

A Preliminary Investigation of Periodontal Disease and Diabetes in Trinidad

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ABSTRACT

Objectives: To describe periodontal disease status in diabetic patients in Trinidad.

Method: A cross-sectional study was conducted. Patients attending a tertiary referral centre for diabetes at an out-patient clinic were invited to undergo oral examinations. The basic periodontal examination (BPE) was used to assess periodontal disease status.

Results: Seventy-two patients participated in the study. Mean age was 55.7 years, 54.2% were female, with 66.7% and 22.2% being of Indo-Trinidadian and Afro-Trinidadian ethnicity respectively. There were 61.1% who had not attended for dental treatment within the last year and 56.9% only attended when in pain; 15.3% had a history of cigarette smoking and 31.9% currently wore a denture. Plaque was detectable with the use of a probe in 40.3% of the 67% that underwent a BPE assessment; 38.8% were found to have advanced periodontal disease.

Conclusion: The prevalence of periodontal disease in this sample of diabetic patients suggests that regular dental examinations, oral health education, and collaborative patient care between medical and dental practitioners should form part of the routine management of diabetic patients in Trinidad.

Keywords: Diabetes Mellitus, oral health, periodontal disease, West Indies

Una Investigación de la Enfermedad Periodontal y la Diabetes en Trinidad

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RESUMEN

Objetivos: Describir el estado de la enfermedad periodontal en los pacientes diabéticos en Trinidad.

Método: Se llevó a cabo un estudio transversal. Un número de pacientes que asistían a un centro terciario de remisión terciario para la diabetes en una clínica ambulatoria, fue invitado a recibir exámenes orales. Se usó el examen periodontal básico (EPB) para evaluar el estado de la enfermedad periodontal.

Resultados: Setenta y dos pacientes participaron en el estudio. La edad promedio fue 55.7 años, 54.2% fueron hembras; 66.7% y 22.2% fueron de etnicidad indotrinitense y afrotrinitense respectivamente. Hubo un 61.1% que no habían asistido para recibir tratamiento dental en el último año, y 56.9% que sólo asistieron cuando tuvieron dolor; el 15.3% tenía una historia de hábito de fumar cigarrillos, y el 31.9% usaba una prótesis dental. La placa era detectable usando una sonda dental en el 40.3% del 67% que recibió la evaluación del EPB, en tanto que se halló que el 38.8% tenía la enfermedad periodontal en estado avanzado.

Conclusión: La prevalencia de la enfermedad periodontal en esta muestra de pacientes diabéticos indica que los exámenes dentales regulares, la educación para la salud oral, y el cuidado colaborativo

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entre pacientes y trabajadores de la salud dental, deben formar parte del manejo de los pacientes diabéticos en Trinidad.

Palabras claves: Diabetes mellitus, salud oral, enfermedad periodontal, West Indies

West Indian Med J 2011; 60 (1): 87

INTRODUCTION

The World Health Organization (WHO) describes diabetes mellitus as a chronic disease that occurs when the pancreas does not produce enough insulin, or alternatively, when the body cannot effectively use the insulin it produces. Hyperglycaemia is a manifestation of uncontrolled diabetes and over time leads to serious damage to various organs in the body, especially the nerves and blood vessels. It is estimated that more than 180 million people worldwide have diabetes and this number is likely to more than double by 2030 (1).

In the Caribbean, a region where there has been a shift from infectious diseases toward chronic and lifestyle related diseases, diabetes mellitus has become one of the leading chronic health problems. It contributes significantly to morbidity and mortality and adversely affects both the quality and length of life (2). In 2000, diabetes mellitus was the third leading cause of mortality in the Caribbean region, accounting for approximately 10% of all deaths; those aged 45–64 years were particularly affected (2).

