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# DIABETES MELLITUS & ITS' RELATION TO ORAL MANIFESTATION – A REVIEW

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## ABSTRACT

This is a descriptive review of ten research papers chosen by an in-house editor and prepared for publication after peer review by external reviewers. The goal of this article was to provide more information regarding the oral manifestations and problems of diabetes mellitus. An overview of recent reliable papers concerning diabetes mellitus and its oral manifestations was conducted using Google and PubMed (keywords: "diabetes mellitus," "oral manifestations," and "oral complications"). Xerostomia, tooth caries, gingivitis, periodontal disease, increased susceptibility to oral infections, burning mouth, taste disturbance, and poor wound healing are all major oral problems in diabetic individuals. There is evidence that chronic oral problems in these individuals have a poor impact on blood glucose control. Hence, oral complications prevention and care are critical.

**KEYWORDS:** Diabetes, diabetes mellitus, oral, oral manifestation, relation.

## INTRODUCTION

Diabetes is a systemic disease that falls under the category of metabolic diseases characterized by elevated blood glucose levels. Type-1 diabetes, type 2 diabetes, gestational diabetes, and different kinds of diabetes exist (Shangase et al., 2013). Type 1 diabetes, often known as insulin-dependent diabetes, most commonly affects children and teenagers, but it can also affect adults and the elderly. This is one of the most singular types due to the extensive loss of insulin-producing cells in type1 diabetes. The causes of type 1 diabetes, on the other hand, are still unknown. Because their body (pancreas) can no longer produce insulin, these patients will require lifelong insulin therapy. The type-2 diabetic patient has both insulin deficiency and insulin resistance, which means that he or she needs more insulin to control the same glucose level in the blood. As a result, people with increased insulin resistance may have higher insulin levels but normal glucose levels at first. Type 2 diabetes, as opposed to type 1 diabetes, is associated with both poor eating habits and genetic factors (Soysa et al., 2017). Gestational diabetes develops in a previously non-diabetic patient during pregnancy and resolves after delivery. This form of diabetes, however, should not be overlooked, as nearly half of pregnant women with diabetes will develop type 2 diabetes if preventive measures are not taken. This form of diabetes can cause several issues during labor, including the necessity for cesarean surgery, an overweight infant, and even spontaneous abortions (Veiga et al., 2018). Long-term hyperglycemia impacts the body, risking the patient's health. Diabetic retinopathy, neuropathy, cardiovascular disease, nephropathy, peripheral vascular disease, and periodontal disease are long-term effects of hyperglycemia (Al-MAweri et al., 2013). Diabetic Mellitus and periodontal disease have been recognized for several decades, and they have been linked to an increase in diabetic problems in the long run. Diabetic individuals have a weakened immune system, making them particularly vulnerable to infection (Almeida et al., 2006). Diabetes Mellitus is a word used to describe a condition in which the body cannot create enough insulin or respond appropriately to the insulin that it produces. The body's metabolism slows down, resulting in hyperglycemia, and tissue and organ damage over time. Because it is a long-term condition, it can cause severe consequences across the body. Oral candidiasis and xerostomia are more common in Diabetes Mellitus patients. However, the systemic disease of which they are carriers can exacerbate other oral problems (Young et al.,2017). This revised article will discuss several oral symptoms caused by or aggravated by diabetes. A more detailed examination of the link between diabetes and certain oral diseases, such as oral candidiasis (De Lima et al., 2008), dental caries (Seethalakshmi et al., 2016), periodontitis (Martinez et

al., 2013), and premalignant lesions (Dikshit et al., 2006) will be carried out. Diabetes mellitus is related to several oral disorders that could have been avoided or controlled if patients had been informed of the risks. There are severe oral signs ranging from dry mouth to caries, so diabetic patients should pay special attention to their dental health. This revised article will discuss several oral symptoms caused or worsened by diabetes. There will also be a more detailed examination of the association between diabetes and certain oral illnesses, such as oral candidiasis, dental caries, periodontitis, and premalignant lesions.

## MATERIALS AND METHODS

The search procedures included electronic databases, such as Pub-Med, Cochrane Library, and Science Direct, reference lists of articles, and selected textbooks to carry out this review article. Consecutive keywords were used to find articles and textbooks for this study: "diabetes," "oral lesions," "periodontitis," "oral candidiasis," "dental caries," "oral cancer," and "xerostomia." Exclusion criteria for all of the publications and other literature reviewed dated back to 2005, and they all dealt with common oral diseases in diabetic patients. A total of 93 articles were detected using these criteria. Ten papers were chosen for study after reviewing their abstracts and abstracts.

