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## Original Article

### Profile of use of local anesthetics by dental surgeons in hypertensive patients in a Brazilian city

*Perfil de utilização de anestésicos locais por cirurgiões-dentistas em pacientes hipertensos de uma cidade brasileira*

*Perfil del uso de anestésicos locales por cirujanos dentistas en pacientes hipertensos en una ciudad brasileña*

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## ABSTRACT

**Background and Objectives:** The success of the anesthetic technique is fundamental to any procedure and guarantees patient safety, being supported by imperative protocols and fundamentals to provide the best care. This study verifies the use of local anesthetics, focusing on hypertensive patients in private offices of the city of Palmas/Tocantins. **Methods:** This is a quantitative cross-sectional descriptive study supported by a closed questionnaire of free construction applied to professionals from the private health service of Palmas; all participants signed informed consent forms. In total, 113 questionnaires underwent descriptive analysis using the Statistical Package for the Social Sciences 22.0. **Results:** Of the interviewees, 58.4% were women, the most common specialty was prosthodontics (20.4%); 53.1% answered that the choice of anesthetic is made according to the patient's condition; 47.8% of professionals have more than 3 types of anesthetics available for care; 53.1% indicated teaching anesthesiology in undergraduate courses satisfactory; 65.5% did not attend courses and lectures on this topic; 41.6% of dentists measured pressure only in hypertensive patients, lidocaine was the most widely used salt and specifically when considering only hypertensive. **Conclusion:** The most commonly used local anesthetic in hypertensive patients is lidocaine 2% with adrenaline 1:100,000, but most professionals only check blood pressure in patients already diagnosed with hypertension, showing relatively satisfactory results due to conducts that still need to be adjusted.

**KEYWORDS:** Anesthetics, Local. Dentistry. Drug Interactions. Hypertension.

## RESUMO

**Justificativa e Objetivos:** O sucesso da técnica anestésica é fundamental para qualquer procedimento e garantia de segurança ao paciente, sendo sustentado por protocolos e fundamentos de caráter imperativo a fim de conferir o melhor atendimento. Nesse sentido, o presente trabalho verificará a utilização dos anestésicos locais, com ênfase em pacientes hipertensos, nos consultórios particulares da cidade de Palmas/TO. **Métodos:** Trata-se de um estudo descritivo, do tipo transversal de abordagem quantitativa realizado por meio de um questionário fechado de construção livre aplicado para profissionais do serviço privado de Palmas/TO, após assinatura do Termo de Consentimento Livre e Esclarecido. Foi realizada análise descritiva de 113 questionários por intermédio do Statistical Package for the Social Sciences 22.0. **Resultados:** Dos entrevistados, 58,4% eram mulheres, a especialidade mais encontrada foi implantodontia (20,4%); 53,1% apontaram que a escolha do anestésico é feita de acordo com a condição do paciente; 47,8% dos profissionais possuem mais de 3 tipos de anestésicos disponíveis para o atendimento; 53,1% apontou ensino de anestesiologia na graduação satisfatório; 65,5% não frequenta cursos e palestras sobre esse tema; 41,6% dos dentistas aferiam a pressão somente em hipertensos, lidocaína foi o sal mais utilizado de forma geral e também de forma específica ao considerar somente hipertensos. **Conclusão:** O anestésico local mais utilizado em hipertensos é a lidocaína 2% com adrenalina 1:100.000, porém a maioria dos profissionais só aferi a pressão arterial em já diagnosticados com hipertensão, expondo resultados relativamente satisfatórios em virtude de condutas que ainda necessitam ser readequadas.

