Case Report

Oral health management in hypertensive patients addressing coated tongue caused by antihypertensive medication use: a case report

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Introduction: Hypertension is a chronic condition characterized by elevated blood pressure, often accompanied by symptoms such as headaches, epistaxis, and palpitations. Coated tongue is a clinical condition in which the tongue's surface develops a pseudomembrane due to accumulated debris, non-desquamated keratin cells, and microorganisms, such as bacteria and fungi. This study aims to explore the potential relationship between hypertension and coated tongue, emphasizing the importance of oral hygiene in hypertensive patients. By examining a clinical case, the research highlights the role of tongue cleaning in managing coated tongue and improving oral health. Additionally, it underscores the need for patient education and adherence to proper oral hygiene practices to achieve better treatment outcomes. **Case Report**: A 49-year-old female patient presented to Sartika Asih Bhayangkara Hospital with complaints of persistent bad breath for one month. She reported white spots on her tongue causing discomfort but no pain. The patient reported brushing her teeth one to two times daily but had never cleaned her tongue. She had a history of hypertension and was one amlodipine therapy. **Conclusion**: Coated tongue in hypertensive patients can be managed through regular tongue cleaning after brushing. Effective communication, education, and patient cooperation are crucial for optimal treatment outcomes.

KEYWORDS
Hypertension, coated tongue, education, tongue scraper

INTRODUCTION

Hypertension or high blood pressure is a major risk factor for atherosclerotic cardiovascular disease, heart failure, stroke, and kidney failure.[1] Based on the results of the 2018 *Riset Kesehatan Dasar* (Riskesdas), the prevalence of hypertension among individuals aged over 18 years in Indonesia was found to be 658,201 diagnosed cases.[2] Hypertension is a chronic condition characterized by elevated blood pressure against the walls of the arteries.[2]

Hypertension is often referred to as the "silent killer" because it can cause degenerative diseases and even death.[3] Additionally, various clinical symptoms may be observed, including headaches, epistaxis, palpitations and difficulty breathing after working hard or lifting heavy loads, fatigue, irritability, ringing in the ears, dizziness, tinnitus, and fainting.[4,5]

Effective management of hypertension needs to be done quickly and accurately. It is categorized into: non-pharmacological and pharmacological. Non-pharmacological efforts include adopting a healthy lifestyle, such as maintaining a healthy body weight, reducing salt intake, exercising, and limiting alcohol and tobacco consumption. Pharmacological therapy involves the consumption of antihypertensive drugs.[6]

However, while antihypertensive medications are crucial for managing high blood pressure, they can sometimes have adverse effects on oral health. These drugs can lead to dry mouth, swollen gingiva, bleeding gums, and even canker sores.[7] When the mouth lacks sufficient moisture, it becomes more susceptible to bacterial growth, affecting both the hard tissues (e.g. teeth) and soft tissues (e.g. tongue). Poor oral hygiene combined with dry mouth creates an environment where harmful microorganisms thrive. One common outcome is a coated tongue, a condition characterized by a film of debris, bacteria, and dead cells covers the tongue's surface. This condition can lead to discomfort, bad breath, and an altered taste sensation.

Coated tongue is characterized by a pseudomembrane formation on the tongue's surface due to the accumulation of debris, food residue, non-desquamated keratin cells, and microorganisms like bacteria and fungi. Dentists often encounter complaints of bad breath related to this condition. The exact cause of coated tongue remains unclear.[8] Under normal conditions, the tongue undergoes keratinization and desquamates through contact with food, the palate, and upper jaw teeth. This layer is replaced by new epithelial cells underneath. However, when tongue movement is restricted due to disease or abnormalities in the oral cavity, the filiform papillae elongate, allowing bacteria like *Streptococcus* or fungi such as *Candida albicans* to adhere to them. These elongated papillae create the appearance of a coated or "hairy" tongue, where debris and pigments from food, cigarettes, and candy can accumulate.[8,9]