## RESULTS AND DISCUSSION

### Diabetes Oral Manifestations

According to oral symptoms, people with diabetes (type 1 or type 2) have a considerably higher propensity to develop oral disorders than healthy people. The vascular and neuropathic changes that come with diabetes, among other things, contribute to the disparity in prevalence (Belazi et al., 2005). It is worth noting that type 2 diabetics have a higher rate of oral lesions than type 1 diabetics (Auluck., 2015). The ulcerative type of oral lesions is the most common in diabetes patients, and the prevalence is significantly higher in type 2 diabetics. Symptoms such as glossodynia, pain, and burning may occur due to these lesions. In extreme cases, it can cause dysgeusia, oral paresthesia (Berbudi et al., 2020) increased susceptibility to dental abscesses, and impaired tissue regenerating capability (Li et al., 2015). As a result, you may have dryness, generalized erythema, and stomatitis. These issues are critical in patients with detachable prostheses because the lesser salivary flow means the prosthesis will remain considerably less (Li et al., 2015). As a result, people with diabetes who use removable prostheses are more likely to have a higher rate of prosthetic stomatitis than people with diabetes who do not. Actinic cheilitis is also common (Kakoei et al., 2015). However, it is

more prevalent in the elderly population. Hyperinsulinemia, hyperglycemia, and chronic inflammation, all caused by diabetes, have been shown to influence neoplastic growth. This is due to the high amounts of glucose-insulin found in diabetics, which encourage cell proliferation and the formation of metastases (Nguyen et al., 2020). The fact that premalignant lesions such as leukoplakias and erythroplasia have a significantly higher prevalence in patients who do not have diabetes adds to this notion. Because certain of these lesions have a high potential of becoming cancerous, diabetic patients must be closely monitored and inspected (Shangase et al., 2013).

**Oral Candidiasis**

Candidiasis is the most prevalent oral mycosis, affecting healthy and immunocompromised (Veiga et al., 2018). It is a perfunctory, opportunistic infection caused by the fungus Candida spp. It is more likely to develop due to various local and systemic conditions (Susanto et al., 2011). In reality, the isolation of Candida species in most diabetic patients' samples has been investigated. The prevalence of Candida is linked to the type of diabetes, the duration of the disease, and the degree of glycemic control in diabetics (Silva et al., 2015). During hyperglycemia peaks, high glucose levels in saliva can induce glycosylation products with proteins. These products may eventually result in more Candida receptors being available. As a result, people with diabetes are more likely to experience the early mechanism of colonization, and it is more intense (Veiga et al., 2018). Candida albicans are linked to a significant frequency of oral candidiasis in people with diabetes who use continuous acrylic removable prostheses (Li et al., 2015). The acrylic used in prosthesis can act as an extra field for bacterial and fungal biofilm adhesion, resulting in more extensive biofilms that can spread to other areas of the oral cavity. This is especially true for diabetes patients who wear prostheses and are over 60 years old (Young et al., 2017). Furthermore, diabetic individuals with traumatic injuries caused by the prosthesis have a reduced infection resistance (Li et al., 2015). As a result, epithelial permeability to bacteria and fungus has significantly increased. It has also been established that diabetic people who smoke have greater blood glucose levels due to tobacco's impact on adrenaline levels. As a result, smokers are likely to have more prominent Candida than non-smokers (Li et al., 2015). Candida albicans are the most common Candida species in both people with diabetes and healthy people, even though the percentage of cases is substantially higher in people with diabetes (Auluck., 2015). The epidemiology of Candida in the oral cavity of diabetic individuals is highly complex due to the interaction of numerous distinct predisposes. It is feasible to establish a link between

diabetes and prosthetic stomatitis linked with Candida by considering the occurrence of xerostomia in patients who use prostheses regularly and in people with diabetes (Auluck., 2015). However, it may be caused by something other than hyperglycemia. Thus, additional research is needed to find out (Berbudi et al., 2020). To overcome the increased risk of oral candidiasis infections, diabetic patients should maintain the highest level of oral cleanliness and remove their prostheses overnight (Berbudi et al., 2020).