**DESCRIPTORES:** Anestésicos Locais. Odontologia. Interações de Medicamentos. Hipertensão.

## RESUMEN

**Justificación y objetivos:** El éxito de la técnica anestésica es fundamental para cualquier procedimiento y garantía de seguridad del paciente, lo cual es respaldado por protocolos y fundamentos imperativos para brindar la mejor atención. El presente trabajo tuvo como objetivo verificar el uso de anestésicos locales en pacientes hipertensos en oficinas privadas de la ciudad de Palmas (Tocantins, Brasil). **Métodos:** Este es un estudio descriptivo, transversal, cuantitativo, en el cual se aplicó un cuestionario cerrado de construcción libre a profesionales del servicio privado de Palmas, después de firmar el término de consentimiento libre y esclarecido. Se analizaron 113 cuestionarios por medio del Statistical Package for the Social Sciences 22.0. **Resultados:** De los entrevistados, el 58,4% eran mujeres, la especialidad más encontrada fue la implantología (20,4%), el 53,1% señaló que la elección del anestésico se realiza según la condición del paciente, el 47,8% de los profesionales tienen más de 3 tipos de anestésicos disponibles para la atención, el 53,1% indicó que la enseñanza de anestesiología en cursos de grado fue satisfactoria, el 65,5% no asistió a cursos y conferencias sobre este tema, el 41,6% de los dentistas verificaron la presión solo en pacientes hipertensos, lidocaína era la sal más utilizada en general y también de manera específica cuando se consideraban solo pacientes hipertensos. **Conclusión:** El anestésico local más utilizado en los pacientes hipertensos es la lidocaína 2% con adrenalina 1:100.000, pero la mayoría de los profesionales solo ajustan la presión arterial en los pacientes ya diagnosticados con hipertensión, lo cual apunta resultados relativamente satisfactorios debido a las conductas que aún deben ser ajustadas.

**PALABRAS CLAVE:** Anestésicos Locales. Odontología. Interacciones Farmacológicas. Hipertensión.

## INTRODUCTION

According to the International Association for the Study of Pain, painful sensation is an episode that can be defined as an unpleasant sensory and emotional experience when faced with a harmful stimulus associated with tissue injury.<sup>1</sup> In Dentistry, pain can occur both due to the pathology that affects the oral cavity and the therapeutic procedure, making the use of anesthetics indispensable in most cases.<sup>2,3</sup> Idea justified by the fact that anesthetic solutions cause cellular hyperpolarization and can act as a reversible blocker of the conduction of the action potential, giving the surrounding areas tolerance to painful stimuli.<sup>1</sup>

The evolution of these drugs enabled improving the techniques, making them more efficient and safer. However, the risk of complications still exists, and this has extreme relevance because local anesthetics are the most used drugs in dental clinics, with an estimated 300 million anesthetic tubes used per year in the United States.<sup>1</sup>

Based on this premise, the risks are multiple: incorrect choice of anesthetic; drug interactions; hypersensitivity reactions, which are rarer; or changes in the central nervous and cardiovascular system, which usually result from intravascular injection, overdose and consequent increase in systemic absorption, which can evolve to fatal cases due to sudden increase in blood pressure and intracranial hemorrhage, especially in patients with susceptibilities.<sup>1,4-6</sup>

The dentist surgeon must be aware of the protocols to be followed, respect the conditional particularities of each patient reported in anamnesis and check vital signs to choose the appropriate anesthetic.<sup>4</sup> Hypertension, considered one of the main causes of death in the world is an example, since the absence of symptoms leads to the care of decompensated or undiagnosed patients.<sup>7th</sup>

Consequently, dentist surgeons are often responsible for the initial approach to hypertension by preoperative blood pressure measurement, risk assessment and medical referral.<sup>8</sup> Such perspective becomes a problem due to negligence on the part of some professionals, who disregard preoperative conditioning involving blood pressure measurement; studies have shown that 55% of professionals previously perform the measurement.<sup>3</sup> This lack of compliance is further complemented by the use of local anesthetics with sympathomimetic vasoconstrictors, considering that adrenaline acts predominantly in  $\beta$  receptors, causing increased heart rate and blood pressure, while justifying using the vasoconstrictor felypressin – synthetic vasopressin analogue – for emergency care in decompensated patients.<sup>4,9</sup>

The dental clinic appears, thus, a place of maintenance and health assurance and dentists present themselves as the professional responsible for detecting conditions, pursuing proper conduct and providing safety and quality of care. Thus, this research aimed to verify the use of local anesthetics by dentists, focusing on hypertensive patients in the private service of the city of Palmas/TO.

