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Comparative evaluation of periodontal status among diabetic and non-diabetic population in davangere city: A cross-sectional study

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Abstract

Background: Systemic disease like diabetes exerts general effects throughout the body and modulates periodontal disease expression. Objective of the study was to assess and compare the prevalence and severity of periodontal disease among 25-64 years old diabetic and non diabetic population in Davangere city.

Methods: A cross sectional comparative study was conducted among 25-64 years old, 210 diabetic and 300 non diabetic subjects in Davangere city. Relevant and required information regarding demographic characteristics and diabetic status was obtained. Community Periodontal Index (CPI) and Loss of Attachment Index (LOA) were used to assess the periodontal status. Chi-Square test, Z-test and Multiple Logistic Regression Analysis were used for statistical analysis.

Results: There was a highly significant association between diabetic status and periodontal status ($p < 0.001$). Severity of periodontal disease (Community Periodontal Index code '4' and Loss of attachment code '1') was high among diabetics compared to non diabetics ($p < 0.001$).

Conclusion: The findings of this study suggest that diabetes contributes to severity of periodontal disease and underlines the need for preventive services for diabetic community, tailored to improve their glycemic control which contributes to prevention of diabetic periodontopathy.

Keywords: Diabetics, periodontal status, loss of attachment

1. Introduction

With increasing life expectancy of Indian population, oral health is bound to play a major role in improving the quality of life. In developing countries, the trend indicates an increase in oral health problems especially dental caries, periodontitis, malocclusion and oral cancer. Periodontitis is the most prevalent oral disease affecting almost 90% of the population and is also the most frequent cause of tooth loss in India^[1]. Systemic disease like diabetes exerts general effects throughout the body and modulates periodontal disease expression. Available literature reveals that in India, diabetes has raised to epidemic proportions. India alone accounts for more than 35.5 million diabetics. It is being speculated that by 2025, India will become the 'Diabetes Capital' of the world^[2]. Diabetic periodontopathy is one of the greatest dilemmas confronting the modern day dentist and aptly periodontitis has been considered as the sixth complication of diabetes^[3]. Although evidence linking diabetes and periodontal disease is strong, the relationship between the two diseases is not completely clear. This may be due to the complex nature of both the diseases. Hence, research trying to disclose the extent of relationship between diabetes and periodontal disease has its own importance. Available literature reveals relative scarcity of Indian studies in this perspective. Hence, an attempt was done to comprehensively assess and compare the periodontal status of diabetic and non diabetic population in Davangere city.

2. Methods

The present study was a cross-sectional, comparative study conducted to assess and compare the periodontal status of 210 diabetic and 300 non diabetic subjects belonging to 25-64 years age group residing in Davangere city, India. The proposed study was reviewed by the ethical committee of Bapuji Dental College and Hospital, Davangere and clearance was obtained. Voluntary written informed consent was obtained from every subject participating in the study.

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A specially prepared and pretested format, exclusively designed for recording all the required and relevant general information, clinical findings and laboratory findings was used for recording the data. The periodontal status was assessed using Community Periodontal Index and Loss of Attachment index (According to WHO Oral health survey Basic Methods, 1997)^[4]. The clinical examination for every subject was comprehensively carried out by investigator herself who was calibrated prior to conducting the study.

A total sample size of 500 was calculated based on a diabetic prevalence rate of 12.1% from a national survey with allowable error of 20% (5% risk) using the statistical formula, $n = 4pq/L^2$. The sampling methodology adopted was the purposive or deliberate sampling. The study sample consisted of 210 known diabetic patients (residents of Davangere city) aged 25-64 years, with minimum of fourteen functional teeth in the oral cavity and with 5 years of minimum duration of diabetes visiting a diabetic center, a hospital and a laboratory in Davangere. Patients who were pregnant or with concurrent infections, myocardial infarction and on drugs like diazoxide, thiazides, phenytoin, steroids and hormones were excluded from sample. Control group consisted of 300 non diabetic subjects all residents of Davangere who were spouses/friends of diabetic patients with no family history of diabetes. The selected subjects were of similar age and sex as the study group with no history of systemic diseases, concurrent infections and pregnancy. Those subjects who were on antimicrobial medication and those who had undergone any periodontal therapy during past six months were excluded from the study.

