INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH

IJCMPR

Available Online at http://www.journalcmpr.com

RESEARCH ARTICLE

DIABETES AND PERIODONTAL DISEASES-THE CURRENT SCENERIO

Sepuri Krishna Mohan[1]., Tahir Ahmad*[2]., Sepuri Tirumala Devi[3]., Javaid Ahmad Wani[4] and Asra Tabassum[5]

[1]Chief Diabetologist, Sepuri Diabetes Center, Kurnool, Andhra Pradesh.
[2]Indira Gandhi Government Dental College, Jammu.
[3]Diabetologist, Sepuri Diabetes Center, Kurnool, Andhra Pradesh, India
[4]Dental surgeon, Department of Health, Jammu and kashmir.
[5]Jammu

ARTICLE INFO

Article History:

Received 5th November, 2016
Received in revised form 17th December, 2016
Accepted 26th January, 2017
Published online 28th February, 2017

Key words:

Diabetes, Periodontitis, India.

ABSTRACT

In the present scenario Periodontitis and diabetes have appeared as common and complex set of chronic diseases with an interrelated disease manifestations and the relationship has been mutually dependent on the state of the body perhaps that is the reason these two diseases are fast gaining the status of a potential public health hazard. For such obvious reasons, treatment and management of periodontitis in people with diabetes is particularly important. This article envisages the current scenario of diabetes and periodontal diseases from dentists and diabetologists perspective.

INTRODUCTION

Periodontitis and diabetes are two common prevalent diseases, with huge dependence on line of treatment that both follow and associationbetween these two common diseases has been recognized by both dental professionals as well as diabetologists across the world.

Epidemiological studies have clearly identified that diabetes is a major risk factor for periodontitis, increasing the risk approximately three-fold compared to non-diabetic individuals, particularly if glycemic control is poor. [1]

Diabetes mellitus is defined as a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin [2]

The two main types of diabetes are classified primarily on the basis of their underlying pathophysiology.[3]

Type 1 diabetes, which constitutes about 5 to 10 percent of all cases in the United States, results from autoimmune destruction of insulin-producing β-cells in the pancreas, leading to total loss of insulin secretion.[4]

Type 2 diabetes, which constitutes about 85 to 90 percent of all cases, results from insulin resistance rather than from total absence of insulin production.[4]

Gestational Diabetes mellitus .This is defined as any degree of glucose intolerance with onset or first recognition during pregnancy [5]. Women who have had gestational diabetes are at increased risk of developing NIDDM later in life [6][7]

Autoimmune destruction of β-cells does not occur in type 2 diabetes, and patients retain the capacity to secrete some insulin, although production often diminishes over time. Patients with type 2 diabetes can remain undiagnosed for years because hyperglycemia appears gradually and often without symptoms.[4] The American Diabetes Association provided the most recent classification of DM, in 1974 [Table 1].[8]

Table 1: Classification of diabetes mellitus

Classification	Etiology
Type 1	(insulin dependent diabetes: juvenile diabetes)
Type 2	(noninsulin dependent diabetes: adult onset diabetes)
	Gestational diabetes (pregnancy diabetes)
Other types of diabetes	Genetic defects affecting beta cell function or insulin action
	Pancreatic diseases or injuries (pancreatic cancer, pancreatitis, traumatic injury, cystic fibrosis, pancreatectomy)
	Infections (congenital rubella, Cytomegalovirus infection)
	Drug induced diabetes (steroid hormones (glucocorticoids), thyroid hormone)
	Endocrine disorders (hyperthyroidism, Cushing's syndrome, glucagonoma, acromegaly, pheochromocytoma)
	Other genetic syndromes (with associated diabetes)
	Reproduced with permission from American Diabetes Association[8]

The American Diabetes Association's Expert Committee on the Diagnosis and Classification of Diabetes Mellitus also recently approved new criteria for diagnosis of DM [Table 2];[9]

Table 2: Criteria for the diagnosis of diabetes

Measurement	Diagnostic values for diabetes	Characteristics
Glycosylated hemoglobin (HbA1c)	≥ 6.5%	The test should be performed in a laboratory using the standardized method. It reflects average blood glucose levels over a 2- to 3-month period of time
Fasting plasma glucose	≥ 126 mg/dl (7.0 mmol/l)	Fasting is defined as no caloric intake for 8 h
Postprandial plasma glucose (2 h after caloric intake)	≥ 200 mg/dl (11.1 mmol/l)	The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water
Random plasma glucose	≥ 200 mg/dl (11.1 mmol/l)	

