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Management of Oral Candidiasis in Patients with Diabetes Mellitus: Case Report

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Abstract:
Background: Diabetes mellitus (DM) is a global health problem that has a tremendous impact on general health, especially on blood vessels, heart, kidneys, eyes, nerves, and other organs. DM cases are recorded as one of the contributors to the high number of deaths directly related to this disease, with high treatment costs. The oral cavity is one of the organs and systems affected by the progression of DM. Manifestations in the oral cavity are closely related to high glucose levels in oral fluids, decreased saliva flow, decreased pH, and decreased immunity of sufferers that support fungal colonies on the mucosa. These manifestations can be effectively and comprehensively managed in line with the patient's DM treatment. Laporan: A 73-year-old patient came to the Oral Diseases Department of RSGMP University of Jember complaining of a thick and uncomfortable tongue. The patient was taking glimepiride, an oral hypoglycemic agent, and amlodipine, an antihypertensive agent. Tatalaksana kasus: The patient underwent oral swab testing to detect fungal morphology, and was given a causal therapy of nystatin and a supportive therapy of multivitamins (Becomzet). The patient was instructed to follow up in one week. Discussion: The oral manifestation in this case is the presence of white plaque on the dorsum of the tongue, which is called oral candidiasis. Patients with diabetes mellitus (DM) with high glucose levels experience hyposalivation and changes in tissue resistance, which facilitates colonization and penetration of fungi into the oral mucosa. Conclusion: The diagnosis of this case is oral candidiasis, with the systemic etiology being diabetes mellitus (DM). The success of the treatment depends on the integration of therapy between the dentist, the doctor who treats the systemic disease, and the patient's compliance with the doctor's instructions.
Keywords*: diabetes mellitus, oral candidiasis*

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I. Introduction

The incidence of diabetes mellitus (DM) continues to rise sharply, with 117 million cases recorded to date and an estimated 300 million cases expected by 2025. In developing countries, DM is also responsible for 4–5 times more deaths than other diseases. DM is a complex metabolic and vascular disease characterized by hyperglycemia and various complications, including microvascular diseases of the kidneys, eyes, and various clinical forms of neuropathy. Some clinical manifestations in DM patients can also be found in the oral cavity, including serostomia, oral candidiasis, angular cheilitis, oral lichen planus, median rhomboid glossitis, gingivitis, and periodontitis[8]. Diabetes mellitus (DM) is a disease characterized by abnormalities in carbohydrate, fat, and protein metabolism, resulting in complications due to insulin deficiency, either absolute or relative[2]. Dentists must have the ability to identify patients with diabetes mellitus, including understanding the severity and glycemic control, as well as its general manifestations and those within the oral cavity. One manifestation of diabetes mellitus in the oral cavity is oral candidiasis, which is closely associated with high glucose levels in oral fluids, reduced saliva flow, decreased pH, and impaired immunity in patients, thereby facilitating fungal colonization of the mucosa[1],[8].

Oral candidiasis can develop in any mucous membrane of the oral cavity, but the most common locations are the buccal mucosa, corners of the mouth, oropharynx, and palate. The clinical presentation of oral candidiasis typically consists of white plaques located on the mucous membranes of the oral cavity, irregular in shape, with clear borders, and can be scraped off to reveal a red base. The diagnosis of oral candidiasis can be established through anamnesis, clinical examination, and mycological examination with the collection of oral swab specimens from the surface of lesions suspected of being infected with candida. Oral manifestations in patients with diabetes mellitus can be managed comprehensively in line with the management of the patient's diabetes mellitus status, so good cooperation between the patient, doctor, and dentist is required. Complications of DM can be fatal if not managed seriously. The condition of oral lesions is also very important to address, as appropriate management can improve the patient's quality of life. The purpose of this case report is to present the management of Oral Candidiasis in a patient with controlled diabetes mellitus.

