



Assessment of Periodontal disease status in type 1 diabetic and non- diabetic subjects aged 6 to 17 years in Bengaluru, India

Dental Science

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ABSTRACT

Background: Type 1 Diabetes Mellitus has oral health implications

Aims: The present study aims to assess and evaluate difference in the periodontal disease burden and oral hygiene practices amongst Type 1 diabetic and non-diabetic subjects aged 6 to 17 years.

Methods and Material: The study comprised 108 type 1 diabetics and 216 age and sex matched non-diabetic subjects, the evaluation of periodontal status was done using the periodontal disease index. Student's t test, chi-square, fisher exact test and regression analysis was used for statistical analysis.

Results: Diabetic subjects had significantly higher scores of PDI index ($p < 0.01$) when compared to the non-diabetic subjects.

Conclusions: Poor glycaemic control and inadequate oral hygiene practices in type 1 diabetics increases periodontal disease burden.

KEYWORDS

Diabetes Mellitus, Type 1; Periodontitis; Oral Hygiene, Glycaemic control.

INTRODUCTION:

Type 1 Diabetes Mellitus has a serious short term and long term implications, it accounts for 5 – 10% of all cases of Diabetes in India. Knowledge of oral and general health co-morbidity among individuals with diabetes is generally poor and suggests the need for appropriate health education and health promotion to improve the oral health of type 1 diabetic subjects.⁽¹⁾

Poor metabolic control of type 1 diabetes further leads to the deposition of advanced glycation end products in the body tissues as a result of hyperglycaemia which can alter the phenotype of macrophages and other cells via a specific cell-surface receptor. Macrophages are transformed into cells with a destructive phenotype, producing pro-inflammatory cytokines in an uncontrolled fashion.⁽²⁾ Type 1 diabetes mellitus is one of the most common endocrine and metabolic conditions occurring at a young age; incidence is rapidly increasing especially among children and adolescents who are unable to cope emotionally and psychologically with their condition.^(3,4)

Studies related to the prevalence of type 1 diabetes and its oral implications are meagre. The aim of the present study was to understand the periodontal disease burden, oral hygiene practices, impact of sex, age, glycaemic control and duration of diabetic condition in type 1 diabetic subjects as and compared with to non-diabetics aged 6–17 years old.

Material and Methods:

A cross sectional analytical study was conducted in order to evaluate periodontal disease status in two groups of 6-17 years old Type 1 diabetic subjects and compared with another group of age and sex matched non-diabetic subjects visiting the outpatient department of a Paediatric hospital. A specially designed Proforma was used to collect information on patient's demographic details, oral hygiene practices, and duration of type 1 diabetes, information regarding the HbA1c level in the tests done not more than 15 days ago was collected, among the study participants. Sample size was estimated to be 100 in each group based on considering 95% confidence interval with 5% margin of error.

The study comprised of 108 type 1 diabetic subjects and 216 age and sex matched non-diabetic subjects as controls. The ethical clearance

was obtained from the institutional ethical clearance committee of AECS Maaruti College of Dental Science and Research Centre. Informed consent was obtained from the parents of the participants before the start of the examination. The subjects were selected by using simple random sampling method, the exclusion criteria for the diabetic group included type 1 diabetic subjects who underwent oral prophylaxis in the last six months prior to the assessment, presence of any serious pathology related to oral cavity, patients on antibiotic therapy and subjects who are suffering from any other serious systemic disease other than type 1 diabetes. The oral examination of all diabetic and non-diabetic subjects was carried out by the principle investigator after due calibration. The evaluation of periodontal disease status was done using periodontal disease index (Ramfjord index) given by Sigurd P. Ramfjord in 1959. All the details were recorded in a specialized designed Proforma. A pilot study on 20 type 1 diabetic subjects and 20 controls was performed in the month of April 2012, for five successive days after initial calibration of the examiner. The pilot study assessments were utilized for planning and execution of the main study.

The clinical examination involved visual and tactile inspection of the oral cavity using a mouth mirror and CPITN probe under adequate light conditions. Significance is assessed using 1% level of significance. Student t test (two tailed, independent) and Chi-square tests have been used to find the significance of study parameters on categorical scale between two or more groups. Multiple logistic regression analysis is used in order to predict the oral disease burden which forms the outcome variable based on the various independent predictor variables. The Statistical software namely SPSS 15.0, Stata 10.1, MedCalc 9.0.1 were used for the analysis of the data.

Results:

The study and control participants were age matched, 111 (53.3%) belonged to the age (6-11 years) among the Non-diabetic subjects and 72 (67%) among the diabetic subjects. In the age group of (12-17 years), 60 (56.1%) were present among the diabetic subjects and 105 (46.7%) in non-diabetic subjects. The groups were age matched ($P = 0.986$). There were 53 (49.5%) males and 55 (50.4%) females among diabetic subjects, the non-diabetic group comprised 110 (52.7%) males and about 106 (47.3) female subjects. (Table 1).

