Review Article

Diabetes and oral health- An overview of clinical cases

Thayumanavan B[1], Jeyanthikumari T[2], Abu Dakir[3], Vani NV[4]

[1]Dr B Thayumanavan
Professor & Head
[2]Dr T Jeyanthikumari
Assistant Professor
Prosthodontics
Tamil Nadu Government Dental College & Hospital
Chennai, India
kumarijayanthi@gmail.com
[3]Dr Abu Dakir
MDS, Reader, Department of Oral & Maxillofacial Surgery
Sree Balaji Dental College & Hospital, Chennai, India
drabu_dakir@yahoo.co.in
[4]Dr NV Vani
MDS, Senior Lecturer
drvanisuresh@yahoo.co.in
[1,4]Department of Oral & Maxillofacial Pathology
Sathyabama University, Dental College and Hospital
Rajiv Gandhi salai, Jeppiaar nagar, Sholinganallur, Chennai, India

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Correspondence to:
Dr B Thayumanavan
+919884156415
okc2002sep@yahoo.co.in

ABSTRACT

Diabetes Mellitus is a chronic disease prevalent worldwide with an increasing frequency of occurrence. Diabetes produces a wide array of symptoms throughout the body. It is said that mouth is the mirror of systemic health. The effects of diabetes are most frequently reflected in the oral cavity. Gingivitis and periodontitis are most frequently associated with diabetes. Periodontitis has been reported as sixth complication of diabetes and they both exhibit a bidirectional interrelationship.

This article reviews about the oral lesions occurring in diabetes and their pathogenesis. This article also focuses on the interrelationship between diabetes and oral health stressing the need for oral health assessment and treatment as part of preventive medical therapy for diabetes.

Key Words: *Diabetes, oral health, gingivitis, periodontitis, taste dysfunction*

Introduction

Diabetes mellitus is a chronic disorder of carbohydrate, fat and protein metabolism. A defective or deficient insulin secretory response which translates into impaired carbohydrate use, is a characteristic feature of diabetes mellitus, as is the resultant hyperglycemia. [1] This metabolic disorder lowers tissue resistance to infection.

Prevalence of Diabetes

Diabetes is pandemic in both developed and developing countries. In 2000, there were an estimated 175 million people with diabetes worldwide and by 2030 the projected estimate of diabetes is 354 million. In India alone, the prevalence of diabetes is expected to increase from 31.7 million in 2000 to 79.4 million in 2030. [2]

Oral manifestations of diabetes

It is said that mouth is the mirror of systemic health. The effects of diabetes are also reflected in the oral cavity. The oral problems in diabetics include gingivitis, periodontitis, fungal infections, dental caries, enamel hypoplasia, tooth sensitivity, crackling of oral mucosa, angular chelitis, xerostomia, taste

dysfunction, salivary dysfunction, neurosensory dysfunction, lichen planus, burning mouth syndrome, premalignant lesions and malignancy. [3]

Dental caries

Patients with diabetes are susceptible to oral sensory, periodontal and salivary disorders which increase their risk of developing new and recurrent dental caries.[4] Type 2 diabetics are often associated with obesity and intake of high-calorie and carbohydrate-rich food which are highly cariogenic. Furthermore, diminished salivary flow in diabetics is a risk factor for dental caries. [3] (Fig. 1)

Fig.1 Dental caries

Salivary Dysfunction

Patients with diabetes are more likely to have dry mouth or xerostomia and experience salivary gland dysfunction. [5, 6] Salivary flow may be affected by a variety of conditions, including the use of prescription medications and increasing age, and it appears to be affected by the degree of neuropathy and subjective feelings of mouth dryness that may accompany thirst. [6] (Fig. 2)

Fig. 2 Dry Mouth

Oral mucosal Diseases

Diabetic patients are associated with a greater likelihood of developing oral mucosal lesions such as lichen planus (3A), recurrent aphthous stomatitis. (Fig. 3B) These may be most likely due to chronic immunosuppression which is a sequelae of the disease in type I diabetes whereas in type 2 diabetes, acute hyperglycemia causes alteration in immune responsiveness. [7] The 'Grinspan syndrome' (diabetes, lichen planus and hypertension) may be purely coincidental associations of common disorders probably related to drug use. Oral mucosal lichenoid changes (Fig.3C) may result from use of antidiabetic agents.

Glossitis (Fig 3D) with alterations in filliform papillae and fissuring of tongue (Fig 3E) may also be seen.

