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Dental management in hypertensive patients

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***Keywords*— Blood pressure, Hypertension, Oral health.**

***Abstract*—** *Systemic arterial hypertension or high blood pressure is a disease that affects many people in the world and is considered a relevant factor in establishing the cause of death. Arterial hypertension is when the pressure that the blood exerts on the walls of the arteries to move is very strong, being above the values considered normal. In addition, this disease involves hardening of the vascular walls, which makes it difficult for blood flow to pass. Therefore, the general objective of this work is to evaluate the existing literature, in order to verify dental care for hypertensive patients. The methodology used was a review of the integrative literature, which searched material databases that supported the theme addressed here. After this survey, 13 articles made up the research results. It is concluded that in the case of diagnosed and treated hypertension, the dentist should consult the patient's doctor, when starting the treatment plan, to make possible the integration of the medical and dental treatments. These patients can be submitted to non-surgical treatments using normal methods, and in case of simple surgical procedures, complementary sedation should be used.*

I. INTRODUCTION

Hypertension is known as the “silent killer” and affects 80 million adults over the age of 20 in the United States alone and only <1 billion people worldwide. In 2025, the number of patients diagnosed with hypertension is expected to be 1.56 billion. Hypertension is responsible for> 7 million deaths annually and is one of the main risk factors for mortality from cardiovascular diseases. The disease is defined as systolic blood pressure (SBP) of 140 mmHg or diastolic blood pressure (DBP) ≥90 mmHg, or anyone receiving a prescription for antihypertensive medication for the purpose of controlling hypertension. In addition, hypertension is defined as high blood pressure readings on at least two occasions with or without provocation (CALISTRO et al., 2019).

As mentioned by Yugar-Toledo et al. (2020), for those normotensive or prehypertensive patients, providing a complete education is essential for prevention. Explain the risk factors associated with the disease and provide advice on lifestyle changes, such as weight loss, dietary changes (dietary approaches to stop hypertension), decreased sodium intake, increased physical activity and restricted intake of alcohol can prove to save lives in this population.

The dentist is faced daily with cardiovascular pathologies. Inappropriate consideration of such a story can lead to potentially fatal accidents. In relation to the hypertensive subject, the dentist must know how to assess the severity and stability of hypertension. In the case of uncontrolled hypertension, the patient should be referred to the attending physician to adjust the treatment (SOUTHERLAND et al., 2016).

The dentist must be careful not to interrupt the antihypertensive treatment and limit the stress caused by their care, ensuring optimal analgesia, or even prescribing premedication. Local anesthetic solutions with adrenaline are not contraindicated in controlled hypertension. People with heart valve disease are at risk of developing infective endocarditis. Dental care is particularly indicated in these

patients, as the oral cavity represents an important reservoir of germs. Some treatments are contraindicated and antibiotic prophylaxis is sometimes recommended. Finally, the coronary subject must undergo a careful evaluation in collaboration with the cardiologist. High-risk patients should be treated in a hospital structure in case of urgent intervention. Antiplatelet therapy should not be stopped under any circumstances. Local hemostasis should then be treated particularly because of the high risk of bleeding. The patient should be informed of the risk of bleeding and given guidance to limit bleeding. Certain treatments may require postponing treatment. In the event of a cardiovascular accident in the office, the dentist should immediately call the emergency medical service (RODRIGUES et al., 2015; SCHUEROFF et al., 2016; SILVA et al., 2020). Therefore, the following problem arises: What is the importance of a dental care protocol for patients with hypertension?

It is important that the oral health professional is well versed on the challenges involved in prevention, management and treatment options for patients with systemic disorders, as well as on the opportunities available that can improve general patient care and treatment outcomes in the Odontological office. Under such conditions, immediate diagnosis and immediate treatment are mandatory, especially when a patient is clinically compromised. The purpose of such an operation is the prevention, identification and immediate implementation of an adequate dental care protocol (CALISTRO et al., 2019; PRIYANKA et al., 2019).