Before the start of clinical examination, information related to patient's identification, their socio demographic details and diabetes was recorded. All subjects participating in the study were assessed for fasting blood glucose levels. Subject was diagnosed of having diabetes if his/her fasting venous blood glucose level was ≥ 126 mg/dl with symptoms of diabetes such as polyuria, polydipsia or weight loss. The examination was conducted in the hospital/diabetic centre/diagnostic lab. Clinical examination of the study subjects included recording of number of teeth present, teeth missing, Oral Hygiene Index, Community Periodontal Index and Loss of Attachment Index. Statistical analysis was done using computer with SPSS (Version 12) USA, and Cystat software. Significance level was fixed at $p \leq 0.05$. Statistical tests employed were Chi-square test, Z-test and multiple logistic regression analysis.

3. Results

Mean number of healthy sextants (CPI Code 0) affected per subject was more in non diabetics than diabetics. Mean number of sextants with bleeding on probing was lesser in diabetics than non diabetics. The difference between mean number of sextants scoring calculus between diabetic and non diabetic group was statistically highly significant ($Z=5.93$, $p<0.001$). No significant difference was found with respect to the mean number of sextants scoring shallow pockets between diabetic and non diabetic group. Mean number of sextants with deep pockets and excluded sextants were significantly higher in diabetic group when compared to non-diabetic group ($p<0.001$). (Graph 1).

The mean number of sextants per person affected with loss of attachment code '0' was significantly lesser in diabetic group than non-diabetic group ($p<0.001$). Mean number of sextants affected by loss of attachment code '1' was significantly more in diabetic group when compared to non diabetic group

($Z=7.7$, $P<0.001$). The difference between mean number of sextants affected by loss of attachment code '2' among diabetic and non diabetic group was highly significant ($p=0.001$). Difference between mean number of sextants affected by loss of attachment code '3' between diabetics and non diabetics was not statistically significant ($p=0.22$). No sextant coded '4' either in diabetic group or in non-diabetic group. Mean number of excluded sextants was significantly more in diabetic group when compared with non-diabetic group ($p<0.001$). (Graph 2). Mean number of missing teeth per person was significantly more in diabetic subjects when compared with non-diabetics ($p<0.001$). (Graph 3)