The current status of diabetes mellitus in India

Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease.[10][11]

According to Wild et al.3$ the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease.[12][13]

The etiological factors of diabetes in India are multiple ranging from genetic, environmental, rapidly developing urbanization lifestyle modifications and many others. Yet despite the incidence of diabetes within India, there is no national health policy or framework on mitigation of DM and its complications in Indian population.

Diabetes and periodontal disease –the rapidly progressing complication

Impact of periodontal disease on diabetes

Evidence to support a negative impact of periodontal disease on diabetes was first postulated following studies of the Gila River Indian Community, a population of Native Americans with a high prevalence of diabetes. It was noted that severe periodontitis was associated with increased risk of poor glycaemic control (HbA1c >9.0%, 75 mmol/mol) at follow-up (minimum of two years later), suggesting that periodontitis may be compromising diabetes control.[14]

Other studies have reported increased prevalence of diabetes complications, such as cardiovascular complications, retinopathy, neuropathy and proteinuria in people with advanced periodontitis.[15-18]

The impact of periodontitis on deaths from cardiovascular complications and diabetic nephropathy has also been investigated in a longitudinal study of Pima Indians with type 2 diabetes. Age- and sex-adjusted death rates (deaths per 1,000 person-years) were 3.7 for those with no/mild periodontitis, 19.6 for those with moderate periodontitis and 28.4 for those with severe periodontitis. After adjustment for known confounders, it was shown that diabetic individuals with severe periodontitis had 3.2 times increased risk of cardiorenal mortality (ischaemic heart disease and diabetic nephropathy combined) compared with the reference group (those with no periodontitis, mild and moderate periodontitis combined). [19] Changes in HbA1c in non-diabetic individuals who were monitored for a period of five years have also been associated with the presence of periodontitis. In a longitudinal study, the (non-diabetic) participants with the most advanced periodontitis at baseline were found to have a five times greater increase in their HbA1c values over five years (change in HbA1c 0.106 ± 0.03%) compared to those who did not have periodontitis at baseline (change in HbA1c 0.023 ± 0.02%).[20]

Impact of diabetes on periodontal diseases

In 1999, the American academy of periodontogy issued a position paper about diabetes and periodontal diseases. [21].this report indicates that DM, especially when poorly controlled increases the risk of periodontitis. Several contributing factors have been proposed including reduced polymorphonuclear leucocyte function, Abnormalities in collagen metabolism and the formation of advanced glycation end products or AGE which adversely affect collagen stability and vascular integrity. AGE binding to macrophage and monocyte receptors also may result in increased secretion of interleukin-1 and tumor necrosis factor@ resulting in increased susceptibility to tissue destruction.

Some evidence suggests that periodontal infection and periodontal treatment have the potential to alter glycemic control. [21]. the presence of severe periodontal infection may increase the risk of microvascular and macrovascular diabetic complications. Control of periodontal infection has been shown to have a positive effect in glycemic control [21]

Patients with poorly controlled diabetes mellitus have an increased rate of surgical wound infections and poor wound healing and therefore some researchers have recommended that management of periodontal diseases be conservative and non-surgical as much as possible [22]. Since prevention plays a primary role in periodontal disease control in diabetic patients they may need more frequent plaque control and scaling than non-diabetic patients [22]

Studies have indicated that smoking increases the risk of periodontal diseases several fold in diabetic patients [23][24]

Most of the evidence also suggests that diabetes increases the risk of developing periodontitis. In a classic cross-sectional study, type 1 diabetes was associated with a fivefold increased prevalence of periodontitis in teenagers.[25]

A recent case-control study confirmed that attachment loss is more prevalent and extensive in children with diabetes than in children without diabetes.[26]

In addition, epidemiologic research supports an increased prevalence and severity of attachment loss and bone loss in adults with diabetes.[27][28]

A multivariate risk analysis showed that subjects with type 2 diabetes had approximately threefold increased odds of having periodontitis compared with subjects without diabetes, after adjusting for confounding variables including age,sex and oral hygiene measures.[27][28]

