ISSN: 0976-3031

International Journal of Recent Scientific Research

Impact factor: 5.114

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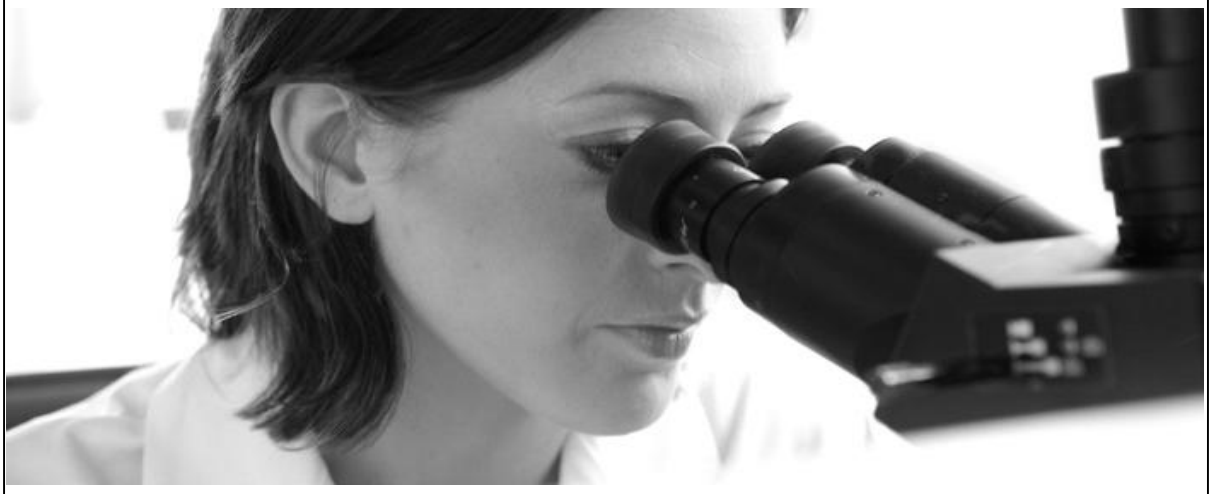

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Volume: 6 Issue: 9

THE PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH
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Available Online at http://www.recentscientific.com

ISSN: 0976-3031

International Journal of Recent Scientific Research
Vol. 6, Issue, 9, pp.6347-6350, September, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

ORAL HEALTH CONSIDERATION AND ITS MANAGEMENT IN DIABETIC PATIENT

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ARTICLE INFO

Article History:

Received 06th June, 2015
Received in revised form 14th July, 2015
Accepted 23rd August, 2015
Published online 28st September,2015

Key words:

Oral disease, Dry mouth, Halitosis Candidiasis, Burning mouth syndrome.

ABSTRACT

Diabetes mellitus is a major health problem affecting the population worldwide. Through this article, we attempt to review a variety of oral diseases associated with diabetes mellitus. The assessment of diabetes mellitus can be done by repeated fasting blood glucose level. This disorder can affect the oral health may lead to increased mortality and morbidity. Neglected oral health has multiple implications in relation to function, esthetics and need future rehabilitative treatment. Oral health care is an essential part of overall health. Dental care is important for these patients and can prevent long term health problems.

INTRODUCTION

The term diabetes has its origin from Greek language and literally means "siphon" and was introduced in pathology by 'Aretaeus of Cappadocia'. The word mellitus means 'honey' which was added to the name diabetes by 'Cullen' (Rahman K, 2006). WHO defined diabetes mellitus is a heterogeneous group of metabolic disease showing features of hyperglycemia which results from disorder in carbohydrate, fat and protein metabolism (Harsh Mohan, 2005). Hyperglycemia may result from decreased insulin secretion, reduced glucose uptake by the body and increased amount of glucose production.The various risk factors associated with diabetes mellitus are family history of diabetes, obesity, smoking, hypertension, infertility, previous gestational diabetes, hirsutismetc (Matthews DC 2002).

Diabetes mellitus can be classified as – Type I diabetes mellitus and Type II diabetes mellitus. Type I diabetes mellitus is an autoimmune disease which results from destruction of beta-cells in Islets of Langerhans caused by immune effector cells against endogenous beta-cell antigens and give rise to absolute insulin deficiency. Type II diabetes mellitus can be defined as a heterogeneous multifactorial disease which results from either due to insulin resistance or impaired insulin secretion and leads to relative insulin deficiency. Approximately 5-10% of cases have type I diabetes and occurs mostly in children and young adults whereas type II diabetic mellitus accounts for approximately 90-95% of cases and mostly associated with adults. The signs and symptoms of diabetes mellitus include polyuria, polyphagia, nocturia, polydipsia, fatigue, unexplained weight loss, increased infections, numbness, leg cramps, blurred vision and impotence (Kumar *et al* 2013, Seino Y *et al*,2010) .World health organization demonstrated that in the year 2000, the total number of people affected in India was 32million but the rate is increasing day by day due to population growth, obesity, aging and development. As per International diabetes federation that 40.9 million people was affected in India in the year 2000 and this rate increases to 69.9 by the year 2030 (Mohan *et al* 2007, Mohsin *et al* 2014).