The present study is justified due to the importance of seeking an adequate dental care protocol for hypertensive patients. New information on these types of patients is published frequently and management is often changed. It is important to implement these new changes to maintain the best quality of care in the treatment. A dental professional must be aware of the disease, know the current therapeutic options and have the ability to educate and provide access to patient care. The recommendation for the management of these patients is based mainly on the judgment of a professional. Before providing assistance to these patients, the professional must be able to assess their health status and make appropriate decisions (NAKANISHI et al., 2017; GUEIROS et al., 2019; LEITE et al., 2020).

Therefore, the general objective of this work is to evaluate the existing literature, in order to verify dental care for hypertensive patients. The specific objectives are: Describe the etiology, classification, epidemiology and risk factors associated with hypertensive patients; Point out the main oral manifestations present in hypertensive patients; Provide an overview of the concerns related to the treatment of hypertensive patients and useful recommendations in managing a wide spectrum of these patients who present themselves at the dental office.

II. HELITERATURE REVIEW

2.1 EPIDEMIOLOGY OF SYSTEMIC ARTERIAL HYPERTENSION

Hypertension is clinically defined as a disorder of elevated blood pressure blood pressure at rest. There are some risk factors that can lead individuals to develop some degree of hypertension, including age, black race, female gender and lifestyle like sedentary lifestyle and obesity. (COSTA et al., 2013)

Hypertension affects more than 30% of the adult population worldwide, that is, more than one billion people. It is the main risk factor for cardiovascular disease, especially coronary heart disease and stroke, but also for chronic kidney disease, heart failure, arrhythmia and dementia (WHO, 2018).

The burden of hypertension is felt disproportionately in low- and middle-income countries, where two-thirds of the cases are largely due to the increase in risk factors in these populations in recent decades. In addition, about half of people living with hypertension are unaware of their condition, which puts them at risk for preventable medical complications and death (BRASIL, 2017).

According to the World Health Organization (WHO), hypertension affects 20 to 40% of the adult population, with the highest prevalence among men and in middle and low income countries (WHO, 2018).

In Brazil, according to data from the National Health Survey (PNS), the prevalence of hypertension in 2013 was 21.4%, with 24.2% among women and 18.3% among men. This prevalence was higher according to age: 20.6% among adults aged 30 to 59 years, 44.4% among elderly people aged 60 to 64 years and 52.7% among those aged 65 to 74 years. The prevalence of hypertension was also higher in people with low education, living in urban areas and in southeastern Brazil (BRASIL, 2017).

Data from the Surveillance of Risk and Protection Factors for Chronic Diseases by Telephone Survey (Vigitel) in 2016 showed that the prevalence of hypertension in Brazil was 25.7%, varying between 16.9 and 31.7%. The prevalence was higher among women (27.5%) than among men (BRASIL, 2017).

2.2 ETIOLOGY, PHYSIOPATHOLOGY AND CLASSIFICATION OF HYPERTENSION SYSTEMIC ARTERIAL.

In order for blood to circulate in the body, the heart must exert pressure when pumping it. When performing this task, this organ contracts, at the moment called systole, and plays a great amount of blood to the arteries. This is the pressure known as the maximum pressure or systolic (SBP). When the heart relaxes, the pressure of the blood vessels decreases; so it is known as diastolic pressure (DBP) or minimum. The determinants of BP are the cardiac and peripheral resistance and any change in one or the other, or both, interferes with the maintenance of normal blood pressure levels. Several mechanisms control peripheral resistance and cardiac output: cardiac, renal, neural, hormonal, ionic, vascular and structural mechanisms, termed as pathophysiological mechanisms of SAH. These complex mechanisms interact and balance, and are responsible for maintaining blood pressure as well as its variation moment to moment. It is known that a dysfunction in these BP control systems results in hypertension, however, the complex interaction between these physiological systems, as well as the environmental influences, such as excess salt in the diet and psychoemotional stimuli, make it difficult determine whether the changes found in hypertensive patients are the primary cause of SAH or consequence of other dysfunctions still unknown (RIVERO et al., 2020).

