

Diabetes and Oral Health: A Case-Control Study

JV Bharateesh, Mansoor Ahmed¹, Ganganna Kokila²

Department of Community Dentistry, Sri Siddhartha Dental College and Hospital, Agalakote, Karnataka, India, ¹Department of Community Medicine, Mysore Medical College and Research Institutes, Karnataka, India, ²Department of Oral Pathology, Sri Siddhartha Dental College and Hospital, Agalakote, Karnataka, India

Correspondence to:

Jayanna Vinayak Bharateesh,
Department of Community Dentistry,
Sri Siddhartha Dental College and
Hospital, B.H. Road, Agalakote,
Tumkur-572107, Karnataka, India.
E-mail: bharteshmids1973@yahoo.com

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ABSTRACT

Background: Diabetes mellitus, according to World Health Organization (WHO) is a silent epidemic which affects large number of people around the world and is directly related to the oral health status of the patients.

Objectives: To know the prevalence of common dental diseases such as dental caries, periodontal diseases (pyorrhea), and treatment needs in a group of adult diabetic patients in private medical establishments of Tumkur city, south India, in comparison with non-diabetic patients. To create awareness among general medical practitioners about the common oral manifestations of diabetes and the importance of periodical dental check up for diabetics.

Methods: A group of 300 diabetic patients (males = 186, females = 114) and a control group of 300 non-diabetics (males = 180, females = 120) matched by age and sex were examined according to WHO criteria, for a period of eight months.

Results: The prevalence of dental caries was comparatively more in non-diabetics (32.3%) than in diabetics (13.6%). However, the prevalence of periodontal diseases (pyorrhea) was more in diabetics (92.6%) when compared to non-diabetics (83%).

Conclusions: Oral health is an integral part of general health. Though dental caries was comparatively low in diabetics, periodontal status was compromised. Complex treatment needs was more in the diabetics (58%) when compared to controls (41%). Regular follow-up of dental problems of the diabetics and oral health education is much required.

Key words: Dental caries, diabetes, oral health awareness, pyorrhea

INTRODUCTION

According to the (WHO), at least 220 million people or 2.8% of the population worldwide suffer from diabetes. Its incidence is increasing rapidly, and is estimated that by the year 2030, this number will almost double. The greatest increase in prevalence is expected to occur in Asia and Africa. The increase in incidence of diabetes in developing countries follows the trend of urbanization and lifestyle changes.^[1]

Diabetes can lead to changes in the oral cavity such as gum-

related problems like gingival hyperplasia and periodontitis (pyorrhea). Other diabetes-related oral conditions include dental decay, candidiasis, and glossodynia. Some individuals may notice a fruity (acetone) breathe and others report xerostomia.^[2,3]

Unfortunately, caring for the oral cavity is often overlooked when trying to control other problems associated with diabetes which may contribute to hidden morbidity and undue suffering from oral health problems. Hence, the study was an attempt to know the oral health status and treatment needs in diabetics and to create awareness of oral health problems among general practitioners.

METHODS

A case control study was conducted on group of randomly selected, consenting adult 300 diabetics (186 males, 114 females) and 300 non-diabetics (180 males, 120 females) in the age group of 35 to 74 years visiting private medical establishments of Tumkur city, Karnataka, South India, over a period of eight months from February to August, 2010. Oral health status of the diabetics and non-diabetics was examined according to established WHO criteria and recorded in a pretested WHO proforma (Oral Health Assessment Form 1986).^[4] Other details of study and control groups including demographic data, past dental history, medical history, and oral hygiene practices were recorded. The examination was done using artificial light with a mouth mirror and CPITN (Community Periodontal Index Treatment Needs) probe. The control group consisted of dentate patients matched by age and sex and who had no known disease and

used no medication. Since the number of diabetics dependent on insulin was less in number, they were studied along with the non-insulin-dependent diabetic patients.

Statistical analysis was done using chi-square test for comparison of proportions between the two groups.

RESULTS

The age range of population studied was 35 to 74 years with mean age 47.40 ± 10.89 years. Among the 600 people examined, females were 39% and the males were 61% [Table 1].

Dental caries assessment

The prevalence of dental caries was 13.6% and 32.3% ($P < 0.001$) in diabetics and non-diabetics, respectively. The percentage of subjects with at least one missing tooth was 57.3% and 45.3% in diabetics and non-diabetics, respectively. The percentage of subjects with at least one filling was higher in non-diabetics at 27% when compared to diabetics at 10% [Figure 1].

Assessment of periodontal status (pyorrhea)

The prevalence of periodontal diseases was 92.6% among the diabetics and 83% among the non-diabetics [Figure 2]. About 47% of diabetics and 30% of non-diabetics were found to have CPITN score 4 (severe gingival recession and mobility) ($P < 0.032$).

Assessment of treatment needs

Treatment needs were assessed among diabetics and non-diabetics, oral hygiene instructions