## **METHODS**

This is a quantitative cross-sectional descriptive study carried out in private dental offices in the city of Palmas/TO.

Data were collected at the city's private service between March and June 2018, totaling 113 dentists randomly chosen via the Regional Council of Dentistry website, excluding the professionals who worked only in the public dental system.

The chosen participants answered a closed questionnaire of free construction, applied and recorded by the researcher and answered by the interviewee in person, avoiding any search for information.

Based on similar studies already published in the databases, the questionnaire comprised 14 questions, 3 open questions and 11 closed questions with 4 possible alternatives, of which we selected 8. It involves the variables of gender; professional activity; anesthetic choice criteria; amount of anesthetics available in the office; evaluation of knowledge about anesthesiology acquired in the undergraduate course; anesthetic most commonly used, anesthetic most used when considering only hypertensive; and frequency of blood pressure measurement.

After collection, we typed and attached the data in a general spreadsheet and transferred to the Statistical Package for the Social Sciences 22.0 for descriptive analysis.

This study complies with the ethical precepts of Resolution no. 466/2012 of the National Health Council, submitted and approved by the Ethics Committee of the School of Medicine of São José do Rio Preto (Famerp), under protocol number 032/2007 and CAAE: 0065.0.000.140-07. All participants signed two copies of the informed consent form (ICF).

## **RESULTS**

The 113 questionnaires applied revealed that the majority were female (58.4%), with different specialties, mainly prosthodontics (20.4%) and endodontics (16.8%) (Table 1).

Table 1. Distribution of interviewed participants, according to gender and specialties, Palmas/TO, between March and June 2018.

| Variables N (%)                              |           |
|----------------------------------------------|-----------|
| <b>Gender</b>                                |           |
| Female                                       | 66 (58.4) |
| Male                                         | 47 (41.6) |
| <b>Professional activity</b>                 |           |
| Prosthodontics                               | 23 (20.4) |
| Unspecified                                  | 22 (19.5) |
| Endodontist                                  | 19 (16.8) |
| General practitioner                         | 14 (12.4) |
| Orthodontist                                 | 14 (12.4) |
| Pediatric dentistry                          | 6 (5.3)   |
| Public Health                                | 6 (5.3)   |
| Surgery, Oral And Maxillofacial Traumatology | 4 (3.5)   |
| Dental prosthesis                            | 3 (2.7)   |
| Dentistry                                    | 2 (1.8)   |

The criterion for choosing local anesthetics is the patient's condition, which considers factors such as the drugs used and systemic conditions such as diseases and allergies (53.1%). A slightly less than half of the sample has three types of anesthetic solutions available for care (47.8%), most consider their teaching on local anesthetics in the undergraduate program satisfactory (53.1%) and most do not attend courses and lectures on the subject (65.5%). Only hypertensive patients undergo blood pressure measurement (41.6%), which, when controlled, use lidocaine 2% with adrenaline 1:100,000 (67.3%) (Table 2).

**Table 2.** Informative data on the answers given by dentists of the private offices of Palmas/TO between March and June 2018.