II. Case Report

A female patient came to the Jember University Dental and Oral Hospital complaining that her tongue had been white, thick, and uncomfortable for three years and had never been treated. The patient said that her tongue used to be reddish-white, but since she developed diabetes about three years ago, she felt that her tongue was different from before. Additionally, the patient felt that the white tongue caused discomfort while eating. Currently, the patient regularly takes the blood sugar-lowering medication glimepiride and the blood pressure-lowering medication amlodipine, and undergoes monthly check-ups with an Internal Medicine Specialist at Citra Husada Hospital in Jember every month. The patient admitted that they have never brushed or cleaned their tongue while brushing their teeth. The patient reported consuming fruits and vegetables four times a week. The patient's tongue is currently not painful.

Based on clinical examination, the patient is in good condition and stable. Extraoral examination of the patient shows no abnormalities on the face, head, neck, lymph nodes are not palpable and not painful, salivary glands (submandibular, sublingual, and parotid) are not palpable and not painful, lips (upper, lower) and corners of the mouth show no abnormalities. The intraoral examination of the patient's oral mucosa revealed a white plaque on the dorsum of the tongue, irregular in shape, which could be scraped off with a red base, indistinct borders, and no tenderness. The white color on the patient's tongue appeared slightly greenish, as the patient had consumed hexos candy prior to the examination (Figure 1).

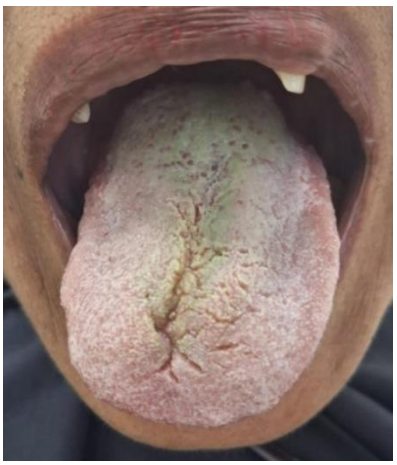

Figure 1. Patient with white plaque on the dorsum of the tongue, irregular in shape, can be scraped off, with unclear boundaries and no pain.

Supporting tests were conducted to confirm the presence of fungal infection in the suspected Oral Candidiasis lesion. Microbiological examination results showed the presence of Candida albicans (+) with spores +3 (positive three) and hyphae +3 (positive three), leading to a diagnosis of Oral Candidiasis.

III. Case Management

Based on subjective and objective examinations in this case, it was found that there were suspected OC lesions on the entire tongue. The patient had a history of controlled diabetes mellitus, which greatly contributed to the predisposing factors for the development of oral candidiasis. During the patient's first visit, communication, information, and education (KIE) were provided regarding the diagnosis, etiology, prognosis, treatment plan, and possible risks and recurrence. The patient was informed that Oral Candidiasis is a disease caused by fungal infection and can be triggered by various factors such as poor oral hygiene, smoking habits, and inadequate consumption of nutritious food. Therefore, the patient was advised to avoid these factors. Additionally, the patient was explained that the Oral Candidiasis they are experiencing is not a serious disease and can be cured.

Mycological fungal testing is conducted to confirm the presence of fungal infection in Oral Candidiasis. The test is performed using an oral swab, involving gentle scraping/swabbing movements from the dorsum to the anterior part of the tongue, repeated three times. The third swab sample is placed on an object slide, covered with a cover slip, and examined for hyphae and spores at the Mycology Laboratory of the Faculty of Dentistry, University of Jember. Subsequently, the patient is prescribed pharmacological therapy in the form of topical antifungal nystatin as causal therapy. The patient is instructed on how to use the medication: the patient is asked to rinse their mouth to clean the tongue of food residues or debris, then dry the tongue with a dry tissue, shake the antifungal medication in the bottle, apply 1 ml of the medication to the entire surface of the tongue (spread and flatten with a clean finger), and avoid eating, drinking, or rinsing for the next 30 minutes.

Patients are instructed to use the antifungal medication four times daily for the next seven days. Patients are also instructed to take the multivitamin Becomzet once daily after breakfast in the morning. Additionally, patients are instructed to brush their tongue twice daily after brushing their teeth, after meals and before bedtime, by placing the tongue cleaner at the back of the tongue and gently pulling it forward, repeating several times, then rinsing and cleaning the tongue cleaner under running water. The patient was instructed to eat nutritious foods, fruits, and vegetables, reduce consumption of foods high in sugar and saturated fats, drink at least two liters of water per day, control their diet to maintain blood sugar levels, reduce excessive physical activity, get adequate rest, and engage in regular exercise. Finally, the patient was asked to return for a follow-up visit one week after the treatment and care were administered.

