



Correlation between diabetes mellitus and periodontal disease: A retrospective assessment of diabetics attending Murtala Muhammad Specialist Hospital, Kano

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Abstract

Periodontal disease is a common oral infection that affects the tissues that surrounds and support the teeth. The aim of the research was to study the relationship between diabetes and periodontal disease. The data was collected at Murtala Muhammad Specialist Hospital, Kano where a thorough review of patients' record (files) who visited or were admitted at the facility within the period of January 2022-May 2023. Correlation coefficients showed the existence of a strong relationship between diabetes and periodontitis. Out of 80 patients with diabetes mellitus; 52(65%) had periodontal disease, 36(45%) were males and the disease was severe within the age range of 55-74; 16 (20%) were females with the disease being severe within the age range of 75 and above while 28 (35%) had no periodontal disease. Twenty percent of the patients had gingivitis, 15% have mild periodontitis, 20% have moderate periodontitis, 10% have severe periodontitis and 35% had no periodontitis. There exists strong relationship between diabetes mellitus and periodontal disease, the poorer the glycaemic control, and the longer the duration of diabetes mellitus; the greater will be the increased risk and severity of periodontitis.


Keywords: Diabetes; Periodontal disease; Gingivitis; Periodontitis

INTRODUCTION

Periodontal Disease which comprises gingivitis and periodontitis is a common oral infection that affects the tissues that surrounds and supports the teeth. According to world health organization (WHO) it is widely

spreadable chronic disease around the world [1]. The condition often presents as gingivitis which is characterized by bleeding, swollen gums and pain if left untreated, it progresses to periodontitis which involves the loss of the

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periodontal attachment and supporting bone [1, 2].

People with diabetes have a threefold increased risk of developing periodontal disease compared with those without the condition [3]. This risk is significantly greater in individuals with poor glycaemic control [4]. Many people with diabetes are unaware of this increased risk and may have undetected gingivitis or periodontitis due to the painless nature of the disease (often presented as bad breath, swollen gums, bleeding and sometimes tooth loss). Diagnosis and treatment in this population is often delayed or absent, thus, treating periodontal disease may result in improved glycaemic control, therefore this will hinder the glycaemic improvements of the diabetics. The need therefore, arises for greater awareness of the relationship between periodontal disease and diabetes in both people with diabetes and members of the healthcare delivery team. This research aimed at studying the relationship between diabetes and periodontal disease with a view to increasing the risk of developing periodontitis in diabetic patients.

METHODS

Study site. This study was conducted at the Endocrinology and Dental Department of Murtala Muhammad Specialist Hospital, Kano, the oldest medical facility serving millions of residents within and outside the metropolitan Local Government Area of the State. Established in 1926, the facility serves as both a specialist and referral center for almost all hospitals run by the state government.

Inclusion and exclusion criteria. The study only includes case folders of those who visited or were admitted into the facility with diabetes mellitus co-morbid periodontal disease. However, the case folders of patients that did not meet the criteria above were excluded.

Sample size. The medical records of patients diagnosed with diabetes mellitus and periodontal disease were screened from January 2022 to May 2023 and 80 patients' case folders met the inclusion criteria for the study using the World Health Organization's community periodontal index.

Ethical clearance. The study was reviewed and approved by the management of Murtala Muhammad Specialist Hospital as contained in a letter dated 15/06/2023 with number MMSHZ/GEN/083/I

Research design. The study involved a retrospective review of the case files of patients who met the inclusion criteria, it involves inferential statistics which shows the extent to which two variables are dependent on one another (Diabetes mellitus and periodontal disease).

Data collection. The data was collected from case folders of representative sample size using a designed and validated data collection form that contained the necessary information required for the study's aims and objectives.

Data analysis. Data was analysed using Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, version 23, Armonk, NY: IBM Corp). Descriptive statistics such as percentages, frequencies, and mean scores were used to present the demographic variables. Pearson correlation coefficient value obtained as 0.710 (Table 4) was used to test the significant association between diabetes and periodontal disease (whose values range from -1 for a perfect negative correlation up to +1 for a perfect positive correlation). The study was set to be statistically significant at $p < 0.05$.

RESULTS

Majority of respondents were males 48 (60%). Also 28 (35%) of the respondents were within the age range of 55-74 years, have NIDDM (Type 2) diabetes mellitus 56 (70%), and have diabetes mellitus greater than >10 years 44 (55%). Forty-eight 48 patients representing 60% had A1C value greater than >7.0 which is considered as uncontrolled diabetes mellitus. Out of 80 patients' medical folders examined 56 (70%) of them were diagnosed with periodontitis (Table 1).