Role of a Dentist in Diabetes

In 2007, the World Health Organization (WHO) Executive Board acknowledged the intrinsic link between oral health,

general health and quality of life.[29]It has been suggested that oral health is a neglected area of global health, and an editorial in The Lancet proposed that promoting and improving oral health should be part of the routine agenda of healthcare policymakers and clinicians.[30]

In 2000, the US Surgeon General referred to a 'silent epidemic' of oral and dental diseases, and stressed the importance of oral health as being essential for general health and well-being.[31] the implications of diabetes mellitus and periodontal disease on patients has been gradually becoming synergistic and the relationship between these two diseases is becoming a new complication for health professionals to deal with. it, thus becomes imperative that dentist's role in prevention and management of DM and periodontal disease becomes essential and should be integral part of treatment strategy of diabetic patients.

Better Screening and early diagnosis of the disease- as an established fact Diabetes is associated with an increased risk of developing inflammatory periodontal diseases and poor oral health and periodontal disease should serve as an indicator for a dentist for referral for further screening thus dentist acts as the first health practioner to suspect a patient with diabetes.

Medical history- dental treatments last for long hours marked with exertion and high levels of anxiety in patients. it becomes essential that the dentist must obtain an elucidative and comprehensive medical history of diabetic patients, their medication, level of dependence and frequency of hypoglycemic episodes and complications, if any, due to exertion or past dental treatments. Anti diabetic medications, dosages times of administration, and status of diabetes control should be determined. And if necessary drug dosage and dietary management should be consulted with the diabetologists before undergoing dental treatment.

According to the recent consensus of the American Diabetes Association (2010),[9] glycosylated hemoglobin, that is, HbA1c ≥6.5%, a preprandialglycemia of ≥126 mg/ dl and a postprandial glycemia ≥200 mg/dl are suggestive diagnostic values of diabetes

Basic Dental Treatment Considerations for A Diabetic Patients

Role of Diabetologist in Periodontal Diseases

Bidirectional communication

There should be clear and regular communication between dentist and diabetologist. This communication should be critical as well as integral component of treatment plan of patients with diabetes. Communication must be comprehensive, bidirectional and primordial. Both dentist and diabetologist must be mutually appraised of oral manifestations and glycemic control of the disease respectively.

Referrals

Patients with Diabetes Mellitus and periodontal diseases should provide an opportunity for both practioners to expand their referral base. During intra oral examination, Dentists should carefully examine the patient and any signs and symptoms predisposing of poor glycemic control should be referred to diabetologist. Similarly diabetologists who treat patients with diabetes should serve as a good referral source of patients with poor oral prophylaxis.

Treatment modalities

It is essential that Diabetologist should be well aware of the treatment modalities of various periodontal diseases and their impact on glycemic control of diabetic patients. Dental treatment should not interfere with the medical control of diabetes. However serum glucose levels and metabolic insulin levels should be carefully monitored before carrying any periodontal surgical procedures.

It is also mandatory that stress level management should be carried before all dental procedures in patients with diabetes. Therefore, Dentists must consider modifying medical therapy in consultation with the patient's diabetologist.

Periodontal Disease and Mortality in Type 2 Diabetes

Studies have been made regarding the chronic effect and relationship between periodontal diseases and diabetes. It has become a major public health Challenge, all over the world.

*Schedule dental appointments in the early to mid-morning hours
* Keep appointments short
* Use adjunct sedation procedures when appropriate
* Instruct patient to continue normal dietary intake before dental procedures
* Prior to an invasive procedure, check the patient's blood glucose
* Modify diet to soft solids and liquids when patient is expected to have difficulty eating solid foods after dental procedures
* Perform appropriate follow-up care in the postoperative period
* Frequent recall examinations and prophylaxis
* Use of topical fluoride when patients are at risk of caries
* Supportive, palliative care for dry mouth, using salivary substitutes

Table 3 Basic patient management strategies[32]

Further periodontal maintenance for diabetic patients have been elaborated in study - Oral health management considerations in patients with diabetes mellitus [36]

In fact, India is home to 40.9 million people with diabetes – nearly 15% of the global diabetes burden; it contributes 1% of the world's diabetes research.[33]

