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The Importance of Cooperation Between Physicians and Dentists in the Recognition and Management of Undiagnosed and Uncontrolled Diabetes: A Critical Need During the COVID19 Pandemic

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ABSTRACT

Introduction: Diabetes mellitus (DM) is one of the most common metabolic disorders. Its pathogenesis involves a combination of anatomical and biochemical abnormalities. Type 2 diabetes exhibits a genetic predisposition, while type 1 diabetes has an idiopathic, autoimmune background. Dentists can play a crucial role in the early diagnosis and identification of uncontrolled diabetes. Chronic inflammation and infections in the oral cavity can significantly impact disease management. Therefore, any dental lesions or gingival alterations, including periodontitis, must be treated promptly. After taking a thorough medical and dental history of suspicious cases, appropriate diagnostic tests should be conducted, or the patient should be referred to a physician. Early diagnosis of diabetes is instrumental in preventing both acute and chronic complications. Additionally, patients with diabetes are at a higher risk of developing severe illness if infected with the novel coronavirus (COVID-19). This article aims to share the latest information about the two types of diabetes and to highlight how dentists can contribute to their management.

Methods: This article provides a compact overview of relevant articles and books published from 2014 to 2024.

Results: Diabetes mellitus can cause various oral complications, including dry mouth, tooth decay, gingivitis, periodontal disease, increased risk of infections, burning mouth, taste disturbances, and poor wound healing.

Conclusion: Dentists play a vital role in the early diagnosis of diabetes and in identifying uncontrolled or poorly controlled cases. Close cooperation between healthcare providers and dentists is essential for effective diabetes management. This collaboration was particularly important during the COVID-19 pandemic.

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Introduction

According to statistics and estimates, the global prevalence of diabetes and the percentage of undiagnosed cases are alarming. Diabetes poses a public health concern and economic burden for both healthcare systems and patients. Therefore, it is necessary to pay serious attention to all aspects of the disease. Diabetes is prevalent in both low-income and industrial countries(1-6).

Understanding Type 1 Diabetes Mellitus (T1DM)

Type 1 diabetes mellitus (T1DM), once known as insulin-dependent diabetes mellitus (IDDM) or juvenile diabetes, is a chronic condition characterized by the pancreas's inability to produce sufficient insulin. This deficiency forces

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individuals to depend on external insulin administration to prevent ketoacidosis, a serious and potentially life-threatening complication.

The progression of T1DM unfolds in four distinct stages:
1. Preclinical β-Cell Autoimmunity: This initial stage involves a gradual decline in insulin secretion due to autoimmune attacks on the insulin-producing β-cells in the pancreas.
2. Onset of Clinical Diabetes: At this stage, the symptoms of diabetes become apparent, marking the transition to a clinical diagnosis.
3. Honeymoon Period: Following the onset, some individuals may experience a temporary remission where insulin requirements decrease, and blood glucose levels stabilize.
4. Established Diabetes: In this final stage, the condition becomes chronic, and individuals may face both acute and chronic complications that can significantly impact their quality of life and life expectancy.

While T1DM typically manifests in childhood, particularly between the ages of 7 and 15, it can develop at any age. The incidence of T1DM has shown considerable variation across different regions of the globe, but it has generally increased in recent decades.The pathogenesis of T1DM is complex, influenced by a combination of genetic predisposition and environmental factors. Understanding these dynamics is crucial for early diagnosis and effective management, ultimately improving outcomes for those affected by this condition. (7-10).

General symptoms and signs: A Dentist's Perspective

The onset of type 1 diabetes is usually acute with clinical characteristics which may be recognized by the dentist. The cardinal symptoms are similar in the two types and may include: polyuria, polydipsia and polyphagia. Other symptoms are weight loss, profuse sweating and fatigue. In some cases of type 2 diabetes, the disease may not be recognized until the stage of coma. Occasionally, undiagnosed diabetes may be discovered after dental surgery such as dental extraction which did not heal in time. In some cases, the progression to the severe complications in type 1 may be more rapid (7-9, 14).