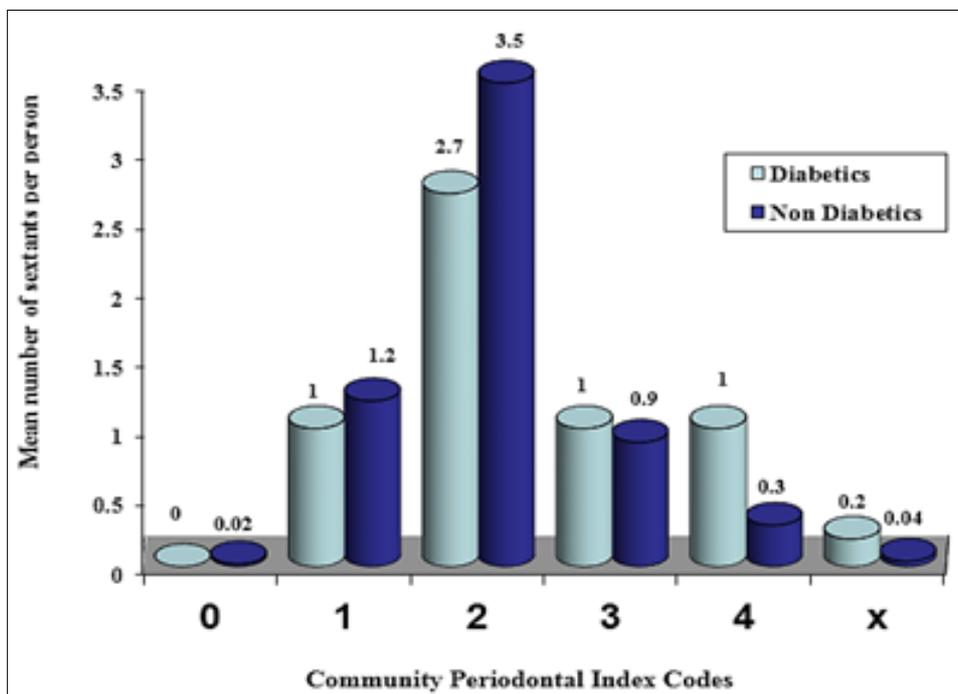
4. Discussion

In the present study, an attempt was done to assess and compare the periodontal status of diabetic and non diabetic population in Davangere city. Community Periodontal Index and Loss of Attachment Indices were used to assess the periodontal status. They are the standard indices used to assess the periodontal health status in epidemiological studies as recommended by WHO^[4]. The mean number of healthy sextants per individual was more in non diabetics than diabetics. This may be due to high prevalence of periodontal disease among the population influenced by local factors like poor oral hygiene. The difference in mean number of sextants with bleeding on probing (community periodontal index code '1') between diabetic and non-diabetic group was not significant. Similar finding was observed in few cross sectional comparative studies^[5, 6]. Bleeding on probing was more common and frequent among diabetics compared to non diabetics in some studies^[7, 8]. This may be due to difference in oral hygiene status among diabetics and non diabetics which is certainly a confounding factor. Significant difference was found between mean number of sextants with calculus for diabetics and non diabetics ($p<0.001$). Calculus (CPI Code 2) was less among diabetics than non-diabetics. These results are basically because of the methodology employed in community periodontal index. This should not be taken into consideration because there might be many sextants with calculus concomitantly having shallow and deep pockets which are assigned higher codes of CPI 3 and CPI 4 respectively. Difference in mean number of sextants with shallow pockets between diabetics and non-diabetics was not statistically significant. Similar finding was observed in some cross-sectional comparative studies^[9, 10]. However, contradictory finding was seen in some studies where shallow pockets were more frequent among diabetics compared to non-diabetics^[7, 8]. Mean number of sextants per person with deep pockets in diabetics was more compared to non diabetics. Similar finding was seen in a study where CPITN index was used to assess the periodontal status of study subjects^[11].

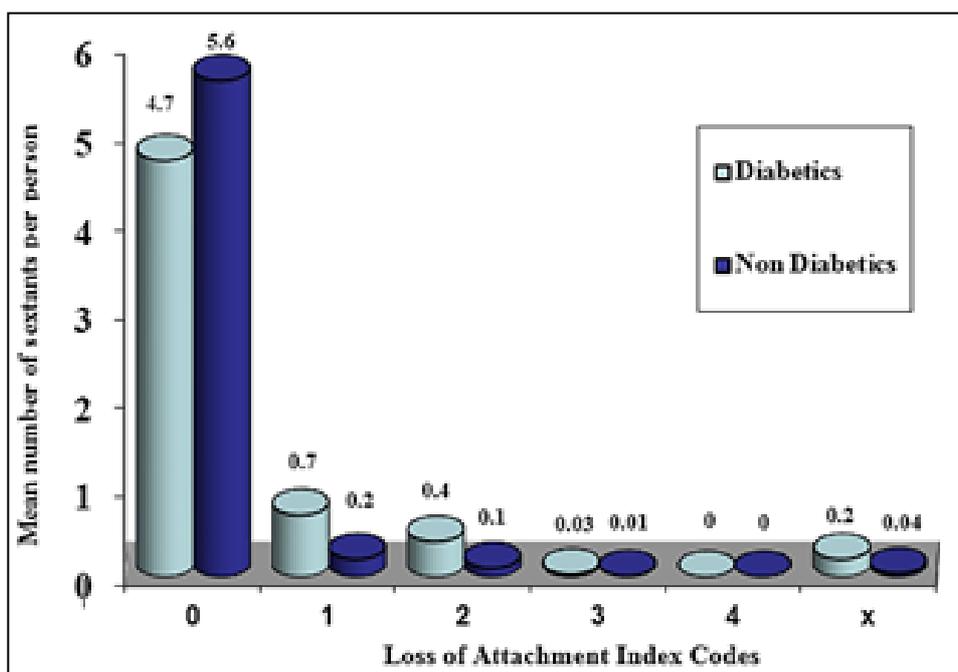
The mean number of excluded sextants per person was found to be significantly higher in diabetics than in non-diabetics. Few studies show similar finding^[7, 11]. This finding might be attributed to increase in the severity of the destructive periodontitis culminating in loss of teeth. This study shows that the severity of loss of attachment was more among diabetics than non-diabetics as seen in some studies.^[7,12] However, certain studies could not show any differences in degree of loss of attachment among diabetics and non-diabetics.^[5,13] This may be due to younger age group and shorter duration of diabetes among diabetic subjects in these studies. However, well controlled diabetics exhibit periodontal status similar to that of non diabetics.