The patient's second visit after seven days of treatment and care revealed that, based on the patient's subjective examination, they had been using the medication and tongue cleaner regularly as instructed, and the patient reported that their tongue felt more comfortable and less thick than before. On objective examination, there were no abnormalities, and the tongue appeared healthy with no white plaque that could be scraped off, with a red base and unclear borders (Figure 2).

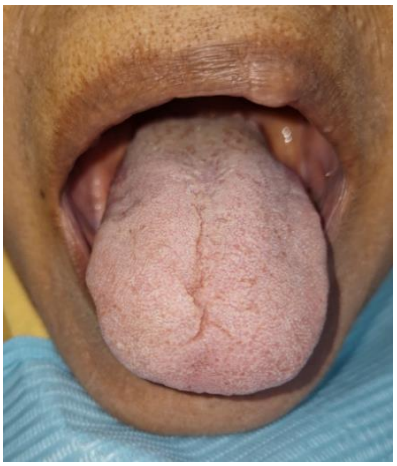

Figure 2. The patient came in for a checkup, and no abnormalities were found.

IV. Discussion

Oral candidiasis is the most common fungal infection in humans, characterized by excessive growth of Candida sp. on the superficial epithelium of the oral mucosa. This condition is closely associated with various risk factors, such as impaired salivary gland function, use of dentures, oral mucosal disorders, use of certain medications (broad-spectrum antibiotics, corticosteroids, antidepressants, antineoplastic agents, and immunosuppressants), age (in neonates and the elderly), dietary factors (high-carbohydrate diets and iron deficiency anemia), cancer, HIV infection, and endocrine changes (diabetes mellitus, pregnancy, renal failure, and hyperthyroidism)[6]. In this case, the patient has a history of diabetes mellitus, a chronic disease that can reduce resistance to microbial infections and decrease the ability of tissues to repair their structure[12].

In patients with diabetes mellitus, Candida sp. grows rapidly due to high glucose levels, causing damage to several acinar cells in the salivary glands and affecting saliva production[1]. Literature studies have frequently indicated that patients with diabetes mellitus have a higher susceptibility to fungal infections compared to non-diabetic patients, with a ratio of 68–85% to 27%. Fungal colonization occurring on the oral mucosa is not easily interpreted as an infection; it requires several pathophysiological conditions and related factors to ultimately result in infection. These factors include: (a) persistent hyperglycemia accompanied by elevated HbA1c levels and high glucose levels in saliva, which increase the multiplication of Candida species and the number of Candida receptors, decreased neutrophil activity, and increased adhesion of Candida sp.; (b) decreased saliva pH, increased levels of phospholipase and extracellular acid protease, and increased adhesion of Candida sp. to epithelial cells; (c) in diabetes mellitus, there is also a decreased tissue response to injury, which supports colonization of Candida sp. on the oral mucosa; (d) in patients with diabetes mellitus who have poor oral hygiene, are elderly, and experience xerostomia, this promotes the development of Candida sp. The common clinical manifestations of Oral Candidiasis include the presence of white plaque on the dorsum of the tongue, which resembles milk or yogurt residue, with irregular borders that can be scraped off. It generally causes a thick and uncomfortable sensation on the tongue, and some patients may also experience a burning sensation[4].

In patients with diabetes mellitus, endocrine dysfunction and metabolism involving blood glucose control occur, leading to hyperglycemia. The resulting hyperglycemia can support the mechanisms of Candida sp., as hyperglycemia can trigger damage to acinar cells in the salivary glands, affecting saliva production.

Reduced saliva production allows certain infectious agents, such as Candida albicans, to grow rapidly and infect the surrounding mucosa. Hyperglycemia also triggers changes in the permeability of the basal membrane in the parotid glands, leading to hyposalivation, which further promotes the growth of Candida sp. Hyperglycemia can also alter neutrophil activity, reduce phagocytic activity, and diminish microbicidal capacity, thereby lowering tissue resistance and facilitating opportunistic microbial infections. In patients with diabetes mellitus and hyperglycemia, an accumulation of glycosylated products is also found in buccal epithelial cells, increasing the number of receptors available for Candida sp. and contributing to enhanced fungal growth[5].