As to the origin, SAH can be primary or secondary. Primary hypertension or essential it is not possible to determine the etiology, being found in about 90% to 95% of the patients. It occurs due to changes in the BP control system caused by the interaction of genetic factors with environmental factors, such as excess sodium in the diet, smoking, obesity and stress. The others are carriers of secondary hypertension that can originate from other pathologies such as renal artery stenosis, pheochromocytoma, Cushing's syndrome, primary hyperaldosteronism and also to the use of drugs such as alcohol, oral contraceptives, sympathomimetics, corticosteroids, cocaine and others (COSTA et al., 2020).

While some forms of secondary hypertension can be treated and cured surgically, the control of primary hypertension requires the prolonged use of medications, which can affect dental treatment. These drugs can be of different groups pharmacological drugs, and the most common ones used to treat SAH are diuretics, beta selective and non-selective blockers, centrally acting adrenergic antagonists, blockers calcium channels, alpha-adrenergic blockers, vasodilators, sympathetic antagonists peripheral action and angiotensin-converting enzyme inhibitors (MENEZES, et al., 2020).

There are three guidelines that classify SAH, the Brazilian one published in 2002, the North American published in 2003 and the European one also published in 2003. As there is a considerable difference among them, especially in the areas of classification and management of the disease, it is questioned which recommendation more correct and that consequently must be adopted. The American HAS classification was modified in 2003 by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (VII-JNC). A new category called prehypertension was created and the old stages two and three of SAH were combined into one stage, emphasizing its control and early treatment (DANTAS; RONCALLI, 2020).

The Brazilian Society of Hypertension published in 2010 the Brazilian Guidelines for hypertension VI, where it says that in the literature, borderline pressure is equivalent to normal-high pressure or pre hypertension (COSTA et al., 2020).

There is also office hypertension also called white coat hypertension, which consists of measuring persistently high BP values in the doctor's office or dental, but normal in the patient's day-to-day. It is present in about 20% of patients with increased BP. As a precursor to SAH, it should be monitored and continuously evaluated. It is important to differentiate SAH from office hypertension, keeping in mind that sometimes multiple BP measurements are necessary (MENEZES, et al., 2020).

The treatment of SAH involves changes in lifestyle (weight loss, physical activities, reduced sodium intake and moderation in alcohol consumption) and use antihypertensive medication. The goal of therapy is to maintain blood pressure levels below 140/90 mmHg, with a consequent reduction in cardiovascular complications. In hypertensive patients and diabetics and / or with kidney disease, the goal is to reach values below 130/80 mmHg (COSTA et al., 2020; MENEZES, et al., 2020).

2.3 ORAL MANIFESTATIONS PRESENT IN HYPERTENSIVE PATIENTS

Patients who use hypertensive drugs are closely linked to the dental care, since some of these medications can cause side effects in oral cavity. Some of these side effects deserve special attention from the dentist, since the SAH is the fourth most common medical condition in the dental clinic. Among the most common side effects cited in the oral cavity is gingival hyperplasia, which is very common in patients using calcium channel blockers such as nifedipine, with an incidence ranging from 1.7% to 38%.

As a form of treatment for cases of hyperplasia associated with the use of these drugs, periodontal surgical

intervention stands out; however, this is not definitive, since the patient will continue using the medicine. Therefore, the most effective way would be to ask the doctor to have the medicine reduced dose, if possible, or to be replaced by another drug of a different class, provided that it is this substitution is viable.

In addition to hyperplasia, pharmacological treatment with antihypertensive drugs can xerostomia, reduced tongue mobility, difficulty chewing and swallowing food, change in taste sensation, increased incidence of Candida infections, increased caries and periodontal disease, nocturnal oral discomfort and a burning sensation.

There are no clearly recognizable oral manifestations associated with hypertension, but many antihypertensive drugs can cause adverse reactions that can serve as clues for the dentist to recognize the condition presented by the patient. Among these, xerostomia, excessive gingival growth, erythema multiforme, paresthesias, altered taste, among others, can be mentioned.

Anxiety induces an increase in sympathetic activity, which leads to marked hypertension and tachycardia. There are no immediate contraindications to the use of benzodiazepine anxiolytics.