In 2001, Barcelo and Rajpathak found that among persons 35–64 years old in Trinidad and Tobago, over 10% of the population had diabetes (3); also 12% of adults aged 25 years and over attending health centres in north Trinidad had diabetes (4). The International Diabetes Federation has projected that by the year 2025, 11.8% of the population will be diagnosed with Type 2 diabetes in Trinidad and Tobago (5). Periodontal disease is dental plaque induced inflammation of the epithelium, connective tissue and supporting alveolar bone around the teeth (6, 7), diabetes mellitus increases the risk of developing periodontal disease in a manner that cannot be explained purely on the basis of age, gender or oral hygiene levels (8), possibly by altering the nature of the inflammatory response to dental plaques (9). Furthermore, it has been reported that periodontal disease may also adversely affect glycaemic control, increasing the risk of diabetic complications (10).

There is no report on dental evaluation of diabetic patients in the Caribbean. The aim of this study was to describe periodontal disease status in a sample of diabetic patients in Trinidad.

SUBJECTS AND METHOD

The sampling frame for this study comprised patients attending a specialist diabetic out-patient clinic within a general hospital in the north of the Island. One-hundred consecutive patients attending the clinic were invited to undergo oral examinations. Those who were edentulous or had any

pre-existing medical conditions, which was a contraindication for periodontal probing (*eg* infective endocarditis), were excluded from the study.

A short questionnaire was used to determine the patients' demographics, medical and dental history, frequency and reason for dental attendance and denture hygiene practices, where applicable. This was conducted in a face-to-face interview before the examination of the mouth. The latter was undertaken by one dentist (RB) and involved recording the patients' visible plaque score using the plaque index of Silness and Loe (11) and an overall assessment of their periodontal health using the Basic Periodontal Examination (BPE). The BPE criteria and coding were based on that described by Ziada *et al*, together with their description of periodontal disease severity based on the BPE codes (12) [Table 1]. Using mouth sextants, the BPE score was recorded

Table 1: Summary of codes used in BPE and their clinical description

| Code | Examination Findings | Clinical Condition |
|------|---|--|
| 0 | No pockets exceeding 3 mm, no calculus or overhangs and no bleeding on gentle probing | Periodontal health |
| 1 | Coloured band remains totally visible, indicating no pockets exceeding 3 mm, no calculus or overhangs but bleeding present on gentle probing | Gingivitis |
| 2 | Coloured band remains totally visible, indicating no pockets exceeding 3 mm, but calculus or other plaque-retentive factors found at or below the gingival margin | Gingivitis complicated by local risk factors |
| 3 | Coloured band on probe remains partially visible when inserted into the deepest pocket, indicating pocket depths greater than 3.5 mm but less than 5.5 mm | Mild periodontitis |
| 4 | Coloured band on probe disappears, indicating a pocket of at least 6 mm in depth | Moderate or advanced periodontitis |
| * | Total attachment loss at any site is 7 mm or greater or if a furcation defect is probed. | Advanced periodontitis |

using a ball-ended periodontal probe with coloured bands at 3.5–5.5 mm, 8.5 mm and 11.5 mm from the tip of the probe. Use of the probe can detect bleeding and loss of attachment around the teeth as well as bone loss between the roots of the teeth (furcation involvement). Only sextants with two or more teeth present were used and the highest score was recorded. Root remnants were considered as missing teeth. Upon completion of the clinical examination, the patients were given oral hygiene advice, a toothbrush and toothpaste along with a pamphlet on home care of the mouth.

Ethical approval for the study was given by The University of the West Indies Research Ethics Committee, St Augustine, and written consent for the examination was obtained from each patient. Data collection took place between January and June 2008. Data were analysed for descriptive statistics using SPSS version 16.0.

RESULTS

Seventy-two of 100 diabetic patients attending an outpatient clinic participated in the study. Reasons for non-participation were not ascertained. The participants were aged between 17 and 75 years with a mean age of 55.56 years (SD). Most participants (54.2%) were female with the main ethnic groups comprising Indo-Trinidadian (66.7%), Afro-Trinidadian (22.2%) and Mixed ethnicity [9.7%] (Table 2).

Sixty-one per cent had not attended for dental treatment within the last year and 56.9% only attended when in pain. Of the 31.9% of participants who wore a denture, 69.6% did not take it out at night. The majority of participants (84.7%) were non-smokers, dental plaque visible by removal with a probe was found in 40.3% of the participants (Table 2).