Coated tongue usually involves the posterior two-thirds region of the dorsal tongue. This disorder can be asymptomatic, but its side effects are halitosis and abnormal taste threshold.[9] Some risk factors that are known to influence the appearance of coated tongue are age, soft diet, oral hygiene, and systemic conditions such as hypertension and diabetes mellitus, which can predispose individuals to oral cavity infections, particularly oral candidiasis on the tongue.[10] One effective treatment to overcome coated tongue conditions is the use of an oral hygiene aids such as a tongue scraper or tongue cleaner.[11]

This case report highlights a unique association between hypertension and coated tongue, emphasizing the impact of antihypertensive medication on oral health. While coated tongue is commonly linked to poor oral hygiene and systemic conditions like diabetes, its potential correlation with hypertension remains insufficiently studied. This case underscores the importance of tongue hygiene in hypertensive patients, particularly those undergoing antihypertensive therapy, to prevent complications such as bad breath and oral infections. Additionally, the report provides practical insights into patient education and oral hygiene interventions, which are crucial for improving both systemic and oral health outcomes. The primary aim of this case report is to describe the management of coated tongue in a hypertension patient.[12]

Case Report

A 49-year-old female patient reported experiencing persistent bad breath over the past month. The patient admitted that she felt bad breath when there were white spots on her tongue, the white spots were not painful but caused discomfort, the patient admitted that she usually brushed her teeth 1-2 times a day but never cleaned or brushed her tongue. The extraoral examination of the 49-year-old female patient revealed no facial asymmetry, swelling, or lymphadenopathy. The patient did not report pain or tenderness in the temporomandibular joint (TMJ) or

surrounding areas. No abnormalities were noted in the lips, perioral tissues, or skin. The chief complaint of persistent bad breath was the primary concern, which was later correlated with intraoral findings.

On intraoral examination on the first day, a white-yellowish plaque lesion was oberved across the entire dorsum of the tongue. The plaque could be scraped off, but did not leave an erythematous area. It was painless, but was accompanied by halitosis. The patient also exhibited poor oral hygiene, with visible plaque and calculus throughout the region. The patient's systemic diagnosis was gastroesophageal reflux disease (GERD) accompanied by hypertension. The patient's primary suspected oral diagnosis was coated tongue at the entire surface of the dorsum of the tongue accompanied by halitosis and generalized chronic marginal gingivitis. The differential diagnosis included oral candidiasis.

The patient care plan. The initial patient care plan focused on education and preventive measures to improve oral hygiene. The patient was instructed to brush her teeth twice a day, once in the morning after breakfast and once at night before bed. Additionally, she was advised to increase water intake to at least eight glasses per day while reducing the consumption of flavored and colored drinks. To address the coated tongue, the patient is encouraged to use a tongue cleaner after brushing or, alternatively, clean the tongue using gauze wrapped around a finger. This approach ensures a clear distinction between the care plan, which emphasizes hygiene and lifestyle modifications, and the treatment plan, which involves specific medical or dental interventions.

Figure 1. Intraoral Documentation of the Patient on the first day (21 November 2023) (A) Upper jaw; (B) Lower jaw; (C) Dorsum of the tongue; (D) Right buccal mucosa; (E) Left buccal mucosa.

In Figure 1, the intraoral documentation of the patient on the first day of examination (21 November 2023) is presented, covering several areas within the oral cavity. The upper jaw was examined to evaluate the condition of the upper teeth, gums, and palatal mucosa. Key observations include the presence of caries, plaque, gum inflammation, or lesions on the palatal mucosa. Any abnormalities, such as erythema or ulceration, were noted as potential indicators of infection or other pathological conditions. In the lower jaw, the examination focuses on assessing the condition of the lower teeth and periodontal tissues, with particular attention given to gum recession, calculus, caries, or signs of periodontal disease such as swelling or gum bleeding.