Fig 3A.Fissuring of tongue

Fig 3B.Glossitis

Fig 3C Oral ulcer

Fig 3D Lichenoid reaction

Fig 3E Lichen Planus

Oral Infections

Diabetics are more susceptible to opportunistic infections such as oral candidiasis, mucormycosis, aspergillosis. Fungal infections of oral mucosal surfaces

and removal prostheses are commonly found in adults with poorly controlled diabetes. [8]

Taste disturbances

Taste is a critical component of oral health and is affected adversely in patients with diabetes.[9] According to the study conducted by Stolbova et al.[10] more than one third of adults with diabetes had hypogeusia or diminished taste perception resulting in hyperphagia and obesity.

Neurosensory disorders

Neurosensory disorders of the oral and perioral tissues including burning mouth syndrome and glossodynia have been reported in patients with diabetes. [3] Temporary lingual and labial parasthesia may follow extraction of mandibular third molar teeth. In patients with insulin treated diabetes, circumoral parasthesia is a common and important sign of impending hypoglycaemia.

Gingivitis and periodontitis

Diabetes is associated with increased gingival inflammation (Fig 4A) in response to bacterial plaque. Diabetes increases not only the prevalence and severity of periodontitis (Fig 4B, 4C) but also the progression of bone loss and attachment loss over time. Periodontitis has been reported as sixth complication of diabetes along with retinopathy, nephropathy, neuropathy, microvascular and macrovascular diseases. [11] Diabetes increases the risk of alveolar bone loss and attachment loss. [12]

Fig 4A Gingivitis

Fig 4B Periodontitis

Fig. 4C Periodontal abscess

Relationship between Diabetes and Periodontitis

Diabetes and periodontitis exhibit a bidirectional inter-relationship. Control of periodontal infection causes improvement in the glycemic control by decreasing hemoglobin A1c levels and insulin demand. [13]

Influence of diabetes on periodontal tissues

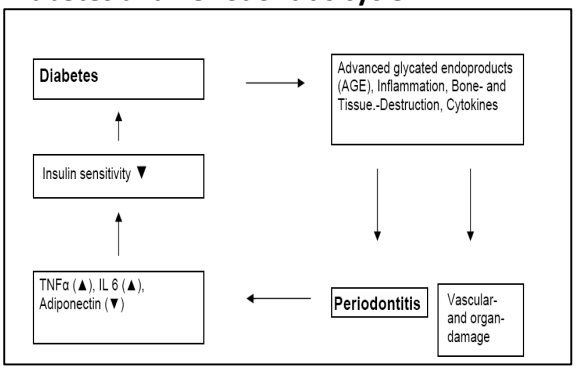
The factors causing periodontitis in diabetics are microangiopathy, altered cell mediated immune response, increased plaque formation, increased collagen breakdown, subgingival microbiota, glucose level in GCF, host response, periodontal vasculature. [14]

Age and its effects on PDL: A Hypothesis

Accumulation of advanced glycation end products (AGEs) as a result of the chronic hyperglycemic state or diabetes, coupled with the presence of infection and an exaggerated host response causes severe periodontitis in diabetes. [13]

Gingival tissue enriched with advanced glycated end products causes activation of permeability, Adhesion molecules, Cytokines, MMPS and Collagenase causing an exaggerated response to periodontal pathogens which leads to accelerated destruction of non mineralized connective tissue and bone in diabetes causing severe periodontitis. [15]

Diabetes and Periodontitis cycle



Influence of periodontal infection on diabetes

Periodontal diseases are inflammatory in nature and they may alter glycemic control. Studies have shown that diabetic patients with periodontal infection have a greater risk of worsening glycemic control over time compared to diabetic subjects without periodontitis. [16]

Chronic periodontitis leads to a state of chronic systemic inflammation increasing the inflammatory mediators in the circulation like c- reactive protein, interleukin-6, fibrinogen. These reduce the insulin sensitivity which increases the glycemic levels causing diabetes.

Treating periodontal disease could improve glycemic control. [17] Treating periodontitis is treating diabetes. Professional scaling and root planing reduces blood sugar level in diabetics with periodontitis. Oral screening and treatment of periodontitis should be a standard protocol in diabetic patients.

Oral premalignant lesions and squamous cell carcinoma

Recent epidemiological studies have implicated diabetes as a risk factor for the development of oral premalignant lesions and oral squamous cell carcinoma (Fig 5A, B). Diabetes seems to promote the activation of the Ras/Raf/MAPK signal transduction pathway leading to increased cell proliferation and further oncogenesis. [18]

Fig 5A Premalignant lesion

Fig 5B Carcinoma

Conclusion

Awareness of the potential associations among diabetes, oral health and general health needs to be increased in diabetic patients. The intimate relationship between oral health and systemic health in individuals with diabetes suggests a need for increased interaction between dental and medical professionals who are charged with management of the patient. Oral health assessment and treatment should become as common as the eye, foot and kidney evaluation that are routinely performed as part of preventive medical therapies. Dental check up should be made mandatory once in 6 months.

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