Patients with cardiovascular diseases should always be treated, even if the procedure is a simple restoration, as the pain tends to increase anxiety and induce tachycardia and elevated BP (blood pressure).

The use of an anesthetic solution containing vasoconstrictor should only be avoided in patients with very high and uncontrolled hypertension, but in general the benefits associated with the use of small doses of epinephrine outweigh the possible disadvantages.

The increase in BP is usually greater in the early hours of the morning, and in the afternoon the fluctuations in their values tend to be less. Thus, it is recommended to assist the patient who has cardiovascular disease in the afternoon.

Many hypertensive patients make daily use of acetylsalicylic acid and the dentist should investigate this possibility before the dental procedure, especially when there is a possibility of bleeding.

2.4 DENTAL TREATMENT FOR HYPERTENSIVE PATIENTS

For dentists, it is extremely important to knowledge of the consequences and possible complications that may arise during the clinical care or, as a result of therapy instituted drug. The use of antihypertensive drugs may cause some oral complications, such as decreased salivary secretion and increased tissue gingival - medication-associated gingival hyperplasia.

The performance of dental treatment should be based on the measurement of blood pressure at the time of care, the classification of hypertension by the doctor and has the following general parameters:

• Moderate or severe hypertension, even if controlled, always interact with the attending physician to define conduct for each procedure and individual need for the use of anxiolytics. Urgent procedures should be performed after using anxiolytic medication and reducing BP. If the pressure remains unchanged, treatment should be conservative (antibiotics and / or pain relievers).

• Uncontrolled hypertension: no procedure should be performed. In an emergency, treatment should be conservative (antibiotics and / or pain relievers).

• Controlled hypertension: simple non-surgical procedures performed normally; Major surgeries (multiple extractions, periodontal surgeries) consider the use of sedatives.

III. METHODOLOGY

The present integrative literature review followed the following points:

1st - elaboration of the guiding question;

2nd - search or sample the literature in the Scielo, PubMed and Science Direct databases. The inclusion criteria were articles published between 2015 and 2020 in Portuguese and English. The following consultation terms were used: blood pressure, hypertension and oral health. The query terms were combined by the Boolean operator 'OR' to request a comprehensive search of the available literature. All other samples were immediately excluded. The exclusion criteria were: duplicate studies, available only in the abstract or with the presentation of only the topic, with the content unavailable and paid articles.

3rd - data collection;

4th - critical analysis of the included studies;

5th - discussion and interpretation of results and;

6th - presentation of the integrative review, that is, presentation of the review / synthesis of knowledge)

The screening was carried out independently by the three authors. Disagreements regarding inclusion during the first and second stages of study selection were resolved by discussion.

The items recovered were selected based on a three-step selection process, which later considered titles, abstracts and full texts. In stage 1, a list of titles was obtained from the databases and titles that clearly did not refer to the theme. In stage 2, the abstracts of the selected

titles were selected and, if it was clear from the abstract text that the article did not deal with the theme, it was excluded from the review. In step 3, full-text articles were read carefully and it was verified whether the studies were relevant to the review objectives.

IV. RESULTS AND DISCUSSION

In the first stage of the study, 547 articles were found, which referred to the etiology, classification, epidemiology and risk factors of hypertension. Then, an attentive and systematic reading of the titles of the selected articles was carried out according to the theme addressed in the research, and 107 articles were selected. Subsequently to reading the abstracts, only 55 studies were chosen to be included in a more detailed analysis, of a critical and integral character. At the end of these verification and analysis steps, 13 studies remained that met the inclusion criteria. It was found that the most significant portion of articles was found in the SCIELO database, followed by the journals PUBMED and Science Direct, as shown in Figure 1.