The dorsum of the tongue is examined for changes in color, texture, or lesions. For example, a whitish coating may indicate oral candidiasis, while red patches or ulcerations could be related to trauma, viral infections, or other systemic conditions. The right buccal mucosa is inspected for irritation, ulceration, or leukoplakia lesions, which can be caused by habits such as tobacco chewing, mechanical trauma, or precancerous conditions. Any color changes or thickening of the mucosa should also be noted.

Similarly, the left buccal mucosa is examined like the right buccal mucosa. Comparing the right and left sides can help identify localized abnormalities possibly due to biting trauma or other localized irritations.On the second day, the patient was followed again. During a focused anamnesis of the chief complaint, the patient admitted that her breath was fresher than yesterday and the white spots on his tongue had decreased significantly compared to the previous day. The white spots had decreased since the patient started cleaning his tongue after brushing his teeth with gauze. On this day, the patient was allowed to go home by an internal medicine specialist. The next step in the treatment plan was to establish the primary diagnosis for this case.

Figure 2. Intraoral Documentation of the Patient on the second day (21 November 2023) (A) Upper jaw; (B) Lower jaw; (C) Dorsum of the tongue; (D) Right buccal mucosa; (E) Left buccal mucosa.

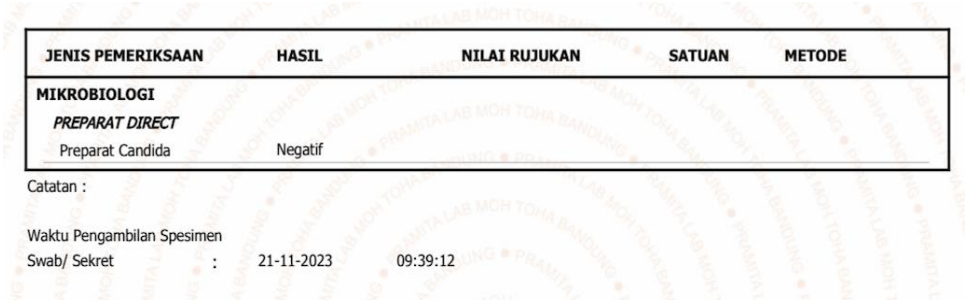
In Figure 2, the intraoral documentation of the patient on the second day of examination (21 November 2023) is presented, showing several areas within the oral cavity. For the upper jaw, the examination focuses on evaluating the condition of the upper teeth, gums, and palatal mucosa. Observations include the presence of caries, plaque, inflammation, or lesions on the palatal mucosa. Any abnormalities, such as erythema or ulceration, were considered potential indicators of ongoing infection, allergic reactions, or other pathological conditions.

For the lower jaw, the assessment aimed to evaluate the condition of the lower teeth and periodontal tissues. Particular attention was given to signs of gum recession, calculus buildup, caries, or indications of periodontal disease, including swelling, bleeding, or changes in gum texture. Comparing the findings with the first-day examination helped to identify any progression or improvement in oral health status.

The dorsum of the tongue was inspected for changes in color, texture, or lesions. Notable findings may include a whitish coating potentially indicating oral candidiasis or red patches and ulcerations that could be associated with trauma, viral infections, or systemic conditions. Monitoring the tongue's appearance on consecutive days provided insights into the progression of any underlying issues.

The right buccal mucosa was examined for irritation, ulceration, or leukoplakia lesions. These could have been linked to habits such as tobacco chewing, mechanical trauma, or precancerous changes. Any color changes, thickening of the mucosa, or differences from the first day were documented.

Similarly, the left buccal mucosa was assessed and compared with the right side. Comparing both sides helped in identifying localized abnormalities, potentially caused by biting trauma or other localized irritations. Noting any changes between the first and second day was essential for evaluating the progression of symptoms or the effectiveness of any interventions.



