excluded from the study were those affected by systemic diseases that directly influenced blood pressure such as hypertension, hyperthyroidism, and diabetes; administration of benzodiazepines in the preoperative period; and allergies to any of the medications or anesthetics used in the study. Were also excluded from the study, pregnant patients or in lactation phase, those who had any contraindication for performing oral surgery in an outpatient setting, patients who had intraoperative complications or those who refused to participate or did not complete the questionnaires.

A prevalence of anxiety of 50% was used to calculate sample size, based on a pilot study with 40 patients. A probabilistic sampling, with a confidence level of 95% (Z = 1.96) and an error margin of 5% was used. This calculation was performed using a formula in the SPSS software program for Windows (version 22.0, SPSS Inc., Chicago, IL., USA), where n = sample size; N = population size, and p = the expected proportion in the population (0.5). Thus, the minimum sample size after the calculation was 233 patients.

3. Research Tools

Two questionnaires were used, a sociodemographic one where gender, age, and level of education were determined, and another questionnaire based on the Corah dental anxiety scale.(Corah, 1969)

This latter questionnaire is based on a scale used to assess the degree of anxiety before a dental treatment. The Corah dental anxiety scale was cross-culturally adapted to Brazilian Portuguese by (Hu, Gorenstein, & Fuentes, 2007), is composed of four questions with five alternatives related to reactions of the patient during visits to the dentist, and the answers are assigned scores ranging from 1 to 5 points; 1 for a state of tranquility and 5 for a condition of exaggerated anxiety.(Corah, 1969; Liau et al., 2008) After the sum of the total scores for the four questions, patients were classified as anxious or not anxious, based on the sum of these points. A sum above 5 points, indicated that the patient was not anxious, while a sum between 6 to 20, indicated that the patient was anxious.

4. Measurement of blood pressure and heart rate

An automatic oscillometric digital device (HEM-7200, OMRON Healthcare, Kyoto,

Japan) was used by following the manufacturer's instructions and the calibration measures according to the VII Brazilian Guidelines for Hypertension (*VII Diretrizes Brasileira de Hipertensão Arterial)*.(Malachias, 2016) Blood pressure and heart rate were measured by a single pre-calibrated examiner at three different moments: in the waiting room, in the dental chair before anesthesia, and immediately after surgery.

Blood pressure was categorized as normal, optimal, or hypertensive. The blood pressure was considered to be optimal when systolic pressure was less than or equal to 120 mmHg and diastolic blood pressure was less than or equal to 80 mmHg; normal when systolic pressure was between 120 and 139 mmHg and diastolic pressure was between 80 and 89 mmHg; and hypertensive when systolic pressure was higher than 140 mmHg and diastolic pressure was higher than 90 mmHg.(do Nascimento, da Silva Araújo, Gusmão, & Cimões, 2011)

Categorization of heart rate (HR) was performed in the same way. The HR was considered to be normal when between 60 to 100 beats per minute. Below this range, the HR was classified as bradycardia and above this range, it was classified as tachycardia.(do Nascimento et al., 2011)

5. Statistical analysis and risk factors

An epidemiological questionnaire was given to patients to obtain data to be used in the analysis of risk factors. The variables analyzed and their respective risk factors were: age groups (18 to 25 years, 26 to 35 years, 36 to 45 years, 46 to 55 years, and > 55 years), gender (female, male), level of education (illiterate, incomplete elementary school, complete elementary school, complete secondary school, incomplete secondary education, and higher education), last visit to the dentist (up to 6 months, from 6 to 12 months, from 13 to 36 months, from 37 months to 72 months, > 72 months and never went to the dentist), blood pressure in the waiting room (optimal, normal, and hypertensive), pre-anesthetic blood pressure (optimal, normal, and hypertensive), immediate postoperative blood pressure (optimal, normal, and hypertensive), heart rate in the waiting room (optimal, normal, and hypertensive), pre-anesthetic heart rate (optimal, normal, and hypertensive), immediate postoperative heart rate (optimal, normal, and hypertensive), and type of procedure (simple exodontia, and complex exodontia).

A uni-variable analysis using the chi-square test ($p \leq 0.2$) was performed for the selection of variables. Significant variables were subjected to a multi-variable analysis using

the multiple logistic regression analysis ($p \leq 0.05$). The adjustment of the model was verified by the Hosmer and Lemeshow test with good fit when $p \leq 0.05$.

The comparison of the mean arterial pressure and HR at all times and the dental anxiety scale of Corah, blood pressure, and heart rate with the other variables was performed with a variance analysis using the Tukey test at 5% significance, using the Statistical Package for Social Sciences (SPSS for Windows, version 22.0, SPSS Inc., Chicago, IL., USA).