The majority of participants (67.2%) had moderate or advanced periodontal disease which included 38.8% with BPE score of * (*advanced periodontitis with furcation involvement*), 28.4% with a score of 4 (*moderate or advanced periodontitis*), 25% with a score of 3 (*mild periodontitis*) and 12% with score of 2 or 1 (*gingivitis*).

DISCUSSION

In 2003, Trinidad and Tobago's total population was estimated to be 1.3 million. The government of Trinidad and Tobago's census reported in 2006 that there was a male: female ratio of 1:1 and an ethnic mix of African 38%, East Indian 40%, mixed 20% and other groups (Asian, European and Middle Eastern) 2% (13). Guilliford (1995) found the prevalence of diabetes to be higher in females and in Indo-Trinidadians (14).

Periodontal disease involves apical migration of the junctional epithelium, destruction of the connective tissue attachment, bone loss and ultimately loss of the affected teeth. Initiation of this process requires the presence of a dental plaque biofilm and early clinical signs manifest as gingivitis (red and bleeding gums). Gingivitis is reversible with good oral hygiene and does not inevitably progress to

Table 2: Demographics, dental care and smoking history for participants (n = 72).

| | n | % |
|------------------------------------|----|------|
| Age | | |
| 17–24 | 2 | 2.8 |
| 25–34 | 2 | 2.8 |
| 35–44 | 11 | 15.2 |
| 45–54 | 13 | 18.1 |
| 55–64 | 29 | 40.3 |
| 65–74 | 12 | 16.6 |
| 75–84 | 3 | 4.2 |
| Gender | | |
| Male | 33 | 45.8 |
| Female | 39 | 54.2 |
| Ethnic group | | |
| Afro-Trinidadian | 16 | 22.2 |
| Indo-Trinidadian | 48 | 66.7 |
| Caucasian | 1 | 1.4 |
| Mixed | 7 | 9.7 |
| Do you have a dentist | | |
| Yes | 32 | 44.4 |
| No | 40 | 55.6 |
| When was your last visit | | |
| 6 months | 23 | 31.9 |
| 1 year | 4 | 5.6 |
| More than one year | 44 | 61.1 |
| Never | 1 | 1.4 |
| How often do you attend | | |
| Once | 10 | 13.9 |
| More than once a year | 13 | 18.1 |
| Less than once a year | 6 | 8.3 |
| Only when in pain | 41 | 56.9 |
| Never | 2 | 2.8 |
| Do you wear a denture | | |
| Yes | 23 | 31.9 |
| No | 49 | 68.1 |
| Do you take it out at night | | |
| Yes | 7 | 30.4 |
| No | 16 | 69.6 |
| Do you smoke | | |
| Yes | 11 | 15.3 |
| No | 61 | 84.7 |
| Visible Plaque | | |
| 0 | 7 | 9.7 |
| 1 | 29 | 40.3 |
| 2 | 22 | 30.6 |
| 3 | 14 | 19.4 |

periodontitis (7). The prevalence of periodontal disease in adults varies between regions of the world; US (35%), UK (42%), Latin America (57%) and Africa (79%) (6). Currently, there is no prevalence data for periodontal disease among adults in Trinidad and Tobago or elsewhere in the West Indies.

In October 2007, the FDI and the International Diabetes Federation (IDF) organised a symposium to emphasize the interrelationship between diabetes and oral health. Several studies have shown that long standing diabetics, particularly those who show systemic complications appear to have greater rates of periodontal progression than age-matched healthy people (7). The possible reasons for their increased susceptibility could be the nature of the inflammatory response to dental plaque with respect to vascular changes and changes in polymorphonuclear leucocyte (PMN) function in the periodontal tissues (7).

This study used the BPE to determine the presence or absence and severity of periodontal disease. It should be noted that the BPE was developed as a screening tool and a more accurate diagnosis of periodontal disease would require full mouth probing depths to measure attachment loss together with intra-oral radiographs. The BPE is useful as it is quick and easy to use as an initial assessment (12). All patients were examined by a single dentist in order to reduce inter-examiner errors in determining the BPE scores. It has been reported that men have a higher prevalence of periodontal disease than women (6) however that was not evident in this study. The majority of participants in this study were of either Afro or Indo-Trinidadian ethnicity. Non-Caucasian groups have been shown to have more severe periodontal disease (6). Consistent with the literature, advanced periodontal disease was more prevalent among older participants in this study (6).