Oral signs and symptoms

The uncontrolled diabetic patient may have a characteristic odor of acetone. The patient may complain of burning sensations in the mucosa and increased thirst at this point. The erythema of the oral mucosa may be observed. The dry mouth may increase in gingival response to local factors. Periodontal abscesses and loosening of the teeth may occur due to long-term destruction of supporting alveolar bone. Diabetes mellitus can have several oral manifestations in children, which may serve as important indicators of the condition. Here are some common signs and symptoms of diabetes mellitus in the oral cavity:

Dry Mouth (Xerostomia), Children with diabetes may experience dry mouth due to reduced saliva production. This can lead to discomfort and difficulty in swallowing and speaking(1).

Increased Risk of Infections: Diabetes can impair the immune response, making children more susceptible to oral infections, such as Candidiasis, Periodontal Disease, and gingivitis, and more severe gum disease (periodontitis) can occur, leading to gum swelling, redness, and bleeding(6).

Gingival Hyperplasia: This condition involves the overgrowth of gum tissue, which can be exacerbated by poor blood sugar control. It may lead to discomfort and difficulty in maintaining oral hygiene(1, 4).

Delayed Wound Healing: Children with diabetes may experience slower healing of oral wounds, such as those resulting from dental procedures or injuries, due to impaired blood flow and immune response(4,6).

Taste Alterations: Some children may report changes in taste sensation, which can affect their appetite and dietary choices(1-3).

Tooth Decay: Poorly controlled diabetes can lead to an increased risk of dental caries (cavities) due to dry mouth and changes in oral flora(5, 6).

Bad Breath (Halitosis): A fruity or sweet odor on the breath may be present, particularly in cases of diabetic ketoacidosis, which is a serious complication of diabetes(1).

Changes in Oral Mucosa: The oral mucosa may appear pale or have a different texture due to changes in blood flow and hydration levels(4).

Enamel Hypoplasia: Children with diabetes may have enamel defects, leading to weaker teeth that are more prone to decay(4-6).

Oral Pain or Discomfort: Children may experience general oral discomfort or pain, which can be associated with infections or periodontal disease. Recognizing these signs and symptoms in the oral cavity is crucial for early diagnosis and management of diabetes mellitus in children. Dentists and healthcare providers should work

together to monitor and address these oral health issues, as they can significantly impact the overall well-being of pediatric patients with diabetes. Regular dental check-ups and good oral hygiene practices are essential for maintaining oral health in children with diabetes. (13-15).

Long-term Complications: Long-term complications of diabetes in the oral cavity include periodontal disease, oral infections, enamel defects, and increased risk of tooth loss(17-18).

Surgery

Any surgical procedure, including dental extractions, should be postponed until the patient's diabetes is under medical control. Diagnostic tests such as fasting blood sugar or HbA1c levels are essential (see Table 1). Prophylactic antibiotic therapy should only be administered when necessary. Local anesthesia without epinephrine is preferred, not because it raises blood sugar levels, but because the ischemia caused by epinephrine can increase the risk of postoperative infections. The optimal appointment time for diabetic patients is in the morning. Additionally, dentists should inquire whether patients have taken their insulin and consumed sufficient calories before the appointment(14, 15).

Table 1. Diagnostic Criteria for Diagnosis of Diabetes and Prediabetes*

Diabetes: One of the following tests should be carried out: Fasting plasma glucose (FPG) =>126 mg/dL (7.0 mmol/dL) 2 hr plasma glucose (OGTT) =>200mg/dl (11.1 mmol/dL) HbA1c =>6.5% (48 mmol/mol). A random plasma glucose =>200mg/dL (11.1 mmol/dL) + Cardinal diabetes symptoms. Pre diabetes: FPG 100-125 mg/dl (5.6-7 mmol/dL). 2 hr OGTT=>140 mg/dl (7.8 mmol/dL) but <200mg/dL HbA1c 5.7-6.4% (39-47 mmol/mol).