Projections show that this will increase to 70 million by 2025. As India has a population of 1.2 billion, 40% of whom are under the age of 18, investment in the health of India's future workforce is crucial.[34]

A strong relationship between Periodontal Disease and Mortality in Type 2 Diabetes has also been established. Periodontal disease is a strong predictor of mortality from IHD and diabetic nephropathy in Pima Indians with type 2 diabetes. The effect of periodontal disease is in addition to the effects of traditional risk factors for these diseases.[Diabetes Care28:27–32, 2005][35]

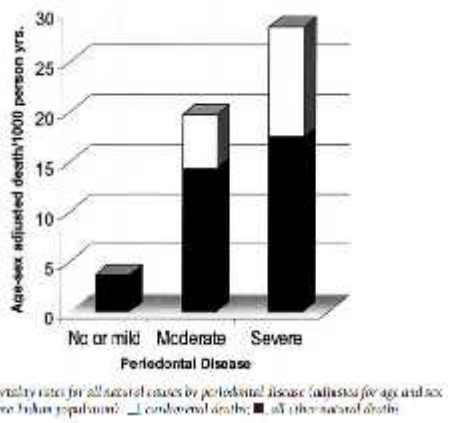

Figure 1-Peridontal disease and mortality in type 2 diabetes[Diabetes Care28:27–32, 2005][35]

Steps needed to prevent diabetes and periodontal problems in India

1. The potent diabetes mellitus and periodontal diseases has been termed as grave problemand recognized as top priorities of public health care.However its prevention needs a professional watchdog and primordial approach for early detection and prevention viz.inclusion of oral health specialist/doctor's in PHC /CHC's in consultation with diabetologists ,using modern means of digital technology, to play a primary role in prevention of these diseases.
2. Dietary and lifestyle modifications that have been predisposing factors for both diabetes and periodontal diseases needs to be addressed. Diabetes and periodontal diseases throughintroduction of healthier diets and dietary guidelines are basic preventive principles of suchchronic diseases.
3. Patient education, health care promotion and empowerment in healthcare settings are crucial for ensuring good management and control of diabetes and periodontal disease.
4. It's imperative to campaign and highlight the basic etiological factors among the general population. Village to village, block to block-awareness and counseling center's plus college and school symposiums for creating awareness in youth and adults about the harmful dietary habits, ill valued and bizarre life styles that prove as predisposing factors for DM and periodontal diseases.
5. To control the increasing burden of Non--Communicable Diseases, Better implementation and execution through the National Programme on Prevention and Control of Diabetes, Cardiovascular diseases and Stroke (NPDCS) 2008 under aegis of Ministry of Health and Family welfare, Government of India, is need of hour.

References

1. Mealey B L, Ocampo G L. Diabetes mellitus and periodontal disease. *Periodontol* 2000 2007; 44:127–153.
2. Edwards CRW, Baird JD, ToftAD, Frier BM, Shepherd J. Chilvers ER. Davidson's principles and practice of medicine 17theds church Livinstone, London, Britian1996: 669-774
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus: position statement. *Diabetes Care* 2005;28 (supplement 1):S37-S42.
4. Mealey BL, Ocampo GL. Diabetes mellitus. *Periodontol* 2000 (in press).
5. Metzger BE, Coustan DR (Eds.): Proceedings of the Fourth International Workshop Conference on Gestational Diabetes Mellitus. *Diabetes Care*1998; 21 (Suppl. 2):B1-B167.
6. Therapy for Diabetes Mellitus and Related Disorders 3rd Edition. *American Diabetes Association*, 1998: 20-26.
7. Lalla RV, D' Ambrosio JA. Dental management considerations for the patient with diabetes mellitus. *J Am Dent Assoc*. 2001; 132(10): 1425-1432.
8. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 1997;20:1183-97
9. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care* 2010;33:62-9
10. Joshi SR, Parikh RM. India - diabetes capital of the world: now heading towards hypertension. *J Assoc Physicians India*. 2007;55:323–4.
11. Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. *Australas Med J* 2013;6(10):524-31
12. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes-estimates for the year 2000 and projections for 2030. *Diabetes Care*. 2004;27(3):1047-53.
13. Whiting Dr, Guariguata L, Weil C, Shawj. IDF Diabetes atlas: Global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Res Clin Pract*. 2011;94:311-21
14. Taylor G W, Burt B A, Becker M P *et al*. Severe periodontitis and risk for poor glycaemic control in patients with non-insulin-dependent diabetes mellitus. *J Periodontol* 1996; 67:1085–1093.
15. Karjalainen K M, Knuuttila M L, von Dickhoff K J. Association of the severity of periodontal disease with organ complications in type 1 diabetic patients. *J Periodontol* 1994; 65:1067–1072.
16. Moore P A, Weyant R J, Mongelluzzo M B *et al*. Type 1 diabetes mellitus and oral health: assessment of tooth loss and edentulism. *J Public Health Dent* 1998; 58:135–142.
17. Moore P A, Weyant R J, Mongelluzzo M B *et al*. Type 1 diabetes mellitus and oral health: assessment of periodontal disease. *J Periodontol* 1999; 70:409–417.