| <b>Variables N (%)</b>                                                |           |
|-----------------------------------------------------------------------|-----------|
| <b>What criteria is considered for choosing the local anesthetic?</b> |           |
| According to the patient's condition                                  | 60 (53.1) |
| According to the procedure                                            | 18 (15.9) |
| According to the durability and power of the solution                 | 13 (11.5) |
| Use of the only option available at the clinic                        | 13 (11.5) |
| According to knowledge acquired in courses                            | 3 (2.7)   |
| Lower cost                                                            | 3 (2.7)   |
| Unspecified                                                           | 2 (1.8)   |
| Does not use                                                          | 1 (0.9)   |
| <b>How many types of anesthetics are available in the office?</b>     |           |
| Three types                                                           | 54 (47.8) |
| Two types                                                             | 31 (27.4) |
| One type                                                              | 18 (15.9) |
| Four types                                                            | 6 (5.3)   |
| Five types                                                            | 2 (1.8)   |
| Excluded from the system                                              | 2 (1.8)   |
| <b>The teaching on anesthesiology in undergraduate programs was:</b>  |           |
| Satisfactory                                                          | 60 (53.1) |
| Average                                                               | 40 (35.4) |
| Unsatisfactory                                                        | 13 (11.5) |
| <b>Do you attend courses or lectures on local anesthetics?</b>        |           |
| No                                                                    | 74 (65.6) |
| Yes                                                                   | 37 (32.7) |
| Unspecified                                                           | 2 (1.8)   |
| <b>Do you usually measure blood pressure?</b>                         |           |
| Only in hypertensive patients                                         | 47 (41.6) |
| Yes                                                                   | 40 (35.4) |
| No                                                                    | 26 (23)   |
| <b>In a controlled patient, which anesthetic is used?</b>             |           |
| Lidocaine 2% with adrenaline 1:100,000                                | 76 (67.3) |
| Prilocaine 3% with felypressin 0.03IU                                 | 17 (15)   |
| Mepivacaine 3% with adrenaline 1:100,000                              | 7 (6.2)   |
| Articaine 4% with adrenaline 1:100,000                                | 4 (3.5)   |
| Lidocaine 2% without vasoconstrictor                                  | 4 (3.5)   |
| Mepivacaine 3% without vasoconstrictor                                | 2 (1.8)   |
| Unspecified                                                           | 2 (1.8)   |
| Bupivacaine 0.5% with adrenaline 1:100,000                            | 1 (0.9)   |

## DISCUSSION

The research revealed that the anesthetic most used in dental clinics in Palmas/TO is lidocaine (54%), preference attributed to its excellent efficacy, safety and rare incidences of severe reactions;<sup>1,10</sup> prilocaine, on the other hand, was the least used anesthetic. These findings

agree with some studies that indicated lidocaine as the most preferred salt, but differed regarding the least used salt when pointing to articaine.<sup>11,12</sup>

Still considering the preferences of the research participants, when asked about the criterion for choosing the anesthetic solution, approximately half the sample deliberated according to the patient's condition (53.1%). This response should be considered as the best choice as local anesthetics may react negatively with drugs or systemic and even physiological conditions, such as age.<sup>6</sup>

In the literature, studies pointing how administering benzocaine and prilocaine in pediatric patients, older adults and pregnant women increases the risk of methemoglobin – oxidative reaction of hemoglobin from its ferrous ( $\text{Fe}^{2+}$ ) to ferric ( $\text{Fe}^{3+}$ ) form that prevents oxygen binding and transport – shows the importance of considering physiological conditions, as these are essential factors for choosing the best anesthetic salt for those groups.<sup>6,13</sup>

Following this safety prerogative associated with the administration of anesthetic drugs, the dentist must have more than one anesthetic salt available.<sup>1</sup> Thus, our analysis of the number of types of local anesthetics available in the office is satisfactory, as the sum of professionals who have three types or more surpasses those who have one or two; this contributes to a rapidly, safely and effectively performed care in those patients who with some particularity that implies choosing a specific anesthetic.

These data call attention to those who claimed to have only one type of anesthetic, since, given the variability of patients, it can interfere and derail treatments. The slow percentage of patients who report anaphylaxis to the anesthetic agent are usually reacting to the preservative.<sup>12</sup> Thus, the ideal would be for the dentist to have at least two solutions at his disposal that differ in the preservative – sodium disulfide or methylparaben – as to not suspend care or perform it irresponsibly.