Multiple logistic regression analysis showed that, periodontal status (According to Community Periodontal Index code and Loss of Attachment Index code) was significantly associated with diabetes ($p < 0.001$) and other independent variables like age ($p < 0.001$), oral hygiene aids used ($p = 0.02$), frequency of tobacco consumption ($p = 0.03$) and oral hygiene status ($p = 0.05$). Few cross-sectional studies utilizing regression analysis have concluded that periodontal status was significantly associated with variables like age, sex, education, calculus and metabolic control of diabetes.^[14] Attachment loss was significantly associated with diabetes, age and amount of calculus^[15].

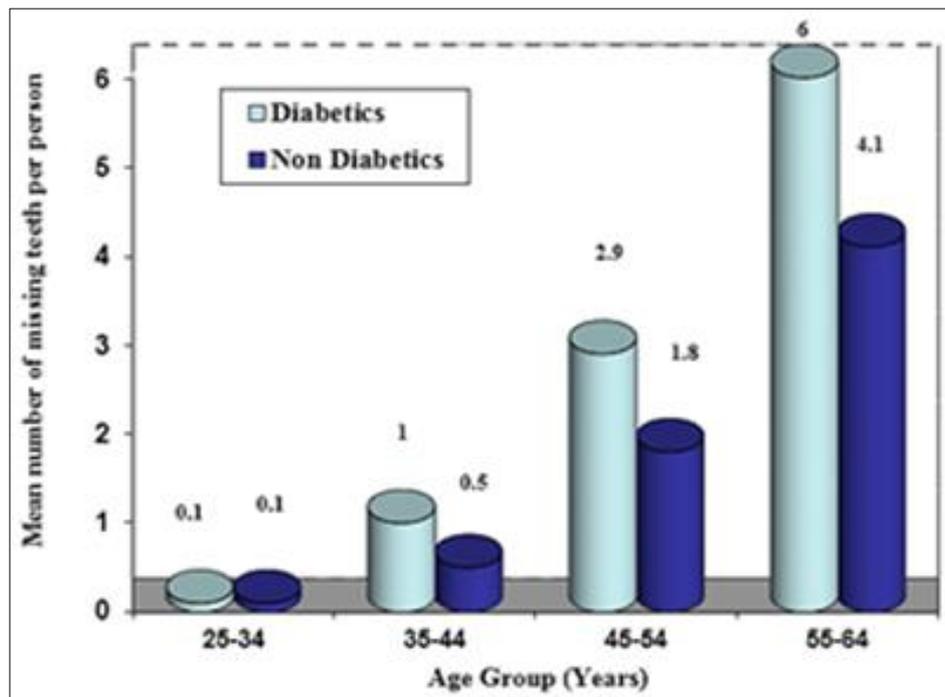
The findings of present study suggest that periodontal disease is more severe and advanced in diabetics when compared to non diabetics. Similar findings were observed in some cross-sectional comparative studies^[6, 7, 8, 11, 16]. However few studies did not show any difference in periodontal status among diabetics and non-diabetics^[17, 18]. Totally valid comparisons could not be done between present study and other studies reported in the literature due to wide variations observed with respect to selected age groups, applied indices and the methodological differences. However, a sincere attempt is done to compare and discuss to the extent permissible and possible.



Graph 1: Shows distribution of mean number of sextants per subject with different Community Periodontal Index codes



Graph 1: Shows distribution of mean number of sextants per subject with different Community Periodontal Index codes



Graph 3: Shows distribution of study population based on mean number of missing teeth per person according to different age groups

5. Conclusion

More diabetic subjects were affected by severe degree of periodontal disease manifested as deep pockets and excluded sextants while among non diabetics, more subjects were affected by relatively lower degree of disease manifested as bleeding.

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