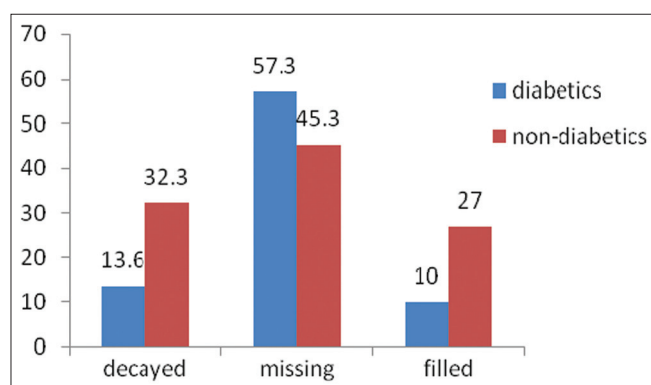


Figure 1: Prevalence of dental caries among diabetics and non-diabetics

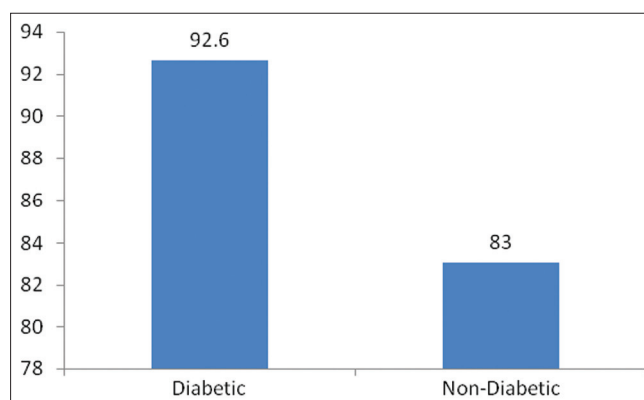


Figure 2: Prevalence of periodontal disease among diabetics and non-diabetics

Table 1: Distribution of study population according to age and gender

Age group in years	Diabetics				Non-diabetics				Total	
	Male		Female		Male		Female		n	%
	n	%	N	%	n	%	n	%		
35-44	29	15.5	11	9.6	27	15	14	11.6	81	13.5
45-54	98	52.6	68	59.6	92	51.1	78	65	336	56
55-64	39	20.9	19	16.6	40	22.2	21	17.5	119	19.8
65-74	20	10.7	16	14	21	11.6	7	5.8	64	10.6
Total	186	100	114	100	180	100	120	100	600	100

Contingency coefficient = 0.135; $P < 0.083$

Table 2: Distribution of treatment needs in diabetics and non diabetics

Treatment needs	Diabetics		Non-diabetics		χ^2	P value
	n	%	N	%		
TN 1	300	100	291	97	0.137	0.711 (NS)
TN 2	289	96.3	278	92.6	0.213	0.644 (NS)
TN 3	174	58	123	41	8.758	0.003 (S)

Contingency coefficient = 0.062; $P < 0.001$, TN: Treatment needs

(Treatment need 1) were required for all diabetics (100%) and a majority of the non-diabetics (97%). Oral prophylaxis (professional cleaning) and/or removal of overhanging fillings (Treatment need 2) were needed in 96.3% of diabetics and 92.3% of non-diabetics. Complex treatments which include periodontal surgery (Treatment need 3) were required in 58% of diabetics and 41% of non-diabetics [Table 2].

DISCUSSION

In our study, prevalence of dental caries was found to be comparatively lower in diabetics than in non-diabetics. Similar results are reported by Bacic *et al.*^[5] who did a study on the oral health status of a group of adult diabetic patients. The reason may be the diet of diabetics, which consists of high protein content and limited fermentable carbohydrates as compared to the diet of non-diabetics, making the diabetics less prone to dental caries.^[6,7]

In the present study, prevalence of periodontal diseases was more in diabetics than among non-diabetics. Similar results were reported by Matu *et al.* in 2009 in his study of periodontal diseases among diabetic patients in South Africa.^[8] Glickmann in 1862 described the oral symptoms of diabetes mellitus as a systemic promoting factor creating suitable conditions producing gingivitis and

periodontitis.^[9] Epidemiological research indicates that diabetes increases the risk of periodontal diseases.^[10] In the present study, the prevalence of at least one missing tooth was higher in diabetics compared to non-diabetics. This may be due to the progression of gum recession which causes alveolar bone resorption and makes the tooth mobile.^[7]

All levels of treatment needs were found to be high in diabetics than in non-diabetics in our study. These findings did not agree with that of Bacic and Plancak^[11] who found lower treatment needs in both the groups. The reason may be difference in awareness and motivation of patients toward dental treatment and patient's perception of the dental treatment needs in different societies.

The increased prevalence and severity of periodontitis typically seen in diabetic patients, with poor metabolic control, has led to the designation of periodontal diseases as the "sixth complication of diabetes mellitus."^[12] American Diabetes association has officially recognized that periodontal disease is common in patients with diabetes and the Association's standards of care, includes taking a history of current or past dental infections as part of the physician's examination.^[13,14]

Periodontitis (pyorrhea) is a Gram-negative infection which may result in severe inflammation with potential intravascular dissemination of micro-organisms and their products throughout

the body. However, periodontitis tends to be a “silent” disease until destruction results in acute symptoms. Most patients, as well as many medical professionals do not recognize this potential source of infection that may exist within the oral cavity.^[9]

Presence of chronic diseases has been found to be associated with lower physical scores of perceived health status.^[15] So, it's been suggested that adherence to prescribed medications and diary checklists about how they took their drugs can be effective method of secondary prevention in chronic diseases like diabetes mellitus.^[16]

CONCLUSION

Diabetes mellitus in the near future may be regarded as one of the most dreaded and silent epidemic health problems, especially in the developing countries. But, very few health professionals and patients have an idea of the implications of diabetes on oral health. This contributes to an ever increasing burden of underlying, undiagnosed, and untreated morbidity in the community. Therefore, it is necessary to make the health professionals and the patients aware of the magnitude of problem and chalk out proper preventive procedures.

Within the limitations of the study, it was found that, though the prevalence of dental caries was low in the diabetics when compared to non-diabetics, the periodontal health of the diabetics was compromised. Unmet treatment needs were more in the diabetics when compared to non-diabetics.

Suggestions

Health professionals should be educated about the common oral manifestations of diabetes. Diabetics should be educated about the oral health implications of diabetes and encouraged to meet dentists on a regular basis and more frequently than the non-diabetics to seek active and continued care for their problems in order to have a satisfactory prognosis and an improved quality of life.

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