Oral manifestations in diabetic patient

Various oral changes have been associated in patient with diabetes, such as xerostomia, mucosal drying, cracking, halitosis, taste impairment and burning mouth syndrome, glossitis, alteration in normal microbial flora, dental caries, gingivitis and periodontal disease, oral candidiasis, lichen

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planus, decreased wound healing and increased susceptibility to infection (Alamo *et al* 2011, Ponte *et al* 2001).

Periodontal disease

It is a localized infection that involves tooth supporting structures such as gingiva, periodontal ligament, alveolar bone and cementum. Periodontitis is considered to be the sixth most complication of diabetes mellitus whereas other five complications include retinopathy, nephropathy, microvascular disease and peripheral vascular disease. In patient with poor glycemic control have greater risk of developing periodontal disease which begins as gingivitis and then gradually progressive to advanced periodontitis (Weidlich *et al* 2008, Moore *et al* 1997). Periodontitis is defined as inflammation of supporting tissues of tooth caused by specific microorganisms resulting in progressive destruction of periodontal ligament and alveolar bone. The microorganisms associated with periodontal disease are P. gingivalis, T. forsythia, T. denticola, P. intermedia, C. rectus, E. corrodens, F. nucleatum, A. actinomycetemcomitans, P. micros and Eubacterium species. The most important clinical feature of periodontal disease is periodontal pocket which provides afavorable microenvironment for the colonization of microorganisms (Newman *et al* 2011).

The main factors which are responsible for the formation of periodontal disease in diabetic patients are

1. In a patient with uncontrolled diabetes mellitus, there is an altered collagenase activity and collagen synthesis. When there is a prolonged exposure of tissue to hyperglycemia, non-enzymatic glycosylation of various proteins and matrix molecules occur and give rise to the formation of accumulated glycated end products (AGEs). These end products play an important role in the progression, higher prevalence and severity of periodontal disease. The accumulated glycated end products bind to macrophages and monocytes receptors and produce increase levelsof interleukin-I and tumor necrosis factor-α. These factors cause periodontal tissues more susceptible to destruction (Bascones-Martinez 2011,Marin 2008,Bjelland 2002, Allen 2012) .
2. Diabetic patients are more prone to infection as a result of deficiencies in function of polymorphonuclear leucocytes like defective chemotaxis, phagocytosis, killing effect and adherence (Moore *et al* 1997, Bascones-Martinez 2011).
3. Colonization of gram negative anaerobic bacteria such as A. actinomycetemcomitans, P. gingivalis, P. intermedia etc (Moore *et al* 1997, Bascones-Martinez 2011).
4. Changes in flow of blood in periodontal disease (Bascones-Martinez 2011).

The major signs and symptoms of gingivitis and periodontitis in diabetic patients are velvety-red enlarged gingiva that bleeds easily, sessile or pedunculated gingival polyps, polypoid gingival proliferations, deep periodontal pockets, abscess formation and loosened tooth indicate bone loss (Newman *et al* 2011, De Almeida 2008).

Xerostomia

Oral cavity is kept moist by a film of fluid secreted by salivary glands called saliva which constantly coats the inner surfaces and occupies the space between lining mucosa and the teeth. Saliva plays an important role in protection of oral cavity, taste, speech, tissue repair, mastication and deglutition. They act as buffer by inhibit the colonizationof pathogenic microorganisms and neutralize the acids produced by cariogenic bacteria, thereby inhibiting enamel demineralization (Gumus Pinar and Buduneli N 2013).Variations in salivary gland function during metabolic disease haveintense effect on oral tissue. Xerostomia means dryness of mouth resulting from degenerative changes in the salivary glands and poor glycemic control. Diabetes affects the salivary gland production that results in higher concentration of glucose in saliva and bacteria in mouth.The most common signs and symptoms of xerostomia in diabetic patient are sticky and dryness of mouth, angular chelitis, stomatitis, ulcerations in the oral cavity, increase thirst, burning sensation starts in the tongue and progressivelyextent the whole oral cavity, problems in tasting, mastication and deglutition, parotid gland enlargement, sialadenitis, halitosis and dental caries (Priya 2013, Leilte *et al* 2013, Sanjeeta 2014). This can be prevented by maintaining the normal blood glucose level and various preventive measures should be used that may relieve the symptoms are chew sugar free gums or suck sugar free candy, drink lots of water to keep your oral cavity moist, brush your teeth regularly with fluoridated tooth paste, visit your dentist for regular follow up, avoid carbonated beverages etc (Leilte *et al* 20130).

