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Review Article

Oral Complications of Diabetes Mellitus: A Comprehensive Review

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ABSTRACT:

Background: Diabetes mellitus (DM) is a chronic metabolic disorder associated with elevated blood sugar levels and can lead to various complications, including those affecting the oral cavity. This review aims to provide an overview of the oral complications of diabetes, their underlying mechanisms, and potential management strategies. **Methods:** A comprehensive review of recent reliable scientific literature was conducted to gather information on oral manifestations and complications related to diabetes. Relevant studies on xerostomia, dental caries, periodontal disease, oral infections, burning mouth syndrome, taste dysfunction, and oral mucosa alterations in diabetic patients were included. **Results:** Xerostomia, or dry mouth, is prevalent in diabetic patients and is linked to reduced salivary flow and altered composition. Dental caries and periodontal disease are more common in diabetes due to altered salivary function and hyperglycemia. Diabetic patients exhibit increased susceptibility to oral infections, particularly candidiasis. Burning mouth sensations and taste dysfunction are associated with poor glycemic control, neuropathy, and immunological changes. Oral mucosa alterations such as coated and fissured tongue, geographic tongue, and lichen planus have also been reported in diabetic individuals. **Conclusion:** Proper blood glucose control and oral hygiene play crucial roles in mitigating oral complications associated with diabetes. Regular dental check-ups, preventive measures, and early intervention can significantly improve oral health outcomes in diabetic patients. A multidisciplinary approach involving healthcare providers, dentists, and patients is essential for effectively managing oral complications in individuals with diabetes.

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INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by elevated blood sugar levels due to inadequate insulin secretion or resistance to insulin. This condition can lead to various complications in different parts of the body, including the oral cavity. Therefore, it is crucial to maintain proper blood glucose control.[1]

The oral complications associated with diabetes are believed to result from impaired neutrophil function, increased collagenase activity, reduced collagen synthesis, microangiopathy, and neuropathy. These factors contribute to a range of oral issues such as dry mouth (xerostomia), tooth decay (including root caries), gingivitis, periodontal disease, oral candidiasis, burning mouth syndrome (glossodynia), altered taste, geographic tongue, coated and fissured tongue, oral lichen planus (OLP), recurrent aphthousstomatitis, increased susceptibility to infections, and impaired wound healing.[2,3]

The severity of these oral complications is generally linked to the extent and duration of hyperglycemia. To gain insights into these manifestations and complications, recent reliable scientific papers have been briefly reviewed.

MATERIAL AND METHODS

A comprehensive review of recent reliable scientific literature was conducted to gather information on oral manifestations and complications related to diabetes. Relevant studies on xerostomia, dental caries, periodontal disease, oral infections, burning mouth syndrome, taste dysfunction, and oral mucosa alterations in diabetic patients were included.

XEROSTOMIA

Xerostomia, a condition characterized by reduced salivary flow and changes in saliva composition, is

prevalent among individuals with diabetes, with estimates ranging from 34% to 51%. This condition can lead to difficulties in eating, swallowing, and speaking, negatively impacting the quality of life for affected patients. Studies have revealed impaired salivary function in adults with diabetes, and while the exact cause remains unclear, it may be associated with factors such as polyuria, autonomic neuropathies, and microvascular changes affecting the salivary glands' basement membranes. Interestingly, there is a direct correlation between the severity of xerostomia and glucose levels in saliva, with the most significant salivary dysfunction observed in diabetics with poorly controlled blood sugar levels.[4]

DENTAL CARIES

Diabetic patients are more prone to experiencing both new and recurrent dental caries. This susceptibility is attributed to various factors such as reduced cleansing and buffering capacity of saliva, elevated carbohydrate levels in saliva, and an increase in oral yeasts, mutans streptococci, and lactobacilli. These factors contribute to a higher incidence of tooth decay in individuals with diabetes. Additionally, chronic hyperglycemia can lead to irreversible pulpitis and subsequent pulp necrosis. Some studies have also found that diabetic individuals are more likely to experience apical periodontitis and radiolucent periapical lesions compared to those without diabetes**(fig-1).**[5]

Fig 1: The clinical image depicts a patient with diabetes who exhibits suboptimal oral hygiene, resulting in evident dental caries and tooth loss.