18. Thorstensson H, Kuylenstierna J, Hugoson A. Medical status and complications in relation to periodontal disease experience in insulin-dependent diabetics. *J ClinPeriodontol* 1996; 23:194-202.
19. Saremi A, Nelson R G, Tulloch-Reid M *et al.* Periodontal disease and mortality in type 2 diabetes. *Diabetes Care* 2005; 28:27–32.
20. Demmer R T, Desvarieux M, Holtfreter B *et al*. Periodontal status and A1C change: longitudinal results from the study of health in
21. American Association Of Periodontology. Diabetes And Periodontal Diseases (Position Paper). *J Periodontal* 1999;70;935-49
22. Galili D, Findler M, GarfunkelAa. Oral And Dental Complications Associated With Diabetes And Their Treatment. *Compendium* 1994;15;496-509
23. Moore Pa, Weyant Rj, Mongelluzzomb *et al.* Type 1 Diabetes Mellitus And Oral Health; Assesseement Of Periodntal Disease, *J Periodontol* 1999;70;409-17
24. Haber J, Wattles J, Crowley M, Mandell R, Joshipura K, KentRl, Evidence For Cigarette Smoking As Major Risk Factor For Periodontitis. *J Periodontol* 1993;64:16-23.
25. Cianciola L, Park B, Bruck E, Mosovich L, Genco R. Prevalence of periodontal disease in insulin-dependent diabetes mellitus (juvenile diabetes). *JADA* 1982;104(5):653-60
26. Lalla E, Cheng B, Lal S, Tucker S, *et al*. Periodontal changes in children and adolescents with diabetes: a case-control study. Diabetes Care 2006;29(2):295-9.
27. Shlossman M, Knowler WC, Pettitt DJ, Genco RJ. Type 2 diabetes mellitus and periodontal disease. *JADA* 1990;121(4):532-6.
28. Emrich LJ, Shlossman M, Genco RJ. Periodontal disease in noninsulin dependent diabetes mellitus. *J Periodontol* 1991;62(2):123-31
29. World Health Organisation. Oral health: action plan for promotion and integrated disease prevention (EB120/10). 120th Session, 22-30 January. Geneva: WHO, 2007.
30. Oral health: prevention is key. *Lancet* 2009; 373:1.
31. US Department of Health and Human Services. Oral health in America: a report of the surgeon general.Rockville: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000
32. Varon F, Mack-Shipman L. The role of the dental professional in diabetes care. *J Contemp Dent Pract* 2000; (1)2: 001-027.
33. Arunachalam!S,!Gunasekaran!S.!Diabetes!Research!in! India! and! China! Today:! From! LiteratureH Based! Mapping! to! Health HCare! Policy.! Current! Science!2002;!82(9):!1086–97.!
34. Leeder! S,! Raymond! S,! Greenberg! H,! Liu! H,!Esson! K.!Race! against! Time:! The! Challenge! of! Cardiovascular! Disease! in! Developing! Economies. !New!York:!Columbia! University,! Center! for! Global! Health!and!Economic!Development,!2004.!
35. Peridontal disease and mortality in type 2 diabetes[*Diabetes Care28*:27–32, 2005]
36. Kaur S, Kaur K, Rai S, Khajuria R. Oral health management considerations in patients with diabetes mellitus. *Arch Med HealthSci* 2015;3:72-9.