Gestational Diabetes and Periodontal Disease in Trinidad - A Pilot Study

Ramaa Balkaran¹, Surujpal Teelucksingh², Fallon Lutchmansingh ³, Rahul Naidu¹, Reisha Rafeek¹

I School of Dentistry, The University of the West Indies, Trinidad and Tobago.
2 Department of Clinical Medical Sciences, Faculty of Medical Sciences, University of The West Indies, St. Augustine, Trinidad & Tobago,
3 The Helen Bhagwansingh Diabetes Education Research and Prevention Institute (DERPI)

Corresponding Author:
Ramaa Balkaran
School of Dentistry, Faculty of Medical Sciences
The University of the West Indies, St Augustine
Email: ramaa.balkaran@sta.uwi.edu

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ABSTRACT

Objective
To determine the prevalence of periodontitis in patients with and without gestational diabetes in Trinidad.

Methods
A convenience sample was obtained from antenatal clinic collaborating sites; patients were invited to undergo oral examinations at the School of Dentistry. The basic periodontal examination (BPE) assessed the periodontal disease status in all patients, the examiner was blinded to the GD status.

Results
There were 65 women who participated in the study, of which 13 had gestational diabetes and 52 did not. The mean age was 34.32 years and 43.1% and 35.4% of participants were Afro-Trinidadian and Indo-Trinidadian respectively. Reversible stages of periodontal disease were present in most participants (63.1%). Signs of severe periodontal disease (BPE scores 3 and 4) were more prevalent in the non-GD group and the Afro-Trinidadian group.

Conclusion
These data provide the first insight into the periodontal status of patients with and without gestational diabetes. The non-GD group showed a higher prevalence of severe periodontal disease compared to the group with GD.

INTRODUCTION

The first appearance of hyperglycaemia during the course of pregnancy is referred to as gestational diabetes and usually occurs in the last trimester. Of the 20,000 cases occurring in Trinidad and Tobago annually, 1000 cases are pre-gestational and it is estimated that 3 times as many gestational cases are to be expected. Poorly controlled Type 1 or the first appearance of hyperglycaemia during the course of pregnancy is referred to as gestational diabetes (GD) and usually occurs in the last trimester; type 2 Diabetes Mellitus has been shown to be a risk factor for periodontal (gum) disease. Periodontal disease is an inflammatory response by the host to bacterial infection which leads to the destruction of the bone and surrounding tissues. In a local study, high prevalence and severity of periodontal disease were found in the sample of diabetic patients examined. Periodontal disease may also adversely affect glycaemic control increasing the risk of diabetic complications. The first report of the association between maternal periodontal infection and pre-term low birth weight delivery in 1996 has since emphasized the promotion of oral health during pregnancy. There is reliable data that shows that early detection and treatment of periodontal disease in pregnancy improves outcomes for both mother and baby. This is an important finding since gestational diabetes has also been linked to both the mother and child developing DM later on. The authors have identified a paucity of literature available within the Caribbean region with respect to periodontal health and gestational diabetes.
The prevalence of oral disease in pregnancy has been found to be 44.2%, in a recent study. There is no data regarding the prevalence of periodontal disease in the general population in Trinidad but it has been reported to be over 67% in the diabetic population. It has been recognized that maintaining oral health during pregnancy is an important public health issue worldwide and as such it is now recommended that all women should receive a comprehensive oral health evaluation and risk assessment during pregnancy. Pregnancy has been described as a powerful "teachable moment" for the promotion of health because expectant mothers are especially keen on their baby being born healthy. Dentists can therefore seize the opportunity to fulfill their roles as educators and health promoters during this physiological state.

Aim

To determine the prevalence of periodontitis in patients with and without gestational diabetes in Trinidad and Tobago.

METHODS

All pregnant women over the age of 18 years (at 26–30 gestational weeks) were invited to participate in a fasting, 1-hour and 2-hour oral glucose tolerance test (OGTT) with 75g glucose in their antenatal clinic. Then, those who had at least one abnormal reading between 0-2 hours were referred to the endocrinologist. The WHO recommendation of GD states that GDM should be diagnosed at any time in pregnancy if one or more of the following criteria are met: fasting plasma glucose 5.1–6.9 mmol/L (92–125 mg/dL), 1-hour plasma glucose 10.0 mmol/L (180 mg/dL) and 2-hour plasma glucose 8.5–11.0 mmol/L (153–199 mg/dL) following a 75 g oral glucose load.