PERIODONTAL DISEASE

Poor glycemic control in diabetes can contribute to the onset and progression of gingivitis, periodontitis, and alveolar bone loss. Periodontal disease is more prevalent in both type 1 and type 2 diabetic patients, with severe periodontitis being reported in 59.6% of diabetic individuals compared to 39% in non-diabetics. Various mechanisms explain this increased susceptibility to periodontal diseases, including altered host defense responses (such as neutrophil dysfunction), changes in subgingivalmicroflora, collagen structure and metabolism, vascularity, and gingival crevicular fluid, as well as inheritance patterns. Several risk factors contribute to the development of periodontal disease in diabetic patients, including poor oral hygiene, suboptimal metabolic control, longer diabetes duration, and smoking.[6]

It's important to note that periodontal disease negatively impacts diabetes, and treating periodontal disease can positively affect blood glucose control. The elimination of pathogens through treatment reduces inflammation, subsequently reducing insulin resistance and lowering glucose levels. This creates a two-way relationship between periodontal disease and diabetes. In adults, periodontal disease is the primary cause of tooth mobility and tooth loss. Hence, treating periodontitis not only helps in lowering blood glucose levels but also plays a crucial role in preventing tooth loss.[7]

ORAL INFECTIONS

Patients with diabetes have an increased vulnerability to various oral infections, including both fungal and bacterial infections. The reduced salivary flow rate and the absence of its antimicrobial properties create an environment conducive to these infections. Additionally, impaired defense mechanisms and poor metabolic control may further contribute to the development of infections.[8]

One common fungal infection is oral candidiasis, an opportunistic condition whose prevalence is on the rise. Among diabetic patients, those with type 1 diabetes have higher candida colonization rates compared to those with type 2 diabetes (84% vs. 68%), while nondiabetic individuals show a lower percentage of about 27%.[9]

Oral candidiasis can be triggered by several predisposing factors, including xerostomia. Salivary dysfunction in diabetic patients can promote a higher carriage of fungi. Candida-related lesions include denture stomatitis, angular cheilitis, and median rhomboid glossitis. Diabetic patients who smoke, wear dentures, have poor glycemic control, and use steroids and broad-spectrum antibiotics are more susceptible to Candida infections.[10]

BURNING MOUTH

Diabetic patients often experience a burning sensation or dysesthesia in their oral cavity, which can be attributed to factors such as poor glycemic control, metabolic changes in the oral mucosa, angiopathy, candida infection, and neuropathy. This neuropathic pain may manifest as burning, tingling, electric shock-like sensations, or stabbing pain, and it can be highly distressing for the individuals. These symptoms can significantly impact both their physical and psychological well-being, leading to sleep disturbances, increased anxiety, and depression.[11]

TASTE DYSFUNCTION

Patients with poorly controlled diabetes may experience taste dysfunction. According to a cross-sectional study, approximately 5.7% of diabetic or

prediabetic patients had a sweet taste disorder, and 8.6% had a salt taste disorder. Altered taste sensation or raised detection thresholds can be caused by salivary dysfunction and neuropathy. This sensory dysfunction can hinder the ability to maintain a healthy diet and may lead to difficulties in regulating glucose levels. As a result, taste disturbances can have an impact on overall health and diabetes management.[12]

ORAL MUCOSA ALTERATIONS

Diabetes can be associated with various oral mucosa alterations, including coated and fissured tongue, geographic tongue, recurrent aphthousstomatitis, and some premalignant lesions like lichen planus. The susceptibility of diabetic patients to these oral changes is still a matter of debate, but factors such as inadequate diabetes control, immunological changes, microcirculatory alterations leading to reduced blood supply, xerostomia, changes in salivary flow and composition, and smoking have been implicated.

Oral lichen planus (OLP) is more commonly observed in patients with type 1 diabetes compared to type 2 diabetes, mainly because type 1 diabetes is considered an autoimmune condition, and OLP is thought to have an underlying autoimmune mechanism. Acute hyperglycemia can also lead to changes in immune responsiveness in diabetic patients. Overall, these oral mucosal alterations serve as potential indicators of diabetes and may be influenced by various factors related to the disease.[13]

POOR ORAL WOUND HEALING

Delayed healing of both soft and hard tissues is a recognized complication observed in diabetic patients undergoing oral surgeries. Several factors contribute to this prolonged wound healing process in these individuals. These factors include delayed vascularization, reduced blood flow leading to hypoxia (insufficient oxygen supply), impaired innate immunity, decreased production of growth factors that aid in tissue repair, and psychological stress. These combined factors can lead to challenges in the healing process after oral surgeries in diabetic patients.[14]

CONCLUSION

Diabetes mellitus (DM) poses significant challenges to oral health, leading to various complications in the oral cavity. Xerostomia, or dry mouth, is prevalent among diabetic patients due to reduced salivary flow and altered composition. This condition increases the risk of dental caries and oral infections, especially oral candidiasis. Periodontal disease is more common in diabetics and can result in alveolar bone loss and tooth mobility. Poor glycemic control contributes to delayed wound healing, making oral surgeries more challenging for diabetic patients.Taste dysfunction and burning mouth sensations are other issues faced by individuals with diabetes, impacting their dietary choices and overall well-being. To mitigate these complications, it is essential for diabetic patients to manage their blood glucose levels effectively and maintain good oral hygiene. Regular dental check-ups and preventive measures are crucial for preserving oral health in individuals with diabetes. A comprehensive approach that addresses both diabetes management and oral care is essential to reduce the impact of DM on oral health and improve the quality of life for these patients.

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