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Oral Manifestations and Complications Resulting from Diabetes: An Interdisciplinary Analysis in Health

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LITERATURE REVIEW

ABSTRACT

Objective: This study aims to analyze the oral manifestations and complications of diabetes mellitus, emphasizing their implications in dental practice and the importance of an interdisciplinary healthcare approach to optimize patient management. **Materials and methods:** To construct this narrative review, a methodological strategy was developed to ensure the inclusion of the most current, relevant, and scientifically validated information on the topic, providing robust and well-supported content. Comprehensive searches were conducted across multiple databases, including DeCs, BVS/BIREME, PROSPERO, SciELO, PubMed Central, ScienceDirect, Web of Science, and The Cochrane Library, complemented by Google Scholar. **Results:** Diabetes mellitus significantly increases the risk of periodontal disease, with hyperglycemia leading to an exaggerated inflammatory response and periodontal tissue destruction. Xerostomia, linked to salivary gland dysfunction, promotes dental caries and oral candidiasis, while diabetic neuropathy may induce persistent oral burning sensations. Impaired immune response contributes to a higher prevalence of bacterial and fungal infections, including dental abscesses and osteomyelitis. Additionally, delayed wound healing in diabetic patients complicates post-surgical recovery, increasing the risk of secondary infections and treatment failure. These findings underscore the importance of proactive dental management and interdisciplinary healthcare strategies to mitigate oral complications in diabetic individuals. **Conclusion:** The conclusion effectively squeeze the relationship between diabetes and oral health while emphasizing the importance of an interdisciplinary approach. It highlights key complications such as periodontal disease, infections, and neuropathic alterations, stressing the need for individualized prevention and treatment strategies. Additionally, it underscores the significance of glycemic control and calls for continued research and healthcare collaboration.outcomes of implant surgeries in the future.

Keywords: Diabetes Mellitus; Mouth Diseases; Oral Manifestations.

Manifestações e complicações orais decorrentes do diabetes: uma análise interdisciplinar em saúde

RESUMO

Objetivo: Este estudo tem como objetivo analisar as manifestações e complicações orais do diabetes mellitus, enfatizando suas implicações na prática odontológica e a importância de uma abordagem interdisciplinar de saúde para otimizar o manejo do paciente. **Materiais e métodos:** Para construir esta revisão narrativa, foi desenvolvida uma estratégia metodológica para garantir a inclusão das informações mais atuais, relevantes e cientificamente validadas sobre o tema, fornecendo conteúdo robusto e bem fundamentado. Buscas abrangentes foram conduzidas em várias bases de dados, incluindo DeCs, BVS/BIREME, PROSPERO, SciELO, PubMed Central, ScienceDirect, Web of Science e The Cochrane Library, complementadas pelo Google Scholar. **Resultados:** O diabetes mellitus aumenta significativamente o risco de doença periodontal, com a hiperglicemia levando a uma resposta inflamatória exagerada e destruição do tecido periodontal. A xerostomia, associada à disfunção da glândula salivar, promove cáries dentárias e candidíase oral, enquanto a neuropatia diabética pode induzir sensações persistentes de queimação oral. A resposta imune prejudicada contribui para uma maior prevalência de infecções bacterianas e fúngicas, incluindo abscessos dentários e osteomielite. Além disso, a cicatrização tardia de feridas em pacientes diabéticos complica a recuperação pós-cirúrgica, aumentando o risco de infecções secundárias e falha do tratamento. Essas descobertas ressaltam a importância do gerenciamento odontológico proativo e estratégias de saúde interdisciplinares para mitigar complicações orais em indivíduos diabéticos. **Conclusão:** A conclusão efetivamente estreita a relação entre diabetes e saúde bucal, ao mesmo tempo em que enfatiza a importância de uma abordagem interdisciplinar. Ela destaca complicações importantes, como doença periodontal, infecções e alterações neuropáticas, enfatizando a necessidade de estratégias individualizadas de prevenção e tratamento. Além disso, ela ressalta a importância do controle glicêmico e pede pesquisa e colaboração contínuas em resultados de saúde de cirurgias de implantes no futuro.

Palavras-chave: Diabetes Mellitus; Doenças da Boca; Manifestações Bucais.