It is worth mentioning that vasoconstrictor-free anesthetics lack preservatives, however the presence of these substances prolong the anesthetic effect, provide appropriate hemostasis due to vasoconstriction capacity, and ensure less traumatic procedures and better operative condition for the professional.<sup>9,14,15</sup>

In addition, another regular occurrence in the office is the care of hypertensive patients. Thus, the professional must have theoretical knowledge to ensure patient protection and avoid emergency situations.<sup>8</sup>

The present study revealed that for controlled hypertensive patients, lidocaine 2% with adrenaline 1:100,000 again showed preference with 67.3%, followed by prilocaine 3% with felypressin 0.03IU. These results can be clarified by the statement that stress and pain can cause

increased blood pressure, so it is conventional to use anesthetics with vasoconstrictors in the absence of contraindications, as besides providing deep anesthesia, they reduce systemic toxicity.<sup>8</sup> Additionally, studies confirm that the use of epinephrine, respecting the maximum dosage of tubes, revealed a simple increase in blood pressure in controlled hypertensive patients; thus, choosing lidocaine with sympathomimetic vasoconstrictor is safe for controlled hypertensive patients.<sup>15</sup> Prilocaine appears as the second most used salt for its vasoconstrictor: felypressin raises blood pressure as a result of increased peripheral resistance, without having a direct effect on the myocardium or significant changes in heart rate.<sup>9</sup>

In this perspective, the dental office is regularly attended by undiagnosed or uncontrolled hypertensive patients, which can complicate treatment safety. This conception is ratified by studies conducted in Saudi Arabia, which presented similar results and found that of the hypertensive patients admitted to Dentistry, approximately 50% were unaware of the condition.<sup>7</sup> This becomes an even greater problem because they increase the chances of complications associated with the use of local anesthetics in decompensated patients, since the risks of adrenaline include acute bouts of hypertension, arrhythmias and infarction.<sup>8</sup>

These statistics corroborate the importance of obtaining blood pressure before starting dental treatment to identify unstable or undiagnosed patients.<sup>8</sup> The results found aggravate this situation because 41.6% measure pressure only in patients already diagnosed and 23% does neither, agreeing with the exposed idea about dentists being aware of the importance of measuring pressure, but not yet fully practicing it.<sup>16</sup>

Moreover, these results help alert the dental class about preoperative care, as routine procedures require the use of drugs that can interact negatively, such as non-steroidal anti-inflammatory drugs, anesthesia with sympathomimetic vasoconstrictors in decompensated patients or who use  $\beta$ -blockers.<sup>8,16</sup>

This study reproduces characteristics associated with the profile of use of local anesthetics, since its advantages in dental clinics are unquestionable, but they require extensive knowledge and updating by the professional as to ensure patient safety, better efficacy and higher quality of treatment. Its limitations include the sample size, as it excluded some professionals of the private dental service in the city, and the difficulty in accessing the interviewees, as some who agreed to participate in the study did not receive the researchers to apply the questionnaire.

Based on the analyses, lidocaine is the most widely used salt in dental offices, including for hypertensive patients; and just over half of the sample has three or more types of anesthetic salts available and consider the teaching about anesthesiology in undergraduate courses

satisfactory, while most lack the habit of attending extracurricular courses and lectures on this subject. A concerning point was that a considerable part of the interviewees reported not assessing pressure in all patients prior to treatment, exposing those uncontrolled or undiagnosed hypertensive patients to adverse reactions associated with the use of local anesthetics. As such, the research contributes to discussions on a frequent subject in professional practice, besides warning about the care that should be taken.

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#### **Authors' contribution:**

Paula Vitória Bido Gellen, Mariana Araújo dos Santos, Hyara Luz Moreira and Marlon Brendo da Silva Benigno contributed to the conception, design, analysis and writing of the article; Tássia Silvana Borges and Rodrigo Ventura Rodrigues contributed to the planning and design, revision and final approval of the article;

All authors approved the final version of the manuscript and declared themselves responsible for all aspects of the work, guaranteeing their accuracy and integrity.