

Oral diseases and treatment outcome among diabetics that attended a Nigerian hospital

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ABSTRACT

Introduction

The growing prevalence of diabetes may have a negative impact on oral health. Severe periodontitis has been considered the sixth complication of diabetes mellitus. Periodontitis, which is a serious challenge to oral clinicians, usually leads to impaired oral function.

Purpose

The purpose of this study was to assess the relationship between oral diseases and treatment outcome among diabetic patients that attended IMSUTH, Orlu, Nigeria.

Materials & methods

This 4-year retrospective study was carried out to study 262 patients. All the patients were previously diagnosed with diabetes mellitus by the medical units of the hospital. Patients' response to treatment and blood-glucose levels were monitored till completion of treatment. Data retrieved included data on demographics, presenting complaints, Blood-glucose levels and treatment outcome. A self-designed data collection schedule form (DCSF) was used to record all observations.

Results

Majority of the patients were male (61.07%) and elderly with 40.1% and 34.4% of all patients studied falling into 61 – 70 years and 71 – 80 years age group, respectively. Major complaints among the patients were: pain (25.6%), halitosis (23.7%), tooth mobility (20.9%) and gum recession (14.9%). Treatment given to the patients included periodontal therapy (97%), restoration (5%) and extraction and replacement (20%). Fasting blood-glucose level of majority of the patients fell between 100 – 160 mg/dl. 87.6% patients responded positively to treatment while 12.4% did not. There was a significant relationship between the presenting complaints of patients and treatment outcome ($p < 0.005$). However, there was no significant relationship between blood-glucose levels of patients and treatment outcome ($p > 0.005$).

Conclusions

Data revealed that majority of patients in this study manifested periodontal disease. This calls for oral health education and interdisciplinary management of diabetes targeted at the prevention of oral complications of diabetes mellitus and this will help the diabetologist in the effective management of hyperglycaemia.

INTRODUCTION

Diabetes mellitus is a chronic disease that ensues when the functions of the β -cells of the pancreas are either stepped

down or effaced. Diabetes mellitus patients present with hyperglycaemia and glycosuria among other clinical signs (Gupta & Gui, 2007).

According to Lucas and Gilles (2003), the World Health Organization (WHO) has conducted series of researches into blood-glucose-related morbidities in adult populations, worldwide, in a bid to help their organization, health authorities and healthcare consumers understand important facts about it. Credible inferences are that:

1. diabetes is a chronic disease affecting adult populations around the world in epidemic proportions
2. economic and behavioural factors may be responsible for its wide-spread pattern of distribution
3. people in developing countries or disadvantaged communities in developed countries may be more susceptible to contracting this disease
4. the burden of this disease is set to grow, given its long-term complications

An intricate relationship has long been established between diabetes and oral health (Löe, 1993, Yilmaz et al., 2015). Oral diseases such as periodontal disease, dental caries, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency syndrome (HIV/AIDS)-related oral disease and oral and maxillofacial trauma are major public health problems worldwide (Peterson et al., 2005). Diabetes can lead to changes in the oral cavity too. Of particular concern to dental health care professionals (DHCF) is the impact of diabetes mellitus on oral health. Of note is severe periodontal disease, which has been associated with diabetes mellitus and considered the sixth (6th) complication of diabetes (Löe, 1993).

At the systemic level, diabetes is characterized by frequent urination (which causes sufferers to lose a lot of fluid), inability of tissues to respond normally to the invasion of microorganisms always, altered connective tissue metabolism, changes in some blood vessels and increased glucose concentration in saliva. These changes can be reflected in the oral cavity in a number of ways. It can cause gingival hyperplasia and gingivitis. It can also cause abnormal wound healing, dental decay, burning sensations, fungal infections, acetone breath and xerostomia or change in saliva thickness. Regrettably, many health authorities do not consider oral health as essential to diabetes control strategies or even management or intervention planning (Diabetes monitor, 2005).

Diabetes is affecting people in epidemic proportions worldwide. Consequently, many mouths around the world are getting sick! (Peterson et al. 2005). Prompt and appropriate treatment of oral diseases, including the ones precipitated by diabetes, are ideal oral health intervention goals. Such interventions help to forestall the experience of pain, premature tooth loss and impaired oral function and restore health and dignity to the mouth, improving patients' quality of life. Blood-glucose levels can affect these management goals (Yilmaz et al., 2015).

This study was carried out to assess the relationship between oral diseases and treatment outcome among diabetic patients.

MATERIALS AND METHODS

This 4-year retrospective study was carried out at the Imo State University Teaching Hospital (IMSUTH), Orlu, Nigeria to study 262 diabetic patients seen at the hospital during the period.

Patients:

Participants were patients who were previously diagnosed with diabetes mellitus by the General Out-patient Department (GOPD) and the Medical Out-Patient (MOP) unit of the Imo State University Teaching Hospital (IMSUTH), Orlu, Nigeria.