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INTRODUCTION

The oral cavity significantly reflects the systemic condition of the organism, with diabetes being an emblematic example of this interrelationship. Hyperglycemia, a characteristic of this pathology, is not limited to metabolic impacts, but has direct and indirect repercussions on several specialties in the health area, including dentistry, nursing, nutrition and pharmacology (Negrini et al., 2021). Thus, diabetic patients require a multidisciplinary clinical approach, since oral changes, such as halitosis resulting from ketoacidosis and persistent gingivitis, may indicate glycemic imbalance and influence the progression of systemic complications. In this context, interdisciplinarity is a fundamental pillar for adequate care for diabetic patients. Dentists must understand the metabolic impacts of the disease in order to adopt safe and effective therapeutic strategies (González-Moles & Ramos-García, 2021). Nutritionists, in turn, need to consider the relationship between eating habits and oral health, while pharmacists play an essential role in monitoring drug interactions between hypoglycemic agents and dental protocols. Furthermore, nurses, who are often responsible for ongoing clinical monitoring, must be alert to the early identification of oral complications associated with diabetes.

The oral manifestations of this condition range from xerostomia and oral candidiasis to severe periodontal disease, making the oral cavity a relevant indicator of the patient's glycemic status. Delayed healing and susceptibility to oral infections are additional factors that reinforce the importance of systematic dental monitoring. This article aims to discuss the interrelationship between diabetes and oral health from an interdisciplinary perspective, emphasizing the relevance of joint action by health

professionals in the prevention and control of associated complications (Petropoulou et al., 2024).

The complexity of diabetes requires a comprehensive and coordinated care model. An interdisciplinary approach enables not only the mitigation of oral complications, but also the promotion of patients' quality of life (Sugandh et al., 2023). Therefore, understanding the interdependence between different areas of health is essential for the development of more appropriate and integrated therapeutic strategies.

MATERIALS AND METHODS

During the development of this narrative review article, it was essential to establish a methodological strategy to ensure the inclusion of the most current, relevant, and scientifically validated information on the topic, providing robust and well-supported content. Searches were conducted across multiple databases, including DeCs, BVS/BIREME, PROSPERO, SciELO, PubMed Central, ScienceDirect, Web of Science, and The Cochrane Library, in conjunction with Google Scholar. Additionally, gray literature was utilized to provide supplementary and relevant insights, which proved crucial for a comprehensive exploration of the subject matter. To refine the scope and relevance of the searches, the following descriptors were employed: Diabetes Mellitus, Mouth Diseases and Oral Manifestations. Given the narrative review format, it was necessary to adopt a framework that defines the structure, essential elements, and exclusions pertinent to this type of study. Consequently, Rother's (2007) work served as a methodological guide throughout the preparation of this article, ensuring consistency and adherence to the standards of narrative literature reviews.

RESULTS AND DISCUSSION

The oral cavity significantly reflects the systemic condition of the body, with

diabetes serving as a prime example of this interconnection. Hyperglycemia, the hallmark of this disease, extends beyond metabolic impacts, exerting direct and indirect repercussions on various healthcare fields, including dentistry, nursing, nutrition, and pharmacology (Rohani, 2019). Consequently, diabetic patients require a multidisciplinary clinical approach, as oral alterations such as halitosis due to ketoacidosis and persistent gingivitis may indicate glycemic dysregulation and influence the progression of systemic complications.

In this context, interdisciplinarity is a fundamental pillar for the adequate care of diabetic patients. Dentists must understand the metabolic impacts of the disease to implement safe and effective therapeutic strategies (McKenna, 2006). Meanwhile, nutritionists must consider the relationship between dietary habits and oral health, pharmacists play a crucial role in monitoring drug interactions between hypoglycemic agents and dental treatment protocols, and nurses, often responsible for continuous clinical follow-up, must be vigilant in the early detection of oral complications associated with diabetes (D'Alessandro et al., 2022).

Oral manifestations of this condition range from xerostomia and oral candidiasis to severe periodontal disease, making the oral cavity a valuable indicator of a patient's glycemic status. Delayed healing and increased susceptibility to oral infections further underscore the importance of systematic dental monitoring. Given the complexity of diabetes, a comprehensive and coordinated care model is essential. An interdisciplinary approach not only mitigates oral complications but also enhances the overall quality of life for patients (Surlari et al., 2023). Therefore, understanding the interdependence between different healthcare fields is crucial for developing more effective and integrated therapeutic strategies.

