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Xerostomia as a Side Effect of Antihypertensive Drug Use: A Literature Review

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A B S T R A C T

Hypertension is a chronic disease with a risk of serious complications requiring long-term treatment, which often causes side effects such as xerostomia. Xerostomia, a sensation of dry mouth due to reduced saliva production, often occurs in patients with hypertension taking CCBs or ACE inhibitors and can reduce quality of life and oral health. Methods: This literature review selected five articles from PubMed, SCOPUS, and Google Scholar within the past five years using the keywords "Hypertension," "Antihypertensive Drugs," and "xerostomia" individually or in combination. Results: Five cross-sectional studies were selected, with results describing the distribution of study subjects, findings related to xerostomia, and the types of anti-hypertensive medications studied. Discussion: Xerostomia in patients with hypertension often occurs as a side effect of antihypertensive medications—ACE inhibitors and calcium channel blockers (CCBs), which decrease salivary flow through their effects on the autonomic nervous system and fluid balance. This condition can lead to impaired oral function and a worsening of quality of life, especially in older individuals. Hence, management includes photo-biomodulation therapy, the use of saliva substitutes, hydration education, and medication adjustments, if necessary, with regular monitoring to prevent complications. Conclusion: Antihypertensive drugs—ACE inhibitors and calcium channel blockers (CCBs)—can cause xerostomia, especially in older people, which reduces quality of life and increases the risk of oral complications

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INTRODUCTION

Hypertension is the most prevalent chronic disease, accounting for a significant portion of worldwide morbidity and mortality.1 This condition can be defined as a condition of repeated increases in systolic blood pressure of 140 mmHg or higher and diastolic blood pressure of 90 mmHg or higher. If left uncontrolled, this can lead to serious complications, including visual impairment, stroke, cardiovascular disease, and kidney failure.2

The prevalence of hypertension in Indonesia exhibits a significant upward trend. According to the 2018 Riskesdas (Basic Health Research), at 34.11%, hypertension was prevalent across the country.3 This data indicates that hypertension is a health problem that requires attention in Indonesia. Hypertension is often called a "silent killer" because sufferers are not aware of the condition until serious complications occur. The WHO also reports that approximately 46% of people with hypertension are unaware of their disease, only 42% receive treatment, and only 21% successfully control their blood pressure.4

Hypertension management involves lifestyle changes and pharmacological therapy. Lifestyle modifications, including a low-sodium diet, regular physical activity, weight management, and stress management, have been shown to be effective in lowering blood pressure.5 Hypertension treatment generally involves long-term use of antihypertensive medications to manage blood pressure and prevent cardiovascular complications.6 Nevertheless, side effects are frequently caused by the usage of antihypertensive medications, and xerostomia or dry mouth is one of these side effects.7

Xerostomia comes from the words “xeros,” meaning dry, and “stomia,” meaning mouth. This condition signifies the subjective perception of a dry mouth by the patient, whereas a decrease in saliva production that can be objectively measured is known as hyposalivation.8 Xerostomia often causes discomfort, impedes speech and swallowing, and makes it difficult to wear dentures. In addition, xerostomia can lead to bad breath, decreased oral hygiene due to a lower oral pH, and increased bacterial growth. This condition is often associated with systemic diseases, i.e., Sjögren's syndrome and diabetes mellitus, radiation therapy involving the salivary glands, and the use of certain medications.9 Various medications have been reported to be associated with xerostomia, including antihypertensives such as β-adrenergic blockers, diuretics, and ACE inhibitors, which are known to contribute to xerostomia by decreasing saliva production.10

Studies in elderly populations have shown that patients with hypertension taking antihypertensive medications, particularly CCBs such as amlodipine, have a higher prevalence of xerostomia compared to unmedicated hypertensive patients and individuals with normal blood pressure. This xerostomia is also more common in women and older patients and correlates with the number of antihypertensive medications taken.11

Additionally, xerostomia can impact a person's overall health and quality of life. This is because it can cause discomfort, difficulty swallowing, and an increased risk of oral infections. Further complications of xerostomia include a

higher incidence of periodontal disease, dental caries, oral infections, and ulceration.11