Studies have shown a dose-response relationship between cigarette smoking and severity of periodontal disease and those with a longer smoking history have up to a seven-fold increased risk of attachment loss (6). In this study, current smokers were not found to have greater periodontal disease severity. This may have been due to the small sample size and that the smoking history only recorded 'current smoker or 'non-smoker' (not 'ex-smoker').

Most participants were irregular dental attendees and over half only attended when in pain. This together with generally poor levels of oral hygiene, as evidenced by the majority having visible plaque, could also have contributed to the level of periodontal disease, prevalence and severity found in the sample. Oral hygiene is also made more difficult in denture wearers particularly those who do not remove their dentures at night. In this study, over a third of participants wore dentures and most reported night-time wear.

Several studies have documented the association between diabetes and periodontal disease (15–17) however, over the past few decades there have been some conflicting conclusions, which may be attributed to the aetiology of both diseases being multi-factorial. This study found that 38.8% of all the subjects had advanced periodontitis in this population which showed a similar prevalence rate, to that of periodontal disease in middle-aged people with Type 2 diabetes in an Asian population (18).

Periodontal disease constitutes a chronic bacterial challenge and severe periodontal disease is associated with elevated serological markers of systemic inflammation, *ie*, CRP and IL-6, in otherwise healthy individuals (19). In the diabetic, a self-feeding two-way system of catabolic response and tissue destruction may ensue, resulting in more severe periodontal disease and increased difficulty in controlling blood sugar thereby increasing susceptibility to infection (8). This may help explain the findings of Soskone and Klinger who state that along with epidemiological evidence showing that periodontal disease is more prevalent in diabetic patients, the prevalence of periodontal disease in diabetics can be up to two-fold higher than in people without periodontal disease (10). Oral signs and symptoms in the diabetic patient can therefore be important indicators of the risk of periodontal disease and future diabetic complications (20).

Several studies have concluded that periodontal therapy may result in improved glycaemic control in some individuals with diabetes (8, 9, 20) but there is presently insufficient evidence for precise clinical recommendations. Randomized controlled trials are needed to conclusively measure the effect of periodontal treatment on diabetic patients which could then help design national health policies (21).

In the Caribbean, the Caribbean Health Research Council (CHRC) recently formulated clinical guidelines for the management of diabetes in primary care with an aim to produce a unified, evidence-based approach to the management of diabetes in the region (2). In its requirements for the effective delivery of care it recommends a multidisciplinary team which includes medical and non-medical personnel. It also states that part of the initial physical examination should include inspection of the mouth for gingivitis and periodontal disease. However, following publication of the guidelines an audit showed that the current management of diabetes in primary care in Trinidad has been found to fall short of the Caribbean Health Research Council guidelines (22).

Caution should be applied to the findings of this study in view of some limitations related to it being a preliminary investigation. Firstly the diabetic clinic at Mount Hope is a tertiary referral centre for the country. The patients attend this centre for specialist care as they are more complicated and have diabetes that is difficult to control. Consequently, this diabetic population might not be representative of diabetics in the general population and prevalence of oral disease could have been overstated. Secondly, as no local comparator data exist from non-diabetic adults, it is difficult to infer that periodontal disease status was higher in this sample than in the general adult population. Finally, due to the small sample size, confounding factors could not be accounted for, such as age, ethnicity, smoking, dental care and oral hygiene levels. Further research should employ a larger sample from diabetics being treated in general practice using a case-control design, where controls have diabetes but

not periodontal disease, to assess differential odds of periodontal disease given a range of possible risk factors.

The findings from this preliminary study suggest that periodontal disease may be quite prevalent in diabetic patients in Trinidad and underscore the need for oral health education, regular dental visits and collaborative patient care between medical and dental practitioners.

ACKNOWLEDGEMENTS

The authors would like to thank Ms Sheree Singh, Faculty of Medical Sciences Library, Dr Visha Ramroop and Ms Patricia Garib for their assistance with this paper and the patients who participated.

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