Original Research Article

Study of prevalence of candida infections of oral cavity in diabetes patients and comparison with the non-diabetics

Mahesh Nikam[1], Mukesh More[2]

[1, 2] Asst Professor, Dept of ENT Surgery, SMBT Institute of Medical science and Research Centre, Nandi Hills, Dhamangaon, Ghoti, Nashik, Maharashtra, India

*Corresponding author

Dr. Mahesh Nikam

Email: drmahesh_nikam@rediffmail.com

Abstract: The common occurrence of fungal infections like Candida infections in patients with diabetes mellitus has been recognized and oral candidiasis in particular is thought to be prevalent among these individuals. The present study was done to Study of prevalence of candida infections of oral cavity in diabetes patients. Seventy-nine diabetic subjects and 60 age and sex matched non-diabetic subjects participated in the present study. The study was done at SMBT medical college and hospital, Ghoti, Nasik, Maharashtra. Out of 79 diabetic subjects 40 were type 1 and 39 were type 2 diabetics. Detailed case history was taken of each participant. The growth of Candida was observed by the smooth, white or creamy colored buttery colonies. After 48 hours of incubation, the number of candida colonies on each plate was enumerated and the number of CFU per ml. of oral rinse derived by using the formula. Statistical analysis was performed with the help of ISM SPSS statistics version 20 using student's t test. Among 60 non-diabetic participants, 38 were males and 22 were female participants. out of 60, only 19 (31.66%) had showed positive oral candida carriage and 68.34 % did not shown oral candida carriage. On comparison of the colony forming unit scores of the males and females participants among the non-diabetics, it was found that males were showing higher CFU scores as compared to females. Similarly, on comparison of the CFU scores of the males and females of the diabetic patients, CFU score was higher among the males as compared to females. It was also found that the diabetics were showing higher percentage of colony forming unit (CFU) scores as compared to non-diabetics. In present study, it was found that the diabetics were showing higher percentage of colony forming unit (CFU) scores as compared to non-diabetics and the scores were slightly higher among the males as compared to females.

Keywords: Candida, Diabetics, Non-diabetics.

INTRODUCTION:

The frequent occurrence of Candida infections in patients with diabetes mellitus has been recognized for many years and oral candidiasis in particular is thought to be more prevalent among this individuals. The carriage of Candida in the oral cavity of diabetic subjects is claimed to be higher [1, 2].

Diabetes mellitus is a common and global epidemic in the new millennium, which is strongly related to lifestyle and economic change, caused chronic hyperglycemia with impairment of carbohydrate, lipid and protein metabolism resulting from defects in insulin secretion and action. The World Health Organization (WHO) has expected an increasing development of diabetes to more than 300 million by the year 2025; particularly, with type 2 diabetes mellitus. However, Type 2 DM was known as an adult-onset of diabetes in the past, but it has dramatically increasing more recently in young people and known for about 90% of the global incidence of diabetes and its complications [3-5].

Diabetes mellitus is a major risk factor for mycotic infections. The fungal infections are difficult diagnostic and therapeutic problems, serious cause of morbidity or mortality in diabetes. The particularly difficult problem makes up mycosis among hemodialysis patients with diabetes and in post-transplant diabetes after kidney transplantation. Also, the main risk factor for fungal infections is diabetes with a pre-existing kidney graft in pancreas transplant recipients. Early diagnosis and effective treatment plays an important role in proceeding to the therapy of mycotic infections [6, 7]. The present study was done to

Study of prevalence of candida infections of oral cavity in diabetes patients.

MATERIALS AND METHODS:

Seventy-nine diabetic subjects and 60 age and sex matched non-diabetic subjects participated in the present study. The study was done at SMBT medical college and hospital, Ghoti, Nasik, Maharashtra. Approval of the ethical committee was taken before start of the study and informed consent was taken from each of the participant. Non-diabetic subjects had fasting and 2 hours post prandial blood sugar estimation. Out of 79 diabetic subjects 40 were type 1 and 39 were type 2 diabetics. Detailed case history was taken of each participant. Routine blood and urine investigations like urine analysis, complete hemogram, and chest x-ray, ECG (in relevant cases) apart from fasting, 2 hr. post-prandial blood sugar, and glycosylated hemoglobin and in a few cases lipid profile were done.

Each of the participants was supplied with a container containing 5 ml of sterile phosphate buffer saline solution and was asked to rinse mouth in the presence of clinician. After rinsing the mouth for about 30 seconds thoroughly, expelled the mouth rinse into a sterile container. Saliva samples were collected in the morning hours between 10 am to 12 pm.