The mechanism by which Candida sp. damages the host involves the production of extracellular enzymes, one of which is the Secreted Aspartyl Proteinase (SAP) enzyme, which can damage the host's structure. This enzyme breaks down the host's barriers by degrading proteins and penetrating deeper into the tissue. Furthermore, through the SAP enzyme, Candida sp. utilizes host proteins as a nitrogen source required by the environment to maintain an alkaline state, thereby enabling continued growth of Candida sp. The SAP enzyme can also disrupt vascular permeability, thereby interfering with the host's inflammatory process and humoral response (Cashtilho et al., 2018). Other enzymes found in Candida sp. include protease, phospholipase, and hemolysin activity. Protease and phospholipase enzymes can damage cell membranes, initiate cell lysis, and cause cell death, thereby facilitating Candida sp. penetration into host cells. Additionally, the hemolytic activity produced by Candida sp. can destroy red blood cells, which are important for iron production essential for the growth and survival of the fungus.[3],[7]. The mechanism of Candida sp. involving these enzymes causes Candida sp. to invade prickle cells, resulting in intercellular edema, followed by accumulation of hyphae, desquamated cells, debris, necrotic tissue, leukocytes, and polymorphonuclear cells. Thus, this accumulation causes the formation of white lesions on the dorsum of the tongue[3],[7].

Oral candidiasis can be treated with antifungal agents that target three main areas: cell membranes, cell walls, and nucleic acids[9]. Oral administration of nystatin is intended to kill fungal cells by binding to the main component of the fungal cell wall, ergosterol, and forming plasma membrane channels, thereby causing changes in membrane permeability (damage to the integrity of the fungal cell membrane), potassium leakage (intracellular material), and resulting in the death of fungi internalized by macrophage phagolysosomes. Nystatin is one of the drugs with minimal side effects because it is absorbed by the digestive tract and does not induce fungal resistance[6]. Patients are given Becomzet multivitamins as antioxidants, cell defense, tissue regeneration, and energy production for cells so that they can increase endurance and accelerate the healing process. Regular sugar control can normalize glucose levels, thereby restoring immune function. In addition, a healthy lifestyle and maintaining oral hygiene can help the healing process and reduce the recurrence of fungal infections[10].

The therapy provided to the patient includes treatment from the hospital where the patient is being monitored and the Oral Diseases Department of the University of Jember Dental and Oral Hospital. The therapy provided by the Internal Medicine Specialist at the hospital involves prescribing Glimepiride 10 mg, taken once daily to control the patient's blood glucose levels. The therapy provided by the Oral Diseases Department includes Nystatin oral suspension, with instructions to use 1 ml four times daily, applied to the entire tongue, and multivitamin Becomzet, with instructions to take it once daily after breakfast in the morning. The patient was also instructed to maintain oral hygiene by cleaning the tongue twice daily using a tongue cleaner, taking medications as advised, consuming nutritious food, and drinking 2 liters of water everyday.

The management of the patient's diabetes mellitus was conducted by the hospital's doctors to improve the patient's systemic condition, which triggered oral candidiasis in the oral cavity. Regular blood sugar monitoring and antidiabetic medication intake must continue. Normal blood glucose levels can restore immune system function. Additionally, a healthy lifestyle, including maintaining a balanced diet, proper oral hygiene practices, and reducing tobacco consumption, can aid the healing process and reduce the recurrence of fungal infections in the oral cavity.

V. Conclusion

Based on the medical history, clinical examination, and supporting tests, the diagnosis of this case is Oral Candidiasis, with the underlying cause being systemic diabetes mellitus that is well-controlled, combined with poor oral hygiene as a predisposing factor. The prognosis for treatment in this case is favorable. The success of treatment for Oral Candidiasis in patients with diabetes mellitus depends on integrated therapy between the dentist and the physician managing the systemic disease. Patient compliance in following the doctor's instructions and regular follow-ups also plays a significant role and contributes to the success of the treatment administered.

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