Procedure:

The instrument that was used in collecting the data for this study was a customized Data Collection Schedule Form (DCSF).

Ethical approval for this study was secured from the Education and Ethics Committee of the hospital. Data of patients seen between January 2005 and December 2008 were retrieved from the records of the patients with the hospital, using the customized Data Collection Schedule Form (DCSF).

Data on patients' demographics, presenting complaints, diagnosis on presentation, blood-glucose levels and treatment outcome were retrieved.

Five research questions and two hypotheses were formulated and used to analyze the data.

Data analysis:

Results were subjected to descriptive statistical analysis using percentages and bar charts. Inferential analysis of data was carried out using chi-square (χ^2).

RESULTS

262 patients' cases seen at the hospital during the study period were retrieved. Of this number, 38.93% were female while 61.07% were male.

Majority of the patients were elderly with 40.1% and 34.4% falling into the 60 – 70 years and 71 – 80 years age group, respectively (**Table 1**).

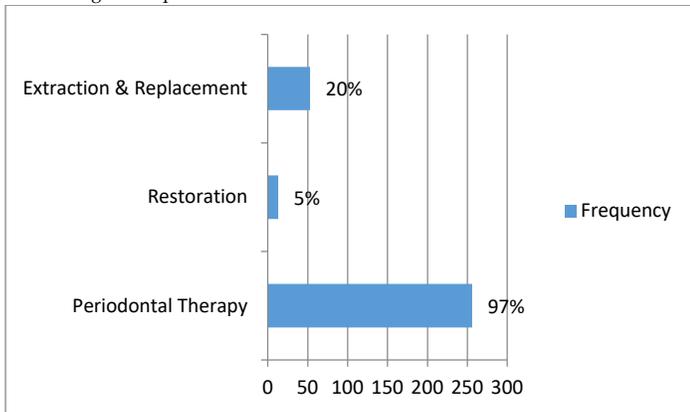
Table 1
Patients' demographics

Variable	Variable category	Participants (N = 262)
		n (%)
Age group (in years)	41 - 50	13 (4.96)
	51 - 60	44 (16.79)
	61 - 70	105 (40.08)
	71 - 80	90 (34.35)
	81 - 90	10 (3.82)
	Total	262 (100.00)
Gender	Male	160 (61.07)
	Female	102 (38.93)

Major complaints among the patients were, pain (25.5%), halitosis (23.7%), tooth mobility (20.9%) and gum recession (14.9%) (**Table 3**).

Treatment given to patients included periodontal therapy – scaling & polishing, sub-gingival curettage and root planning (97%), restoration - temporary fillings and amalgam fillings (5%), extraction and replacement – forceps extractions and partial dentures (20%) (**Figure 1**).

Figure 1
Treatment given to patients



Fasting Blood-glucose of majority of the patients fell between 100 – 160 mg/dl (**Table 2**).

Table 2
Blood-glucose levels and treatment outcome

Blood-glucose level (mg/dl) (80 – 130 mg/dl is normal for diabetics)	Treatment outcome		Total
	Positive	Negative	
Normal (<100)	12 (5.15%)	2 (6.90%)	14 (5.34%)
Moderate (100 – 125)	44 (18.88%)	6 (20.69%)	50 (19.08%)
High (126 -160)	177 (75.97%)	21 (72.41%)	198 (75.57%)
Total	233 (88.93%)	29 (11.07%)	262 (100.00%)

$\chi^2(2, N=262) = 0.23, p=0.889$ (not significant at $P>0.05$).

88.93% of the patients responded positively to treatment while 11.07% did not, judging from clinical assessment on recall visits, using the CPI to assess depth of pockets or vulnerability of the gingivae to bleeding, palpation to determine the extent of tooth mobility, resolution of ulcers and periodontal condition, presence or absence of fetor oris, clinical observation to assess gingival recessions and patients' experience of symptoms (**Figure 2**).