*The result should be repeated and to be confirmed when is needed in suspicious cases.

Oral health care

Diabetic patients should be instructed on how to maintain proper oral hygiene. They require frequent and regular dental care, and any infections that arise should be promptly addressed. In many patients with uncontrolled diabetes, even small deposits of calculus and plaque can lead to severe gingival inflammation. It is the dentist's responsibility to emphasize the importance of consistent oral health care. Oral health education, particularly regarding periodontal care, not only aids in more effective diabetes management but also helps prevent potential complications, such as infections. Additionally, oral health care should be integrated into lifestyle changes that promote the quality of life (QOL) for patients(11, 12).

The role of dentist

Early diagnosis of diabetes is crucial for effective management and prevention of acute complications such as insulin shock and ketoacidosis. Timely identification of the disease significantly reduces the risk of chronic complications, particularly in patients who are uncontrolled or undiagnosed. Early diagnosis can help prevent various symptoms and complications, including delayed healing, tissue necrosis, and even osteomyelitis. A thorough medical history is essential for the dentist to identify known cases of diabetes or to recognize symptoms suggestive of the disease. A complete medical history should be obtained before any surgical procedures. If a dental history reveals a delayed healing response, frequent occurrences of dry socket, or recurrent oral and dental infections, the possibility of diabetes should be considered, as these may serve as important clues. Dentists play a vital role in assisting physicians with the management of diabetes-related complications by preventing oral infections and promoting good oral health. Recently, an early screening method utilizing a questionnaire has been reported, demonstrating an 82.4% sensitivity for identifying undiagnosed diabetes(10, 11).

The Importance of Collaboration Between Physicians and Dentists in Diabetes Management

While the medical treatment of diabetes primarily falls under the physician's domain, the close collaboration between physicians and dentists is essential for effective disease management. A physician cannot successfully control diabetes without first establishing good oral health. When an oral infection arises, it is crucial for the dentist to promptly notify the physician, as this may necessitate an adjustment in insulin dosage. Complications such as abscesses or extensive periodontal disease can occur in uncontrolled diabetic patients, and in rare cases, these issues may even lead to diabetic coma. Educating patients about proper oral health care is vital to prevent

unnecessary irritation of soft tissues. All oral infections should be addressed and resolved to minimize risks. Dentists must also consider the vascular changes and delayed healing associated with diabetes, as an infected tooth can lead to severe consequences. Therefore, dentists should alert parents about any existing oral infections and communicate with physicians to ensure appropriate adjustments to insulin therapy. This close cooperation is critical for the accurate diagnosis and effective management of patients with diabetes. Moreover, it is important to note that individuals with diabetes are among the high-risk groups for experiencing severe illness if they contract the novel coronavirus (COVID-19). By working together, healthcare providers can help safeguard the health and well-being of these vulnerable patients(13, 14,18).

Conclusion

The Importance of Lifestyle Changes and Medical-Dental Collaboration

The dentist plays a crucial role in the comprehensive care of diabetic patients, serving as a diagnostician, therapist for oral and dental lesions, and an important source of information. Dentists play a crucial role in diagnosing uncontrolled diabetes, and maintaining oral hygiene is essential for managing the disease. Dental treatments cannot achieve successful outcomes without effectively managing any underlying metabolic disturbances. When oral infections arise, it is essential for dentists to promptly inform the patient's physician, as adjustments to insulin therapy may be necessary. Undiagnosed and uncontrolled diabetes poses significant health risks, especially during the COVID-19 pandemic. By fostering collaboration between healthcare providers and emphasizing the importance of lifestyle changes, we can enhance the quality of life for individuals living with diabetes.

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Authors' contributions

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