6. Results

Altogether 233 patients were assessed, 58.4% were female. The most frequent age ranged from 18 to 25 years (36.5%) and the majority had completed secondary education (45.5%). In accordance with the Corah dental anxiety scale, 77.3% of the cases were anxious while 22.7% were not. There was a statistically significant difference in mean of systolic blood pressure between the first and third verification moments ($p = 0.000336$) and between the second and third moments ($p = 0.006409$). A statistically significant difference were also found in the mean HR between the first and third moments of verification ($p = 0.03454$), and between the second and third moments ($p = 0.000570$) (Table 1).

Table 1. Comparison of means of systolic blood pressure and heart rate at three moments of examiner.

Moments	Means of systolic blood pressure	SD	P	Means of heart rate	SD	P
1º	126,8	±15,4	0,000336	79,3	±13,1	0,03454
2º	132,5	±16,8	0,006409	80,2	±12,5	0,00570
3º	128,0	±15,9		76,3	±13,5	

SD= Standard deviation.
Source: Author.

Table 1 indicated that the systolic blood pressure and heart rate increased from the moment the volunteers were in the waiting room to the time of measurement before local anesthesia, when they were already in the dentist's chair, falling soon after the end of the surgical procedure.

Patients who underwent tooth extraction represent 58.8% of the sample in this study. When related to the Corah dental anxiety scale a statistically significant number of patients were submitted to a complex extraction (p = 0.028). However, the differences related to blood pressure were not statistically significant.

Although without statistical significance, when comparing the level of anxiety with systolic blood pressure, 44% of patients who demonstrated anxiety during blood pressure measurement in the waiting room and 71% of patients who were anxious just before the anesthetic was administered were also hypertensive, but at the end of the surgery, when patients were assessed for the third time, 84% had normal blood pressure.

When related to anxiety assessed by the Corah dental anxiety scale, the HR was significantly different at the last moment of verification, showing normal post-surgery HR (p = 0.01), in agreement with the behavior of systolic pressure.

When age was correlated with anxiety level, a statistically significant difference was detected (p = 0.028), indicating that anxiety was more frequent in subjects in the lower age range, while this psychological state reduced with increasing age. Statistically significant results were not found with regards to the level of education and the anxiety level, (p = 0.098).

Individuals who never visited the dentist had a higher rate of dental anxiety (p = 0.002). While in the waiting room, these patients displayed hypertension (p = 0.012) but at other moments of verification there was no significant difference in either blood pressure or HR (Table 2) among these patients.

Table 2. Correlation between age groups, sex, blood pressure, procedure and last visit to the dentist.

	Category	Total number	No. and % of individuals	P
Age groups	18 to 25 years	85	66 (77,6)	
	26 to 35 years	68	58 (85,3)	0,028
	36 to 45 years	47	36 (76,6)	
	46 to 55 years	24	15 (62,5)	
	>55 anos	9	4 (44,4)	
Gender	Female	136	114 (83,8)	
	Male	97	65 (67,0)	0,003
Postoperative heart rate	Optimal	0	0(0)	
	Normal	294	236(80,27)	0,01
	Hypertensive	4	4(100)	
Type of procedure	Simple exodontia	137	100 (73,0)	
	Complex exodontia	96	79 (82,3)	0,028
Last visit to the dentist	Up to 6 months	137	103(75,2)	
	From 6 to 12 months	33	27 (81,8)	0,002
	from 13 to 36 months	30	26 (86,6)	
	From 37 months to 72 months	15	8 (53,3)	
	> 72 months	11	7 (63,6)	
	Never went to the dentist	7	6 (85,7)	

No. and %= Number and percentage of individuals
Source: Author.

Table 2 shows the different variables of the patients included in this study, which shows that anxiety is present in a large portion of the population. With regards to the relationship between gender and anxiety, women were about 2.5 times (p = 0.003) more likely to be anxious than men (Table 3).

Table 3. Correlation between gender and anxiety.

Variables	Logistic regression coefficient	Standard error	Wald	Degrees of freedom	*Odds Ratio*	IC 95%	P
Gender Female	0,937	0,318	8,696	1	2,55	[1,36 - 4,75]	0,003

Source: Author.

Table 3 shows the importance of targeting anxiety control in both genders, especially for women.

7. Discussion

In the present study, precautions were taken to use safe and reliable psychometric instruments for assessing anxiety. For this reason, the Corah dental anxiety scale was chosen, as it is the most recommended dental anxiety scale in the literature.(Armfield, Spencer, & Stewart, 2006; Bonafé & Campos, 2016; Enkling, Marwinski, & Jöhren, 2006; Firat, Tunc, & Sar, 2006; Liau et al., 2008; Mento et al., 2014; Nicolas, Collado, Faulks, Bullier, & Hennequin, 2007). In addition,(Bonafé & Campos, 2016) performed a research and reported that this version is the most suitable form to assess procedures that involve local anesthesia.