Figure 2
Treatment outcome

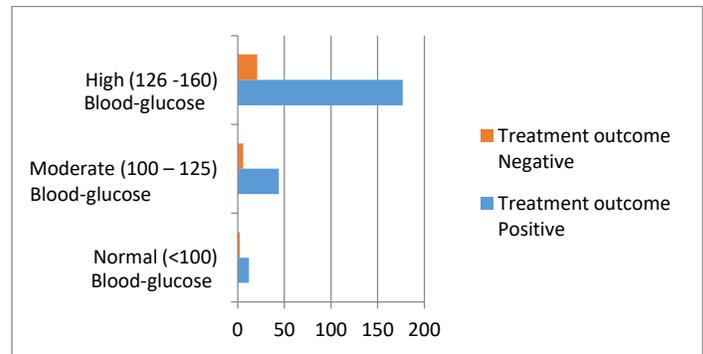


Table 3
Presenting complaints of patients' treatment outcomes

Presenting complaints	Treatment outcome		Total
	Positive	Negative	
Mobility	51 (21.89%)	4 (13.79%)	55 (20.99%)
Receding gum	25 (10.73%)	14 (48.28%)	39 (14.89%)
Halitosis	55 (23.60%)	7 (24.14%)	62 (23.66%)
Pain	65 (27.89%)	2 (6.90%)	67 (25.57%)
BMS	1 (0.43%)	1 (3.45%)	2 (0.76%)
Gingival abscess	15 (6.44%)	0 (0.00%)	15 (5.73%)
Dry mouth	6 (2.15%)	0 (0.00%)	6 (1.91%)
Taste abnormality	1 (0.43%)	1 (3.45%)	2 (0.76%)
Gingival ulcer	14 (6.01%)	0 (0.00%)	14 (5.34%)
Total	233 (88.93%)	29 (11.07%)	262 (100.00%)

$\chi^2(8, N=262) = 40.44, p<0.0001$ (significant at $P<0.05$).

Inferential analyses of data indicated that there was a significant relationship between the presenting complaints of patients and treatment outcome ($\chi^2(8, N=262) = 40.44, p<0.0001$ (significant at $P<0.05$)). However, there was no

statistically significant relationship between blood-glucose levels of patients and treatment outcome ($\chi^2(2, N=262) = 0.23, p=0.889$ (not significant at $P>0.05$)).

DISCUSSIONS

Results of this study indicated that the presenting complaints among the patients included tooth mobility (20.99%), receding gum (14.89%), halitosis (23.66%), pain (25.57%), burning mouth syndrome (0.76%), gingival abscess (5.73%), dry mouth (1.91%), taste abnormality (0.76%) and gingival ulcer (5.34%). There was a significant relationship between the presenting complaints of patients and treatment outcome ($p<0.005$). These result are similar to a result in the study of [Moore et al. \(2003\)](#) that indicated that oral health complications, including extensive periodontal disease, tooth loss, soft tissue pathologies, xerostomia and burning mouth syndrome have been reported among study patients with long standing and poorly controlled diabetes. These symptoms were also confirmed by the Turkish diabetes association in conjunction with the Turkish dental association ([Yilmaz et al., 2015](#)). According to [Yilmaz](#), Xerostomia develops because of the rapid loss of fluid to frequent urination and other disorders or treatment. The mouth becomes dry because of this. And bad breath can either occur from this or other systemic changes occurring in the body as a result of the metabolic disease. Burning mouth syndrome results from peripheral neuropathy. This, in turn can also result in xerostomia, ulcerations and taste disturbances. The high glucose level on its own precipitates varying forms of periodontal problems.

Treatments given to the patients included periodontal therapy (97%), restoration (5%), extraction and replacement (20%). This result is in agreement with the results of a controlled cross-sectional study carried out by [Sandberga et al. \(2000\)](#) in a healthcare district in Sweden, which inferred that diabetic patients showed a greater need for periodontal treatment, dental caries prevention and prosthetic corrections.

Fasting blood-glucose level of majority of the patients fell between 100 - 160 mg/dl. Even though blood glucose targets are individualized based on some factors, American diabetes Association recommends a fasting Blood-glucose of 80 - 130mg/dl for adults with diabetes who are not pregnant (< or + 95 mg/dl) ([American Diabetes Association \(ADA\), 2020](#)). It is worthy of noteworthy that a fasting Blood-glucose level of <180

mg/dl supports dental wound healing ([Yilmaz et al., 2015, ADA, 2020](#)). Given this official recommendation, an appreciable number of the study patients had Blood-glucose level that is considered optimal for dental treatment for a known diabetic. Even though the outliers (<80 mg/dl or >130 mg/dl) portend some potential unsavoury systemic events, they are not directly related to a dental treatment outcome.

Results also revealed that 88.93% of the patients responded positively to treatment while 11.07% did not and there was no significant relationship between blood-glucose levels of patients and treatment outcome ($p>0.005$). This may be because there was a multidisciplinary management of these patients through a close collaboration between the physicians managing the patients' condition and the dentists during the course of the treatment. Consequently, blood-glucose levels were, in the normal course of the management, brought under control, enhancing treatment outcome. To achieve the goal of bringing a diabetic's fasting Blood-glucose level to the recommended <180 mg/dl so as to perform procedures under optimum conditions, the Turkish Diabetes Association asserts that medical consultation is needed ([Yilmaz et al., 2015](#)).

CONCLUSIONS

Data revealed that majority of patients in this study manifested periodontal disease. This calls for oral health education and interdisciplinary management of diabetes targeted at the prevention of oral complications of diabetes mellitus This will help the diabetologist or endocrinologist in the effective management of hyperglycaemia because not only are people with diabetes susceptible to periodontal disease, but the presence of periodontal disease can also worsen glycemic control.

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Ethics Approval: Ethical approval for this work was obtained from the Education & Ethics Committee of IMSUTH, Orlu, Nigeria.

Conflict of Interest: None declared.

OrCID iDs: Nil identified.

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