Establishing a diagnosis of xerostomia requires a comprehensive evaluation, including an examination of the patient's clinical signs and symptoms, a physical examination of the oral cavity, and an assessment of salivary gland function by measuring salivary flow rates at rest and under stimulation. In some cases, a biopsy of the minor salivary glands is also necessary to detect underlying pathological changes in salivary gland function. Moreover, supporting examinations, such as completing the Summated Xerostomia Inventory Indonesian Version (SXI-ID) questionnaire, can be used as a valid and reliable tool to measure the level of xerostomia in the Indonesian population.12

For that reason, this literature study aims to analyze xerostomia as a side effect of using antihypertensive drugs.

METHODS

This study is a literature review, in which five articles were selected through a search of PubMed, Scopus, and Google Scholar, published within the last five years. The search was conducted using the keywords "Hypertension," "Antihypertensive Medication," and "xerostomia." These keywords were used both individually and in combination.

RESULTS

After a study selection process, five literature sources were selected as the data sources for this research. These five studies used a cross-sectional design. Table 1 displays the distribution of locations and characteristics of the study populations. All articles came from various countries, with varying sample sizes and age ranges.

Table 1. Distribution of Research Subjects

Researchers	Research Location	Total	Gender		Age (years)
			Male	Female	
Apriasari et al.	Banjarmasin	41	41	-	36-65
Pebrianty et al.	Kediri	34	6	28	60-90
Eva et al.	Makassar	17	1	16	18-50
Al-Ahmad et al.	Malaysia	41	23	28	65-75
Ramírez et al.	Madrid, Spain	221	90	131	74 (mean)

Table 2. Results of the Literature Review

No	Researchers	Title (Year)	Findings Related to Xerostomia
1.	Apriasari et al.	"Analysis of Clinical Oral Manifestation of Patients with Antihypertensive Therapy in South Kalimantan" (2023)	Clinical manifestations, such as xerostomia, gingival hypertrophy, lichenoid reactions, and altered taste sensation in patients undergoing antihypertensive therapy
2.	Pebrianty et al.	"*Pengaruh Obat Calcium Channel Blocker Terhadap Terjadinya Xerostomia Pada Lansia*" ["The Effect of Calcium Channel Blocker Drugs on the Occurrence of Xerostomia in the Elderly"] (2023)	CCB use significantly influences the occurrence of xerostomia, resulting in decreased salivary flow.
3.	Eva et al.	"*Hubungan Obat Anti Hipertensi Golongan Ca-Antagonis dan ACE Inhibitor Terhadap Xerostomia*" ["The Relationship between Antihypertensive Drugs of the Ca-Antagonist and ACE Inhibitor Groups and Xerostomia"] (2020)	Both CCBs (amlodipine) and ACE inhibitors (captopril) influence xerostomia, with no significant difference in salivary flow reduction.
4.	Al-Ahmad et al.	"Amlodipine and Xerostomia in Elderly Patients" (2023)	The incidence of xerostomia in amlodipine users is high: 34.7% in men and 26.4% in women.
5.	Ramírez et al.	"Risk factors associated with xerostomia and reduced salivary flow in hypertensive patients" (2023)	The prevalence of xerostomia is >50% influenced by medication and comorbidities.

Table 3. Types of Antihypertensive Drugs

Researchers	Title (Year)
Apriasari et al.	ACEi, ARB, CCB, Beta Blockers
Pebrianty et al.	CCB
Eva et al.	Amlodipine (CCB), Captopril (ACEi)
Al-Ahmad et al.	Amlodipine (CCB)
Ramírez et al.	Diuretics, Beta Blockers, CCBs, ACEi, ARB

While Table 2 details the results of the literature used as references in this study, Table 3 contains the distribution of the types of antihypertensive drugs consumed, including angiotensin converting enzyme inhibitors (ACEi), calcium channel blockers (CCBs), beta-adrenergic (ß-blockers), diuretics, and Angiotensin II Receptor Blockers (ARBs).