**Dental Caries**

Based on the data above, diabetics' saliva glucose levels are higher than usual. As a result, these patients should expect changes in salivary pH (Seethalakshmi et al., 2016). This lower pH will create a highly cariogenic environment, resulting in increased activity of cariogenic bacteria such as Treponema identical, Prevotella nigrescens, and many Streptococci species, among others (Silva et al., 2015). The spread of these species will drop pH even further, perpetuating the vicious cycle while also affecting the formation of protective microflora in the oral cavity. When looking at specific types of diabetes, such as type 1 diabetes, there is no substantial variation in the number of dental caries between type 1 diabetics and healthy patients (Veiga et al., 2018) as long as they are appropriately treated and managed. Even though this group eats more frequently, the absence of association could be due to decreased carbohydrate consumption and a greater concern about health conditions. However, there are a link between dental caries (Silva et al., 2015) and poor oral health assessment scores in people with type 2 diabetes, which is much worse when the disease is uncontrolled. Two factors could explain this link: first, people with diabetes have a higher proclivity for periodontal disease, which exposes dental components more; and second, people with diabetes have a significantly more cariogenic oral environment (Silva et al., 2015).

**Periodontitis**

Type 2 diabetes is used to measure the prevalence and severity of periodontal disease and the likelihood of its onset. Geographically, however, the intensity of the link between periodontitis and type 2 diabetes appears to vary, possibly due to genetic, cultural, and ethnic variances (The presence of a causal bidirectional link is unusual because the severity of one illness (diabetes or periodontitis) has a detrimental impact on the severity of the other. When type 2 diabetics' periodontal disease is treated, however, the improvement in glycemic control is examined (Silva et al., 2015). The processes underlying the bidirectional relationship between type 2 diabetes and periodontal disease have been hypothesized differently. The first

theory is that periodontal tissue has undergone immunological alterations. Diabetic patients' periodontium is prone to vascular injury, resulting in poor nutrition and oxygen transport and slower metabolite removal. Furthermore, collagen metabolism is disrupted, lowering the periodontium's regeneration ability. Finally, hyperglycemia causes the development of advanced glycosylation end products, which are chemicals linked to enhanced oxidative stress and an intensified inflammatory response (Young et al.,2017). Periodontitis as an initiating and worsening cause of type 2 diabetes is the subject of the second hypothesis of the type 2 diabetes-periodontitis link. Substances from periodontal disease's usual increased inflammatory response may play a role in blood glucose management, even if the association is not proportionate (Martinez et al., 2013). The link between diabetes and periodontal disease can be pretty dangerous, with some writers even linking chronic periodontal inflammation to the onset of atherosclerosis, a condition that people with diabetes can develop (Young et al.,2017). In diabetic patients, proper periodontal care leads to improved quality of life and reduced morbidity (Martinez et al., 2013).

**Oral Cancer**

Some researchers now believe there is a link between diabetes (especially poorly controlled) and an increased prevalence of premalignant lesions and tumors in the oral cavity. Due to a lack of comprehensive studies with acceptable inclusion criteria and a study that determines a non-association between variables, the topic remains contentious. The increased risk of premalignant lesions, such as leukoplakia, is accepted in individuals with diabetes who smoke (Al-MAweri et al., 2013). In any case, the higher production of reactive oxygen species and peroxides in people with diabetes, especially those with decompensated pathology and high triglyceride levels, is blamed for a probable link between diabetes and the emergence of premalignant lesions and an increased risk of cancer (Soysa et al., 2017). As a result, there will be more free radicals in the oral cavity, which may disrupt the DNA structure of the cells, increasing the chance of malignant lesions occurring (Al-MAweri et al., 2013).

**CONCLUSION**

Diabetes is a disease with ramifications throughout the body, and the oral cavity is no exception. Several oral pathologies have a significantly heightened risk of developing in people with diabetes, and even oral pathology may increase the severity of diabetes (Soysa et al., 2017). It also found that people with diabetes with poor glycemic control incur an even

greater risk, both in terms of frequency and harshness of oral pathologies. Though some oral pathologies do not yet have a proven union with diabetes, a diabetic patient should know the higher risk of spreading oral diseases. The diabetic patient should have extra care with oral hygiene, have a dental appointment more frequently, and be advised to solve or prevent worse severity of oral pathology, thus contributing to greater well-being and quality of life. After reading all the literature, it is stable that Diabetes Mellitus is a chronic metabolic disease; the number of people suffering is increasing day by day. An oral manifestation has been recognized as one of the risks diabetic patients may face in their lifetime. Lack of awareness about oral health and lack of oral hygiene maintenance leads to various oral diseases, which can be prevented if diagnosed early. Regular visits to the dentist, knowing the first signs, and controlling their blood glucose level can help people in the long run. Good personal history and investigation such as HbA1c should be made if the person is not sure about their blood glucose level, and RBS should be performed to reduce the risk of post-operation complications. Also, drugs should be explained, and adequate follow-up is necessary should be explained.

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**Conflict Of Interest**

No conflict of interest was declared for this study.

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