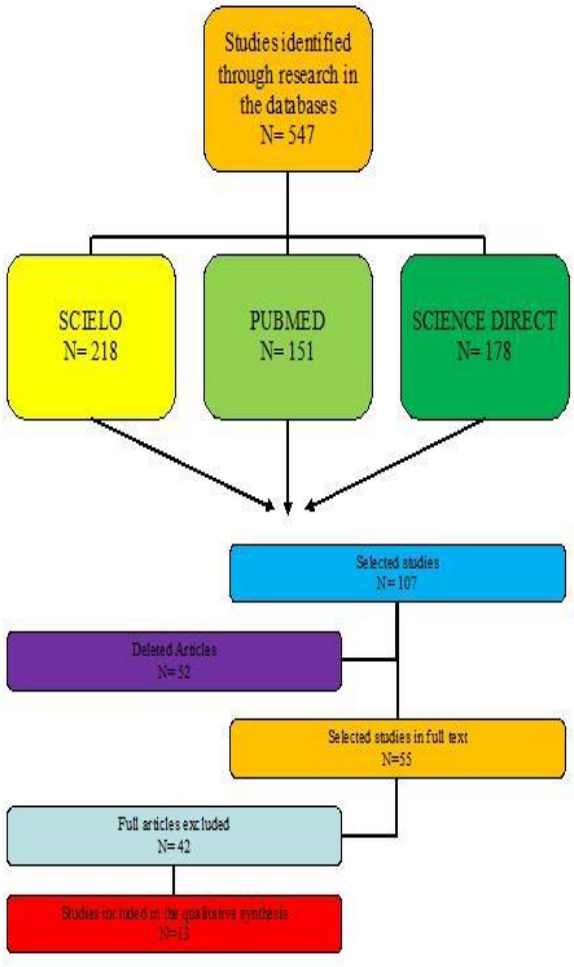

Fig. 1: Selection of studies for review.

This review consists of 13 articles published between 2015 and 2020. Of the selected sample, three were from a literature review, three were cross-sectional studies, a cohort study, a randomized study, a home study, a multicenter study and a survey study data, being distributed, as shown in table 1.

Table.1: References used in this review.

Authors	Title	Year	Objective	Methodology
Rodrigues et al.	Percepção de acadêmicos de Odontologia sobre seus conhecimentos para o atendimento odontológico de hipertensos e diabéticos.	2015	Verify the perception of the students of the Dentistry Course at the Federal University of Pará about their knowledge for the management of patients with SAH and DM in the dental clinic.	Cross-sectional research
Schueroff et al.	Importância do conhecimento do cirurgião dentista sobre pressão arterial, fatores modificadores e complicações sistêmicas durante atendimento cirúrgico.	2016	Clarify the level of knowledge of some professionals who work in the city of Maringá-PR in the areas of Implantology and Oral and Maxillofacial Surgery and Traumatology on BP.	Cohort search
Southerland et al.	Dental management in patients with hypertension: challenges	2016	To provide strategies for managing and preventing complication	Systematic review

	and solutions.		s when treating the patient with hypertension who presents to the dental office.	
Nakanishi et al.	Relationship of Hypertension to Coronary Atherosclerosis and Cardiac Events in Patients With Coronary Computed Tomographic Angiography.	2017	We investigated the relationship between hypertension and the presence, extent, and severity of coronary atherosclerosis in coronary computed tomographic angiography and cardiac events risk.	Multicenter study
Oliveira; Nogueira; Pereira	Relação entre percepção sobre serviços odontológicos e condições de Saúde Bucal em hipertensos e diabéticos.	2018	To evaluate the relationship between the perception of dental services and oral health in a population of hypertensive and diabetic patients enrolled in the Family Health Strategy in Alfenas, MG, Brazil.	Home study
Calistro et al.	Dental care in hypertense patients: systematic review	2019	perform a literature review on dental treatment in patients with hypertension	Systematic review
Gueiros et al.	World workshop oral medicine VII: immunobiologics for salivary gland disease in Sjögren's syndrome: a systematic review	2019	This systematic review evaluated the efficacy of immunobiologics for the management of oral disease in Sjögren's syndrome (SS).	Systematic review
Priyanka et al.	Evaluation of changes in Blood pressure and Pulse rate of hypertensive patient during early morning and evening dental appointments.	2019	The purpose of our study was to evaluate changes in Blood pressure and Pulse rate of hypertensive patient during early morning and evening dental appointments.	Clinical study
Rosa et al.	Efficacy assessment of oral and sublingual sedation using alprazolam in implantology surgical procedures	2019	The aim of this study was to evaluate the efficacy of two formulations of alprazolam (ALP) in patients undergoing oral implantology surgical procedures.	Randomized study
Silva et al.	Atendimento odontológico a hipertensos	2019	To identify the knowledge	Cross-sectional