DISCUSSION

Xerostomia is the subjective perception of dry mouth, typically associated with decreased saliva production or quality, which can lead to impaired oral function, including difficulty swallowing, changes in taste, and an increased risk of caries and mucosal infections. In patients with hypertension, xerostomia can occur as a side effect of the use of antihypertensive drugs, which directly or indirectly affect salivary secretion.18

The mechanism of this disorder involves the pharmacological effects of drugs that alter autonomic nervous system activity, balance of fluid and electrolyte, or blood flow to the salivary glands. Calcium channel blockers (CCBs) and ACE inhibitors are known to decrease salivary flow rate by mimicking the action of the autonomic nervous system or interfering with the cellular processes of salivary secretion.14

Apriasari et al. (2023) reported various clinical manifestations, including xerostomia, gingival hypertrophy, lichenoid reactions, and changes in taste sensation, in patients undergoing antihypertensive therapy in South Kalimantan. Xerostomia was one of the dominant complaints, especially in patients taking CCBs.13

An observational analytical study by Pebrianty et al. (2023) confirmed that CCB use, particularly amlodipine, significantly contributed to decreased salivary flow and the onset of xerostomia in elderly people in Kediri Regency ($p=0.032$). This reinforces the finding that CCBs have side effects on the salivary glands, worsening dry mouth in elderly patients.14

Novawaty (2020) conducted a comparative study on the use of amlodipine (CCB) and captopril (ACE inhibitor) at the Maccini Sombala Community Health Center and reported that although most patients taking both drugs experienced a decrease in salivary flow (93.33% for amlodipine and 83.33% for captopril), the difference in xerostomia between the two was not statistically significant ($p=0.423$). This suggests that both classes of drugs have the potential to cause xerostomia through similar mechanisms, albeit with different mechanisms of action.15

Al-Ahmad et al. (2023) reported a relatively high prevalence of xerostomia in elderly people aged 65-75 years who had been taking amlodipine for at least three years, namely 34.7% in men and 26.4% in women. Xerostomia in this group

negatively impacts the quality of life, increasing the risk of caries, fungal infections, impaired taste sensation, and burning mouth sensations. This denotes that age and duration of drug use are additional risk factors for xerostomia.16

Ramírez et al. (2023) added that apart from antihypertensive medication use, risk factors such as a long history of hypertension and comorbidities (osteoarthritis, use of anticoagulants, analgesics, and antiarrhythmics) also contribute to an increased risk of xerostomia and hyposalivation. Not all antihypertensives carry the same risk; angiotensin II antagonists (e.g., losartan) are actually associated with a lower risk of xerostomia.17

Management of xerostomia in patients taking antihypertensive medications includes a combination approach to reduce dry mouth and increase saliva production. For instance, photo-biomodulation therapy (low-power laser) is effective in increasing salivary flow and reducing xerostomia symptoms, especially in older people.19 The use of saliva substitutes and moisturizing mouthwashes also provides temporary relief and prevents complications, such as caries and fungal infections. As such, patient education is vital to maintain hydration and avoid risk factors, such as alcohol, smoking, and caffeine.20 If xerostomia is severe, adjustment or replacement of antihypertensive medications with lower-risk classes (e.g., angiotensin II antagonists) may be considered after consultation with a physician. Regular monitoring and management of complications are also crucial for the patient's quality of life and maintaining oral health.21

CONCLUSIONS AND RECOMMENDATIONS

The use of antihypertensive medications, particularly calcium channel blockers and ACE inhibitors, can potentially cause xerostomia, leading to a significant reduction in salivary flow, especially in elderly patients. Xerostomia can reduce the quality of life and increase the risk of oral complications, such as caries and infections.

Management of xerostomia includes photo-biomodulation therapy, the use of saliva substitutes, education on hydration and oral hygiene, and medication adjustments, if necessary, with regular monitoring to prevent further complications.

FURTHER STUDY

This study still has limitations, so further research is needed on the topic of Xerostomia as a Side Effect of Antihypertensive Drug Use: A Literature Review to perfect this study and increase insight for readers.

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