JENIS PEMERIKSAAN	HASIL	NILAI RUJUKAN	SATUAN	METODE
MIKROBIOLOGI				
PREPARAT DIRECT				
Preparat Candida	Negatif			

Catatan :

Waktu Pengambilan Spesimen
Swab/ Sekret : 21-11-2023 09:39:12

Figure 3. Direct Microbiology Examination Results for *Candida*

The image shows the result of a microbiological examination, specifically a Direct Preparation Test for Candida. The result is negative, indicating that no *Candida* organisms were detected in the specimen. The specimen was collected through a swab/secretions method on 21 November 2023 at 09:39:12. A negative result suggests the absence of *Candida* infection, which rules out conditions like oral candidiasis or thrush that are commonly associated with *Candida* overgrowth. This finding is critical for guiding the patient's diagnosis and management plan.

Before the patient was discharged, a *Candida* examination was carried out by obtaining a sample from the dorsal surface of the tongue. The *Candida* examination results were negative. After the results were available, the patient was informed and provided with education on maintaining the cleanliness of his oral cavity by brushing his teeth twice a day (morning after breakfast and night before bed), increasing his water intake (at least 8 glasses per day), reducing the consumption of flavored and colored beverages, and using a tongue scraper after brushing his teeth or can be helped using gauze wrapped around his finger when cleaning his tongue after brushing his teeth.

DISCUSSION

The use of antihypertensive drugs can significantly impact the oral mucosa, particularly when medications such as amlodipine are prescribed. One of the notable side effects of these drugs is hyposalivation, which leads to a reduction in salivary flow. Saliva plays a crucial role in maintaining oral health by assisting in the removal of debris and bacteria.[8] A decrease in salivary flow can lead to an increase in harmful microorganisms, such as Streptococcus and *Candida*, on the dorsal surface of the tongue. Additionally, hyposalivation can disrupt the oral pH balance, making the environment more acidic and hindering the natural desquamation of keratinized cells on the tongue. These factors contribute to the formation of a white coating on the tongue, a condition commonly referred to as "coated tongue."[8,9]

Coated tongue is characterized by a pseudomembrane resulting from the accumulation of food particles, bacteria, and dead cells, primarily on the mid-dorsal region of the tongue. This condition may be asymptomatic but is often associated with halitosis and altered taste perception. Additionally, coated tongue has been linked to oral infections, including oral candidiasis, though its precise etiology remains unclear. Given the increased risk of oral complications in patients taking antihypertensive medications, maintaining optimal oral hygiene is essential. Regular toothbrushing, adequate hydration, and the use of a tongue scraper can help manage and prevent coated tongue, reducing the risk of halitosis and secondary infections.

In the present case, the diagnosis of oral candidiasis was ruled out based on clinical evaluation and microbiological testing. A *Candida* preparation test was conducted before the patient's discharge, using a tongue swab sample from the dorsum of the tongue, and the results were negative. Following the test results, the patient was informed and educated about oral hygiene maintenance, including brushing teeth twice daily (morning and evening), increasing water intake (at least

eight glasses per day), reducing the consumption of flavored and colored beverages, and using a tongue scraper or gauze-wrapped fingers to clean the tongue after brushing.[12,13]

The patient had a history of hypertension and was prescribed amlodipine 10 mg once daily upon hospital discharge. Amlodipine is a calcium channel blocker (CCB) that inhibits calcium influx into vascular smooth muscle cells, making it an effective first-line treatment for hypertension and ischemic heart disease. It is commonly used as monotherapy or in combination with other antihypertensive agents such as thiazide diuretics, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, or angiotensin II receptor blockers (ARBs) to achieve target blood pressure levels. If the desired blood pressure control is not achieved with monotherapy, clinicians may consider increasing the dose or combining amlodipine with another antihypertensive agent. However, the simultaneous use of ACE inhibitors and ARBs is not recommended.[14,15]

Antihypertensive medications, including amlodipine, can cause various oral side effects, such as marginal gingivitis, hyposalivation, lichenoid reactions, facial nerve paralysis, gingival enlargement, and xerostomia. Hyposalivation leads to reduced levels of antimicrobial proteins in saliva, including lysosomes, lactoperoxidase, immunoglobulin A, histatin, and lactoferrin, thereby increasing the colonization of microorganisms such as Streptococcus, Lactobacillus species, and *Candida* species on the dorsal surface of the tongue. The subsequent alteration in oral pH and impaired self-cleansing function of saliva contribute to keratin accumulation, leading to coated tongue formation.[16]