	e diabéticos na atenção primária à saúde.		of dentistry professionals in primary health care in the city of Quixadá-CE, regarding the dental treatment of hypertensive and diabetic patients.	research
Leite et al.	Avaliação do conhecimento de cirurgiões dentistas diante do atendimento a cardiopatas graves na atenção primária.	2020	Assess the knowledge of dental surgeons who work in primary health care in a municipality in northeastern Brazil, facing the care of patients with cardiovascular diseases.	Cross-sectional research
Morais et al.	A prospective study on oral adverse effects in head and neck câncer patients submitted to a preventive oral care protocol	2020	To evaluate the occurrence and severity of oral complications, number of radiotherapy (RT) interruptions and quality of life (QoL) in a population of head and neck cancer patients receiving a preventive oral care program	Cohort search
			(POCP) and photobiomodulation therapy (PBMT).	
Yugar-Toledo et al.	Posicionamento Brasileiro sobre Hipertensão Arterial Resistente – 2020.	2020	Conduct a survey on the Brazilian Position on Resistant Arterial Hypertension - 2020	Data survey

From the relevant literature review, it was possible to identify that SAH is a disease cardiovascular disease with high prevalence in the Brazilian and worldwide population. With medical advances, patients with complex diseases are living longer and seeking care, more and more, in dental offices and outpatient clinics (NAKANISHI et al., 2017; YUGAR-TOLEDO et al., 2020).

The dental treatment of hypertensive patients, according to Calistro et al. (2019) represents a challenge for dental surgeons, who must be scientifically based to establish the best conducts for the management of this type of patient. Perform an anamnesis and blood pressure measurement, guide the patient about his systemic condition, clarify how therapies employed and recognize how changes resulting from them are fundamental to establish the best treatment plan and minimize or prevent problems that may occur during dental care.

The mean systolic and diastolic blood pressure (SBP) according to Priyanka et al. (2019) was higher in all groups during morning appointments. The average pulse rate (PR) was also higher during the early morning.

During dental care, Oliveira, Pereira and Nogueira (2018) reinforce these notes by Gueiros et al. (2019) and Rosa et al. (2019), which points out the need for a careful anamnesis, is indispensable for the decision of therapeutic procedures and correct performance of procedures. Special attention is recommended to the types and dosage of medications used by the patient, as well as the choice of local anesthetics.

As it was possible to observe in the literature review, the opinion of these authors when it comes to meeting whether or not a patient with high BP (above 140 by 90 mmHg) in the dental office is contradictory. In general, all authors agree that patients with prehypertension can receive any type of treatment, including local anesthesia

with vasocontractors. However, when pressure levels advance to stage 1 or 2, it seems to be difficult to decide Rodrigues et al. (2015) state that patients with stage 1 and stage 2 SAH should not receive treatment dental treatment and sent to the doctor immediately, however Schueroff et al. (2016) state that stage 1 patients can be treated normally and those in stage 1 e 2 should have their treatment postponed. Nakanishi et al. (2017) argue that dental treatment should be delayed only for patients with BP above 180 by 110. Silva et al. (2019) and Leite et al. (2020) are based on American College of Cardiology and American Heart Association guidelines that assess the risk of occurrence of a serious event in a patient with cardiovascular disease undergoing non-cardiac surgery, which can be applied to non-surgical dental treatment. According to these guidelines, it appears that the risk of providing routine dental treatment for most patients with BP high is very low.

V. CONCLUSION

Given the numerous possible oral manifestations of hypertension and the risk of an emergency in surgical procedures, it is important that dentists recognize and assess the impact of diseases on dental care.

With a complete understanding of this manifestation and its dental management considerations, the oral health team can work together effectively to provide excellent oral health care to hypertensive patients.

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