A convenience sample was obtained from antenatal clinic collaborating sites. A population size of 150 consecutive attendees (50 with Gestational Diabetes GD and 100 without) were invited to undergo oral examinations at the University of the West Indies (UWI) Dental School. The basic periodontal examination (BPE) was used to assess periodontal disease status in all patients with the examiner blinded to the GD status of the patients. However, at the end of the period of data collection, the sample size was 65 participants. The reason for non-participation was not ascertained. Oral examinations were performed by two examiners who had previously been trained and calibrated, were blinded towards patients’ GD status; patients’ GD case-control status information was kept separate until final analyses were performed.

Demographic data such as age, self-reported ethnicity, frequency, reason for dental attendance and denture hygiene practices were determined from an Interviewer-administered questionnaire. Examination involved extraoral assessment, the patients’ visible plaque score using the plaque index of Silness and Loe and the Basic Periodontal Examination (BPE), to determine the periodontal health status.

Guidelines of the Silness and Loe plaque index were followed using the criteria of using 4 surfaces of the 6 selected teeth 6 2 | 4

There was no substitution for any missing tooth, wisdom teeth were excluded. All surfaces were selected, the scores from the four areas of the tooth were added and divided by four in order to obtain the plaque index for the tooth; the following scores were used:

0 No plaque
1 A film of plaque adhering to the free gingival margin and adjacent area of the tooth, which cannot be seen with the naked eye, only by using disclosing solution or by using probe.
2 Moderate accumulation of deposits within the gingival pocket, on the gingival margin and/ or adjacent tooth surface, which can be seen with the naked eye.
3 Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

The Basic Periodontal Examination (BPE), also known as Periodontal Screening and Recording (PSR) Index, is a screening tool for periodontal treatment needs, which identifies the presence or absence of disease. BPE criteria and coding were based on that described by Corbet 2012. Firstly, the mouth was divided into six sextants, only sextants with two or more teeth present were used, all third molars and root remnants were excluded and the highest score was recorded for that sextant. The BPE score was determined using a World Health Organisation/ Community Periodontal Index of Treatment Needs probe periodontal probe. The probe was used to detect bleeding and loss of attachment around the teeth as well as bone loss between the roots of the teeth (furcation involvement).

All patients who had any conditions which required urgent care were identified, informed and offered treatment at the dental school polyclinic.

Data were analysed using SPSS version 24.0 in which descriptive analysis, including cross tabulations, was performed. Ethical approval was obtained by the University of the West Indies Research Ethics Committee and written, informed consent was obtained from each patient prior to the oral health survey. Furthermore, the research has been conducted in full accordance with the World Medical Association Declaration of Helsinki.

RESULTS

Demographics and baseline characteristics

The sample size was 65 women (13 with Gestational Diabetes GD and 52 without). Reasons for non-participation were not ascertained. Mean age was 34.32 years (SD 6.41). The major ethnic groups were 43.1% Afro-Trinidadian, 35.4% Indo-Trinidadian and 21.5% Mixed (Table 1). Most (70.8%) had last visited a dental clinic more than a year before this examination and 61.5% did not have a dentist (Table 1).
Table 1: Characteristics for 65 patients with and without GD

| Variable | Total (N=65) (%) | GD (N= 13) (%) | No GD (N=52) (%) |
|----------|-----------------|----------------|------------------|
| Age (years) mean ± SD | 34.32 ± 6.41 | 34.62 ± 4.15 | 34.25 ± 6.89 |
| Ethnicity | | | |
| Afro-Trinidadian | 28(43.1) | 4(14.3) | 24(85.7) |
| Indo-Trinidadian | 23(35.4) | 7(30.4) | 16(69.6) |
| Mixed | 14(21.5) | 2(14.3) | 12(85.7) |
| Do you have a dentist? | | | |
| Yes | 25(38.5) | 3(12.0) | 22(88.0) |
| No | 40(61.5) | 10(25.0) | 30(75.0) |
| Last visit to dentist | | | |
| ≤ 1 year | 13(20.0) | 1(7.6) | 12(92.3) |
| >1 year or never | 52(80.0) | 12(23.1) | 40(76.9) |
| Frequency of dental attendance | | | |
| Only when in pain | 42(64.6) | 10(23.8) | 32(76.2) |
| More than once a year or less | 23(35.4) | 3(13.0) | 20(86.9) |
| Wear a denture | | | |
| Yes | 0(0) | 0(0) | 0(0) |
| No | 65(100.0) | 13(20.0) | 52(80.0) |
| Smoke | | | |
| Yes | 4(6.2) | 1(25.0) | 3(75.0) |
| No | 61(93.8) | 12(19.7) | 49(80.3) |
| Plaque | | | |
| None and Mild | 42(64.6) | 5(11.9) | 37(88.1) |
| Moderate and Abundant | 23(35.4) | 8(34.8) | 15(65.2) |
| BPE | | | |
| None to mild gingivitis (BPE 0,1,2) | 47(72.3) | 10(21.3) | 37(78.7) |
| Moderate to Severe periodontitis (BPE 3,4) | 18(27.7) | 3(16.7) | 15(33.3) |
Reversible stages of periodontal disease were present in the majority of participants (63.1%) who had gingivitis or plaque retention factors (Figure 1).