Dental caries

It is an irreversible microbial disease of the calcified tissue of the teeth characterized by demineralization of the inorganic portion and destruction of organic substances leading to cavitation. Diabetic patients are more prone to dental caries as a result of reduced salivary flow and production, increased level of glucose in saliva, accelerated growth of candida species, increased levels of streptococcus mutans and lactobaccili (Miralles 2006).

Avariety of oral diseases like fissured tongue, geographic tongue, recurrent aphthous stomatitis, lichen planus and oral candidiasis have strong association with diabetes mellitus. The factors which predispose to these associations are immunosuppression, increased glucose level in saliva, decreased saliva production and flow, microangiopathy, alteration in function of polymorphonuclear leucocytes and delayed healing. The correlation between diabetes mellitus, lichen planus and vascular hypertension was first defined by Grinspan and this triad is known as Grinspan's syndrome. These conditions causes painful and burning sensation which often results in altered taste sensation, difficulty in mastication and swallowing (Lamster *et al* 2008).

Halitosis

Halitosismeans unpleasant odor exhaled in breathing. Diabetic patient can lead to a typical sweet and fruity breath odor. This

occurs due to the accumulation of ketones in diabetic patient. The lack of glucose as a fuel source results in breakdown of fats and proteins. This leads to the production of ketone bodies like acetoacetate and hydroxybutyrate (Negrato C and Tarzia O 2010).

Burning mouth syndrome

It is a burning sensation of mucosa, lips and /or tongue without any visible mucosal lesions. The etiology is multifactorial but diabetic patient may felt burning sensation first in the tongue and then progressively involve the lips, cheeks and palate. In 50% of cases, burning sensation occurs due to dry mouth. It occurs mostly in postmenopausal women (Negrato C and Tarzia O 2010)

Implants

Oral implants have been used for the replacement of missing teeth as an alternative substitute to traditional appliances. Hyperglycemia alters bone formation, remodeling and osseointegration of dental implant. In patients with uncontrolled diabetes, healing process is delayed and there are more chances of infection. This hinders the success of dental implant. High success rate of dental implant has been achieved when diabetic patient is under control (Swati 2013).

Dental management in diabetes *patient (Alamo et al 2011, Laller and Ambrasio 2001)*

1. Proper medical history and assessment of blood glucose level at the initial appointment.
2. Ask the patient about recent blood glucose level, hypoglycemic episodes and medication.
3. If the signs and symptoms of undiagnosed\uncontrolled diabetes mellitus are present before performing dental treatment then refer the patient to the physician for diagnosis and treatment.
4. Morning appointment should be preferred in these patients since cortisol levels are higher in the morning and this reduces the risk of hypoglycemic episodes.
5. If acute infection is present in poorly controlled diabetes mellitus, antibiotics should be prescribed.
6. Proper follow-up of patient at frequent interval should be doneso as to avoid oral complications and maintain optimum oral hygiene.
7. The most complication of diabetes mellitus in the dental office is hypoglycemia.

Hypoglycemia in the dental office can be prevented by

1. Stop the dental treatment.
2. If the patient is awake and able to take orally then administer 15 g oral carbohydrates like glucose tablets or gels, candy, soft drinks etc.
3. If the patient is unable to take orally then administer 25-30ml of 50%dextrose solution or 1mg of glucagon intravenously
4. Glucagon can also beadministered subcutaneously and intramuscularly.

CONCLUSION

Diabetes mellitus is a heterogeneous group of metabolic disease that has significant influence on body tissue including oral cavity. The early and accurate diagnosis of diabetes mellitus has extreme importance as it can allow the prevention of complications. Accurate diagnosis of diabetes mellitus depends on adequate history, clinical information and assessment of blood glucose level. Proper measures should be taken to control glucose level and avoid life threatening complications. Regular dental follow-up should be preferred so as to assess overall oral health and treat the patient with dental problems at an initial stage.

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How to cite this article:

Sonia Gupta *et al*. (2015). Oral Health Consideration and Its Management In Diabetic Patient. *Int J Recent Sci Res,* 6(9), 6347-6350.

International Journal of Recent Scientific Research

ISSN 0976-3031