The sample was taken using inoculating loop and spread in a line across the entire Sabouraud's dextrose agar plate. These plates were then incubated at 37^0C for 48 hours. The growth of Candida was observed by the smooth, white or creamy colored buttery colonies. After 48 hours of incubation, the number of candida colonies on each plate was enumerated and the number of CFU per ml. of oral rinse derived by the formula.10

CFU per ml. = 1000 X number of colonies/4.

Statistical analysis was performed with the help of ISM SPSS statistics version 20 using student's t test.

RESULTS:

Among 60 non-diabetic participants, 38 were males and 22 were female participants. out of 60, only 19 (31.66%) had showed positive oral candida carriage and 68.34 % did not shown oral candida carriage. (Table 1)

On comparison of the colony forming unit scores of the males and females participants among the non-diabetics, it was found that males were showing higher CFU scores as compared to females, but the difference was not found to be statistically significant. (Students t test, p>0.05). Similarly, on comparison of the CFU scores of the males and females of the diabetic patients, CFU score was higher among the males as compared to females, but the difference was not found to be statistically significant. (Students t test, p>0.05) (Table 2 and 3, Graph 1 and 2).

It was also found that the diabetics were showing higher percentage of colony forming unit (CFU) scores as compared to non-diabetics. (Table 3)

Table 1: Table showing the oral candida carriage among the male and female participants of diabetic and non-diabetic

Group	Sex	Oral candida carriage	No candida carriage	Total
Non-diabetic	Male	13 (31.33%)	25 (69.67%)	38
	Female	06 (27.27%)	16 (72.73%)	22
	Total	19 (31.66%)	41 (68.34%)	60
Diabetic	Male	32 (78.04%)	09 (21.96%)	41
	Female	20 (71.42 %)	08 (28.58%)	28
	Total	52 (75.36%)	17 (24.64%)	69

Table 2: Comparison among male and female participants of non-diabetic and diabetic of CFU scores

Group	Sex	Number of participants	CFU Mean ± value SD	P value
Non-diabetic	Male	38	99.21 ± 45.32	>0.05
	Female	22	93.34 ± 41.21	
Diabetic	Male	41	986.65 ± 435.56	>0.05
	Female	28	891.54 ± 453.65	

SD= Standard deviation.

Table 3: Comparison of the CFU scores among the non-diabetic and diabetic participants

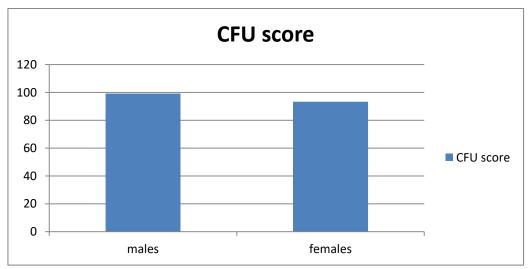| Group	Number of participants	Mean ± SD	P value
Non-diabetic	60	96.275 ± 43.45	<0.001
diabetic	69	939.09 ± 444.33	

Fig 1: Comparison of the CFU scores among the males and females of non-diabetic group.
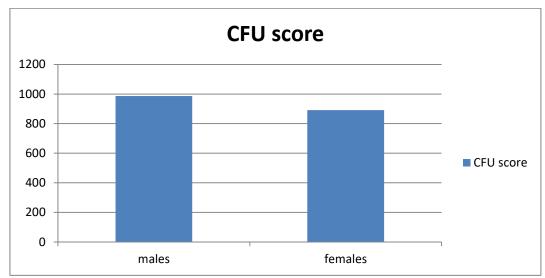

Fig 2: Comparison of the CFU scores among the males and females of diabetic group.

DISCUSSION:

Candida infection (candidiosis or candidiasis) can occur as a side effect of medications such as broad-spectrum antibiotics, antihistamines, chemotherapy or radiotherapy. Other disorders associated with development of xerostomia include diabetes, drug abuse, malnutrition, immune deficiencies, and old age. The manifestation of oral candidiosis (candidiasis) can occur in many different forms and include median rhomboidglossitis, atrophic glossitis, denture stomatitis (stomatitis prothetica), and angular cheilitis. Usually, oral candidiosis is associated with a high density of yeasts in the lesions [8-11].

Candida is present in the oral cavity of almost half of the population and has been shown be prevalent in people with diabetes mellitus as well. Studies have shown a higher prevalence of Candida in diabetic versus non-diabetic individuals. Candida infection is also found commonly in denture wearers. According to a survey of the literature on oral yeast (Candida albicans and other Candida species) isolations from subjects without signs of mucosal diseases the median

carriage rate was 34.4% among healthy adults whereas it was 54.7% in hospitalized patients [11, 12].