In the 25 to 34 years age group just under half (46.15%) had GD (Table 2) and just over one-fifth (22.22 %) had moderate to severe periodontitis based on their BPE scores (Table 3).

**Figure 1: BPE scores of all the participants**

![BPE scores](image)

**Table 2: GD and Age group Cross tabulation**

| GD       | positive GD | 18to24 | 25to34 | 35to44 | 45to54 | Total |
|----------|-------------|--------|--------|--------|--------|-------|
| GD       | 0           | 6      | 7      | 0      | 13     | 65    |
| Negative | 4           | 21     | 23     | 4      | 52     |       |
| Total    | 4           | 27     | 30     | 4      | 65     |       |
**DISCUSSION**

Of the 13 participants who had GD, just over half (53.85%) were Indo-Trinidadian compared with the other main groups of Afro-Trinidadian (30.77%) and Mixed (15.38%). Only two age groups showed participants with gestational diabetes. Within these two groups, 22.22% of the participants of the 25 to 34 years age group and 23.33% of the 35 to 44 years age group had moderate to severe periodontitis based on their BPE scores. Those with moderate to severe periodontal disease (scores 3 and 4) were more prevalent in the non-GD group. Although the socioeconomic status (SES) of the participants was not ascertained, all participants were recruited from a private antenatal clinic which can be used as a proxy for SES because this differentiates them from women who routinely seek public health care antenatal clinics. In a recent study, it was found that there is a negative correlation between SES and periodontal disease where the lower the SES, the higher the prevalence of periodontal disease and periodontitis. This may be one reason why the level of periodontal disease (27%) was low in this population. The majority (52.3%) of the participants had gingivitis and 76.92% of them had GD. This is noteworthy since Kumar et al 2018 showed that the risk of getting GD for women with gingivitis was 1.85 times higher than for healthy women. Similar to the study by Poulsen et al 2019, we found that the non-GD group showed a better oral health status compared to the group with GD. However, the vast majority of
patients (76.9%) with GD had gingivitis compared to the 40.4% of those without GD who had gingivitis.

This study has a few limitations. The population of patients with GD may not be as evenly distributed in general population as it was in this convenience sample and so, firm conclusions cannot be drawn due to small sample size of this exploratory study. Additionally, this study may have been conducted before the necessary periodontal changes, which need time to develop, were clinically visible.

It is recommended that regular tolerance testing and dental screenings of pregnant patients be done to ensure a collaborative oral health promotion approach be established during pregnancy. Moreover, further research could use a larger sample size while employing a similar methodology as described in this paper to obtain more generalisable results.

CONCLUSION

These data provide the first insight into the periodontal status of patients with and without gestational diabetes. In this sample, the non-GD group showed a higher prevalence of severe periodontal disease compared to the group with GD unlike what is known for patients with diabetes who have a higher prevalence of periodontal disease.

Ethical Approval statement: Ethical approval was obtained by the University of the West Indies Research Ethics Committee.

Conflict of interest statement: None.

Informed Consent statement: Informed consent was obtained from each patient prior to the oral health survey.

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Authors Contribution: Dr. Ramaa Balkaran developed the research design, collected and inputted all the data related to the study, contributed to the intellectual content, interpreted the data findings and drafted the manuscript. Professor Surujpal Teelucksingh developed the research design, contributed to the intellectual content, helped in the drafting and critical revision of the manuscript. Ms. Fallon Lutchmansingh, identified patients with and without GD, contributed to the intellectual content, helped in the drafting and critical revision of the manuscript. Professor Rahul Naidu interpreted the data findings, contributed to the intellectual content and helped in the critical revision of the manuscript. Dr. R. Rafeek interpreted the data findings, contributed to the intellectual content and helped in the critical revision of the manuscript. All authors reviewed and approved the final draft of the manuscript.

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