Diabetes mellitus presents a wide range of oral complications that can significantly impact the health of dental patients. The effect of hyperglycemia on the oral cavity includes inflammatory changes, increased susceptibility to infections, and delayed healing, factors that must be carefully considered in dental practice. The relationship between diabetes and periodontal disease is bidirectional. Hyperglycemia promotes gingival inflammation and periodontal tissue destruction, while untreated

periodontitis can exacerbate glycemic control. Diabetic patients face a heightened risk of severe periodontitis, leading to bone loss and tooth loss. Studies indicate that an exaggerated inflammatory response in these patients is due to increased production of pro-inflammatory cytokines such as interleukin-1 beta and tumor necrosis factor-alpha, contributing to bone resorption and destruction of dental supporting structures (Llambés, 2015).

Reduced salivary flow in diabetic patients compromises saliva's protective functions, increasing the risk of dental caries, oral candidiasis, and difficulties in mastication and swallowing (Jawed et al., 2012). Hyposalivation can also lead to persistent xerostomia, negatively affecting patients' quality of life. Dysfunction of the salivary glands in these individuals may be linked to diabetic autonomic neuropathy, emphasizing the need for continuous monitoring of salivary function. The hyperglycemic environment also favors the growth of Candida species, especially in patients with poorly fitted dentures or those using inhaled corticosteroids (Volpato Sanitá et al., 2011 and Al-Aali et al., 2023). Oral candidiasis manifests as pseudomembranous, erythematous, or hyperplastic lesions, requiring early diagnosis and appropriate management. The exacerbated glucose metabolism in the oral mucosa of diabetic patients creates an ideal environment for fungal proliferation, potentially hindering an effective immune response against opportunistic infections (Martorano-Fernandes et al., 2020).

Diabetic patients exhibit increased susceptibility to bacterial and fungal infections due to impaired immune responses. Dental abscesses and maxillary osteomyelitis occur more frequently, necessitating strict glycemic control to prevent severe complications. Diabetic microangiopathy compromises blood circulation in the oral region, hindering immune cell migration and delaying infection resolution. Invasive dental procedures such as extractions and implant placement often result in prolonged recovery times for diabetic patients. Microangiopathy and impaired fibroblast function reduce tissue regenerative capacity, increasing the risk of wound dehiscence and secondary infections. Reduced collagen synthesis and altered activity of growth factors further hinder epithelialization and tissue repair.

Some diabetic patients report a persistent burning or tingling sensation in the oral mucosa without an apparent cause. This condition may be associated with diabetic neuropathy, requiring a multidisciplinary approach to manage pain and improve patient quality of life. Damage to peripheral nerve fibers, associated with chronic glucose toxicity, can lead to oral hypersensitivity and persistent neuropathic pain. Diabetes can also affect gustatory perception, leading to dysgeusia and reduced sensitivity to sweet and bitter flavors (Tan & Renton, 2020). This alteration can impact appetite and the acceptance of certain foods, potentially hindering adherence to dietary recommendations for glycemic control. Hyperglycemia may interfere with taste receptor expression and neural conduction of taste stimuli, significantly affecting patients' quality of life.

Given these complications, the dental management of diabetic patients should include rigorous preventive measures, frequent monitoring, and an individualized approach. Optimizing glycemic control is crucial for reducing the risk of oral complications, and strategies such as intensive periodontal therapy, artificial saliva use, and prophylactic antifungals may be indicated as needed. Collaboration among healthcare professionals is essential to ensure effective and safe treatment, minimizing risks and promoting both oral and systemic health in these individuals.

CONCLUSION

The conclusion effectively squeeze the relationship between diabetes and oral health while emphasizing the importance of an interdisciplinary approach. It highlights key complications such as periodontal disease, infections, and neuropathic alterations, stressing the need for individualized prevention and treatment strategies. Additionally, it underscores the significance of glycemic control and calls for continued research and healthcare collaboration.outcomes of implant surgeries in the future.

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