Comparison of anxiety in developed and developing countries revealed that in richer countries, the population has a lower rate of dental anxiety, as can be seen in studies conducted in Germany 13.2%,(Enkling et al., 2006) Turkey 21.3%,(Firat et al., 2006) France 13.5%,(Nicolas et al., 2007) Australia 16.1%(Armfield et al., 2006) and New Zealand 12.5%,(Locker, Thomson, & Poulton, 2001) while in developing nations these levels tend to increase, as observed in Bulgaria 35.5%(Kirova, Atanasov, Lalabonova, & Janevska, 2010) and Chile 37.9%.(Matias Ríos-Erazo et al., 2016) The present study, which was conducted in a developing country (Brazil), confirmed the high prevalence of anxiety reported in previous studies.

The high prevalence of anxiety among patients in the lowest age group may be justified by the high demand for extraction of third molars with orthodontic or preventive indications against the appearance of carious, periodontal, cystic and/or tumor lesions, in agreement with studies by (Liau et al., 2008) and (Tarazona, Tarazona-Álvarez, Peñarrocha-Oltra, Rojo-Moreno, & Peñarrocha-Diago, 2015). However, in contrast, (Hägglin, Berggren,

Hakeberg, Hällstrom, & Bengtsson, 1999) observed a decrease in dental anxiety when increasing age in a longitudinal study of 28 years in a Swedish population of Gothenburg.

(Armfield et al., 2006) and (Thomson, Stewart, Carter, & Spencer, 1996) observed that women demonstrated more anxiety disorder during dental treatment than men. In fact, it is known that women are more fearful of needles and drills than men.(Holtzman, Berg, Mann, & Berkey, 1997) Regarding the level of education, in agreement with the findings of (Fayad, Elbieh, Baig, & Alruwaili, 2017) there were no statistical differences in relation to the levels of anxiety, unlike the results of other studies.(Bonafé & Campos, 2016; Locker et al., 2001)

According to a medical study conducted by (Agras, Sylvester, & Oliveau, 1969), the thought of going to the dentist for preventive care and dental procedures was the fifth-leading cause of anxiety. This association is still frequently cited in the literature, and has therefore led to regular dental visits being postponed until cases become clinical emergencies.(al Absi & Rokke, 1991; "Infection control recommendations for the dental office and the dental laboratory. ADA Council on Scientific Affairs and ADA Council on Dental Practice," 1996; Mento et al., 2014; Neumar et al., 2015) In this study, it was found that most of the patients had gone to the dentist 6 months before the research interview, but the most anxious group have not been to the dentist for more than 2 years or never sought dental service; these findings were in agreement with the studies by (Dobros, Hajto-Bryk, Wnek, Zarzecka, & Rzepka, 2014; Fayad et al., 2017; Schuller, Willumsen, & Holst, 2003; Sohn & Ismail, 2005).

According to the American Heart Association and the American Dental Association, it is essential to check the blood pressure of all patients before any invasive procedure. Several studies which investigated the relationship between anxiety and blood pressure suggested that this is done in practice, as an imbalance in this relationship may result in unpleasant medical emergencies.(Liau et al., 2008; Matsumura et al., 2001) Thus, it is the duty of the dentist to recognize and deal with anxiety, in order to avoid complications and to offer greater satisfaction and convenience to patients, knowing that a patient who is not anxious or is less anxious will experience less pain. This is because anxiety initiates sympathetic activity, leading to the production of endogenous adrenaline, which causes increased pain through hypersensitivity of nociceptors.(Holtzman et al., 1997; Kirova et al., 2010; Wilson et al., 2014)

Based on the results presented, it is possible to conclude that systolic blood pressure and heart rate vary during oral surgery. These vital signs peaked during the pre-anesthetic site verifications and decreased considerably after completion of the procedure, in agreement with

the findings from the study of (Cheraskin & Prasertsuntarasai, 1959). The mean heart rate was significantly different between the 3 moments measured and its association with anxiety in the postoperative assessment was significant, corroborating the findings from the study of (Liau et al., 2008). The decrease in anxiety, heart rate and blood pressure at the end of the procedure, as observed in this study, can be changed if a patient feels pain during surgery or if the procedure time is too long.

8. Conclusion

In conclusion, we observed that oral surgery is directly related to increased anxiety, and anxiety is mainly related to heart rate.

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