From all the best known systemic diseases, diabetes has been the most frequently blamed as a risk factor for oral pathogenic disorders such as candidiosis. The saliva contains a great number of microorganisms (approximately 108 per ml). Most of the microorganisms in the saliva are derived from other parts of the oral cavity such as the teeth and oral mucosal surfaces as a result of mechanical abrasion caused by chewing, talking and swallowing. The microvascular changes and possibly increased glucose concentration in the saliva and gingival crevicular fluid which might contribute in declining pH of saliva resulting in acidogenic microorganism substrate and plaque formation. As a Result of that, the increased growth of acidogenic microorganisms such as Candida albicans will had a prominent role in developing various oral complications [13, 14].

Diabetes is a dangerous disease since the patient's and healthcare promoter's negligence may impair the patient's quality of life and even lead the patient to death. Diabetes is a disease in which the insulin's regulatory activity is defective. This can be a result of decreased amount of insulin that should be secreted, total absence of insulin secretion or the production of antibodies against insulin causing its destruction before it can act in the different areas of the body. In the first two cases there is degeneration or inactivation of beta cells of the Langerhans islets which produce insulin. In the last case, the amount of insulin secreted may be normal but it does not reach its destination [14, 15].

It is established in the present that diabetes predisposes to high oral candidal carriage. If so, the question arises whether control of diabetes mellitus with anti-diabetic therapy, could prevent the carriage of Candida. Further studies on large scale will need to arrive at a definite conclusion.

CONCLUSION:
In present study, it was found that the diabetics were showing higher percentage of colony forming unit (CFU) scores as compared to non-diabetics and the scores were slightly higher among the males as compared to females.

REFERENCES:
1. Samaranayake LP; Host factors and oral candidosis in: oral candidosis. Samaranayake LP, Mac Farlane TW eds. Butterworth & Co. Ltd. 1990:75.
2. Kumar BV, Padshetty NS, Bai KY, Rao MS; Prevalence of Candida in the Oral Cavity of Diabetic Subjects. JAPI 2005; 53:599-602.
3. Lancet T; Diabetes—a global threat. The Lancet, 2009; 373(9677):1735.
4. WHO Technical Report Series. Prevention of diabetes mellitus; Geneva: WHO Publications; 1994.
5. Jafari AA, Khanpayah E, Ahadian H; Comparison the Oral Candida Carriage in Type 2 Diabetic and Non Diabetics. Jundishapur Journal of Microbiology. 2013; 6(7): e8495.
6. Poradzka A, Jasik M, Karnafel W, Fiedor P; Clinical aspects of fungal infections in diabetes. Acta Poloniae Pharmaceutica ñ Drug Research 2013; 70(4):587-596.
7. Krishnan PA; Fungal infections of the oral mucosa. Indian J Dent Res 2012; 23:650-9.
8. Southerland JH, Taylor GW, Offenbacher S; Diabetes and periodontal infection: making the connection. Clinical Diabetes, 2005; 23:171-8.
9. Webb BC, Thomas CJ, Wilcox MD, Harty DW, Knox KW; Candida- associated denture stomatitis: aetiology and management: a review. Part 3. Treatment of oral candidosis. Aust Dent J, 1998; 43: 244-9.
10. Stenderup A; Oral mycology. Acta Odontal Scand, 1990; 48:3-10.
11. Daniluk T, Tokajuk G, Stokowska W, Fiedoruk K, Ściepuk M, Zaremba ML, et al.; Occurrence rate of oral Candida albicans in denture wearer patients. Advances in Medical Sciences 2006; 51(1):77-80.
12. Pallavan B, Venkatapathy R, Balamurali BP, Dhanasekaran NO, Sudip I, Vasupradha G; Comparison and correlation of candidal colonization in diabetic patients and normal individuals. Journal of Diabetes & Metabolic Disorders 2014; 13:66.
13. Akpan A, Morgan R; Oral candidiasis: a review. Postgrad Med J 2012; 78: 455-9.
14. Talabani AN, Kim CL, Kiat AOH, Ismail AR, Chinna K; The prevalence of Candida spp. in the saliva of controlled and uncontrolled diabetes mellitus type II patients. J Bagh College Dentistry 2013; 25(4):171-6.
15. Abu-Elteen KH, Hamad MA, Salah SA; Prevalence of Oral Candida Infections in Diabetic Patients. Bahrain Medical Bulletin 2006; 28(1):1-8.