Halitosis, or bad breath, is another consequence of poor oral hygiene and coated tongue. It results from the release of volatile sulfur compounds (VSCs) produced by gram-negative bacteria. Contributing factors include inadequate oral hygiene, dental caries, periodontal disease, oral infections, smoking, pericoronitis, and hyposalivation. Halitosis not only affects the individual but can also impact their social interactions, leading to embarrassment, avoidance of social situations, and reduced self-confidence. The maintenance of good oral hygiene is crucial in preventing oral health complications. Sociodemographic factors, education levels, and socioeconomic status influence oral hygiene practices and access to dental care services access.

The patient in this case was educated on the importance of oral hygiene and provided with specific recommendations to mitigate the side effects of antihypertensive medications on the oral cavity. Follow-up appointments were recommended to monitor oral health and ensure compliance with preventive measures. Based on the patient's feedback, improvements in oral hygiene and symptom management were observed, reinforcing the effectiveness of the prescribed oral care regimen. This case highlights the need for increased awareness among healthcare providers regarding the oral implications of antihypertensive therapy and the importance of patient education in minimizing adverse effects.

The flowchart illustrates the relationship between hypertension, the use of calcium channel blocker (CCB) antihypertensive medication, and its impact on oral health. Patients with hypertension are often prescribed CCB antihypertensive medication, such as amlodipine, especially for long-term management. However, CCBs are known to reduce salivary flow, leading to hyposalivation. Reduced saliva production causes dry mouth (xerostomia), which subsequently reduces the self-cleansing ability of the oral cavity. This can increase the risk of dental issues such as plaque accumulation, caries, and oral infections, as saliva plays a crucial role in maintaining oral health by washing away food particles and neutralizing acids produced by bacteria. Understanding this pathway highlights the importance of monitoring oral health in hypertensive patients using CCBs and implementing preventive measures to manage dry mouth.

Coated tongue is one of the oral condition that can be caused by systemic conditions, changes in diet and saliva flow, decreased physical and cognitive

abilities, and lack of knowledge about tongue health. Educational initiatives across all levels of society are essential to reduce the risk of coated tongue.[8,9]

The limitations of this study include its reliance on a single patient case, which restricts the generalizability of the findings, and its primary focus on amlodipine, without considering other antihypertensive medications. Additionally, the short-term observation period may not capture the long-term effects on oral health, particularly regarding coated tongue. Another limitation is the lack of a comprehensive oral health assessment, as well as the absence of a control group for comparison, which limits the ability to conclusively attribute oral health issues to antihypertensive medication use alone. The patient's compliance with oral hygiene recommendations was was presumed rather than confirmed, which may have influenced the outcomes. Although a *Candida* preparation test was conducted, its sensitivity and accuracy could be limited, potentially leading to false negatives. The study also does not address the psychological and social effects of oral health issues, such as bad breath, on the patient's quality of life. Furthermore, underlying medical conditions and sociodemographic factors that might influence oral health were not explored, and ethnic differences in oral health outcomes were not accounted for. These limitations suggest the necessity of further studies with larger sample sizes, longer observation periods, and a broader evaluation of antihypertensive medications.

CONCLUSION

Coated tongue, characterized by a white coating on the tongue due to microbial buildup, can cause bad breath and discomfort, impacting a patient's quality of life. Patient education is essential in mitigating these side effects and improving oral health outcomes. This study highlights the need for greater awareness of the oral health implications of antihypertensive medications. However, due to limitations such as its single-case focus, short observation period, and lack of a control group, further research involving larger sample sizes and extended follow-up periods is necessary to better understand the long-term effects of antihypertensive drugs on oral health. The implications of antihypertensive drugs use, particularly amlodipine, include significant oral health side effects, including hyposalivation, coated tongue, and halitosis.

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