Table 1. Showing demographic details of the study participants.

Demographic details	Type 1 Diabetic subjects		Nondiabetic Subjects	
	Numbers	%	Number	%
Age in years				
6-11yrs	72	67%	93	53.3
12-17	36	33%	105	46.7
Gender distribution				
Male	53	49.5	110	52.7
Female	55	50.1	106	47.3
Total	108	100	216	100

Both the groups were age (P=0.986) and sex (P=0.620) matched.

The difference in frequency of cleaning between diabetic subjects and non-diabetic subjects was significant. (P<0.001). (Table 2).

Table 2. Showing details of oral hygiene practices of the study subjects.

Oral hygiene practices	Type 1 Diabetic subjects		Non-diabetic subjects		P value
	No	%	No	%	
Type of cleaning and material used					
Toothbrush and Toothpaste	75	70.09%	182	82.3%	0.507
Use of Dental Floss	11	11.3	26	12.7	0.725
Use of Mouth wash	22	20.1	90	40.0	0.001
Frequency of cleaning					
Once a day	97	89.1	169	78.2	<0.001
Twice a day	11	10.9	26	12	
After every meal	0	0	21	9.8%	
Don't clean everyday	-	-	-	-	

The glycosylated haemoglobin count at or higher than 7% A1c (152mg/dl) was significantly associated with deep periodontal pockets (P<0.001). There were 18 subjects suffering from less than 3 years. Majority (79) of diabetic subjects were having this condition between 3-6 years. There were also 21 subjects suffering for more than 6 years. The mean Periodontal index score among males was 1.83±0.96 in type 1 diabetic group compared to 1.14±0.38 in non-diabetic group the difference was statistically significant (P<0.001). (Fig 1). The Periodontal index score in females was 1.93±0.75 in study group compared to 1.38±0.62 in Control group the difference was statistically significant (P<0.001). It was clear from the results obtained that periodontitis score was significantly higher amongst males, increased duration of diabetic condition and increase in age. (Table 3).

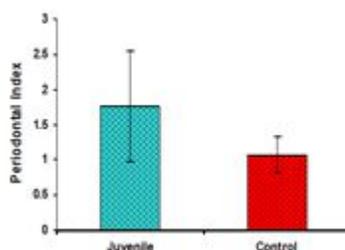


Fig. 1: Comparison of Periodontal disease component score

Table 3. Percentage distribution of different periodontal disease index (PDI) scores among both Cases and Controls groups

Periodontal disease index scores	Study group		Control group	
	No	%	No	%
Score 1	0	0	66	30.50
Score 2	35	31.7	118	54.62
Score 3	56	52.3	26	12.03
Score 4	13	12.1	6	2.17
Score 5	4	3.7	0	0
Score 6	0	0	0	0
Total	107	100	216	100
Mean ± SD	1.88±0.76		1.25±0.52	
Inference	Mean Periodontal disease Index scores is significantly more associated with Cases when compared to Controls .			

Discussion:

The unfavourable knowledge with regards to the oral hygiene practices was due to complete neglect of oral health and more emphasis on the systemic implications of type 1 diabetes mellitus. In contrast to this, previous study has reported that use of fluoridated toothpaste, brushing more than once in a day was equally distributed among the diabetics and their healthy non-diabetic subjects, whereas knowledge regarding dental floss and mouthwash was significantly higher among the diabetic subjects unlike the findings demonstrated in the present study.⁽⁵⁾

The mean periodontal disease index scores were significantly more associated with diabetic subjects when compared to non-diabetic subjects (p<0.001). A study reported the prevalence of periodontitis 90% in diabetics aged 19 years.⁽⁸⁾ In consistent with these studies our study observed almost 95% prevalence of periodontal involvement. Another Swedish study conducted on Type 1 diabetic population showed that female type 1 diabetics had better dental health than male counterparts; these findings are in line with the observations in the present study.^(6,7,8)

Periodontitis is a risk factor for poor glycaemic control and development of other clinical implications in diabetes mellitus. Visits to an endocrinology department was associated with improved oral health status and reduced dental service needs.⁽⁹⁾ High blood glucose sustained over time appears to give rise to a situation of chronic inflammatory mediator secretion, and thus to an exaggerated periodontal response. However, from the opposite perspective, it could be postulated that the severity of periodontitis could affect control of diabetes mellitus despite adequate integral treatment and patient cooperation.^(10,11)

Conclusions:

There is a need to include oral health awareness programs in these periodic health awareness talks, which should include awareness related to co morbidity of oral and general health. However the present study has some limitations, the study group was selected in the hospital set up. When the study was carried out we noticed several other mucosal diseases like lichen planus, candidiasis and dry mouth. Further studies should be conducted to record these findings. Longitudinal multicentre clinical studies should be performed to make more meticulous evaluation of pathological processes in these Type 1 diabetic patients.

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