For the severity of periodontal disease, 16 (20%) of the patients had gingivitis, while 12 (15%) had mild periodontitis, followed by 16 (20%) with moderate periodontitis 16 (20%) and 8 (10%) with severe periodontitis. Only 28 (35%) medical folders examined did not have periodontitis (Table 2). Table 3 showed the severity of periodontal disease which was observed to be higher in males 36 (45%) within the age range of 55-74 (20%). Table 4 shows r is 0.710

Table 1: Demographic characteristics of the patients

Variable	Category	Frequency	Percentage
Gender	Male	48	60
	Female	32	40
Age	15-34	16	20
	35-54	12	15
	55-74	28	35
	75 and above	24	30
Type of diabetes mellitus	Type 1	24	30
	Type 2	56	70
Duration of diabetes mellitus	<10 (years)	36	45
	>10 (years)	44	55
Glycated haemoglobin (A1c) Test	<7.0 (Controlled)	32	40
	>7.0 (Uncontrolled)	48	60
Patients is Diagnosed with Periodontitis	Yes	56	70
	No	24	30
Severity of Periodontitis	Gingivitis	16	20
	Mild periodontitis	12	15
	Moderate Periodontitis	16	20
	Severe periodontitis	8	10
	No periodontitis	28	35

Table 2: Severity of Periodontal Disease in Diabetic Patients (n = 80)

Severity of Periodontitis	Number of Diabetic Patients(n=52)	Percentage (%)
Gingivitis	16	20
Mild periodontitis	12	15
Moderate periodontitis	16	20
Severe periodontitis	8	10
Total	52	65

Table 3: Distribution of Patients According to Age and Sex (n = 80)

	Group	Age group	No. of patients	Percentage (%)
Males	Group 1	15-34	4	5
Males	Group 2	35-54	4	5
Males	Group 3	55-74	16	20
Males	Group 4	75 and above	12	15
	Total		36	45
Females	Group 1	15-34	0	0
Females	Group 2	35-54	4	5
Females	Group 3	55-74	4	5
Females	Group 4	75 and above	8	10
	Total		16	20

Table 4: Correlation between Diabetes and Periodontal disease (n = 80)

	N (months)	Correlation (r)	Sig.
Diabetes and periodontal disease	12	0.71	0.05

r = correlation coefficient

DISCUSSION

This correlation between diabetes and periodontal disease gotten from our research has been substantiated by numerous studies. A vital study conducted by Polak & Shapira [5] reported a significant increase in prevalence of periodontitis and other gums diseases in people with poorly controlled diabetes mellitus. Similar researches by Chapple & Genco [6], Lalla & Papapanou [7] and Llambés et al. [8], established poorly controlled blood sugar in diabetes as substantial risk factor of periodontal disease and also considered among the complications of diabetes mellitus which is in line with our findings that shows a strong relationship between diabetes mellitus and periodontal disease.

Furthermore, research conducted by Ikimi et al. [9] conducted in FCT Abuja, Nigeria shows a significant increase in tooth decay with subsequent tooth loss in addition with symptoms of periodontal disease among diabetic patients than non-diabetic, which is also in line with our research that shows a positive correlation between diabetes mellitus and periodontal diseases. In addition, Molina et al., [10] reported that diabetes mellitus may be considered among the risk factor for the appearance of periodontal disease.

Additionally, a review articles by Lalla and Papapanou [7] established diabetes mellitus as a risk factor for periodontal disease which in turn adversely affect glycaemic control showing a similar finding with our research. It is also reported by Lalla & Papapanou [7] and Chapple & Genco R [6] that patients undergoing proper therapy of periodontitis tend to have good glycaemic control and substantial improvement in diabetic complications, which also is an indication of direct relationship between diabetes mellitus and periodontal disease.

In a study by Preshaw et al., [11] individuals with poorly controlled diabetes mellitus were notably predisposed to periodontitis development, a finding aligned with our research outcomes. Specifically, our study identified a substantial 60% (48 patients) with uncontrolled diabetes mellitus, characterized by glycated haemoglobin levels surpassing 7.0. Notably, Rajhans et al. [12] postulated that heightened glucose levels in the gingival crevicular fluid (GCF) of inadequately controlled diabetics could potentially foster the proliferation of certain pathogenic microorganisms within periodontal pockets. This observation lends support to the notion that poorly controlled diabetes mellitus

serves as a plausible risk factor for periodontal disease.

Moreover, our investigation unveiled a prevailing trend which shows most patients with periodontal disease fell within the age bracket of 55-74 years, encompassing 35% of cases. An additional 30% of cases were evident in individuals aged 75 years and older, aligning with previous research by Rajhans et al. [12] which asserted a direct relationship between age and the prevalence and severity of periodontal disease.

Furthermore, our findings indicated that 55% of patients had endured diabetes for over a decade, a concurrence with previous findings (Rajhans et al. [12], Lakschevitz et al. [13]) which underscore the noteworthy impact of diabetes duration on periodontal disease severity.

Rajhans et al. [12] emphasized a robust connection between diabetic status and the prevalence as well as the intensity of periodontal disease. In light of our present study, it is plausible to deduce that more inadequate glycaemic control and prolonged diabetes mellitus duration contribute to an escalated risk and severity of periodontal disease.

Also, Lakschevitz et al. [13] established poorly controlled diabetes mellitus as a substantial risk factor of periodontitis and subsequent cause of tooth decay, additionally the research also substantiated that an excellent glycaemic control in patient having proper treatment of periodontal disease which is an indication of direct relationship between the two diseases.

Furthermore, our study revealed a notable gender disparity—male patients exhibited a higher incidence of periodontal disease at 60%, in contrast to female patients at 40%. This discordance deviates from some previous findings (Ogunbodede et al. [14], Chinenye et al. [15] and Ikimi et al. [9]) which pointed to a greater prevalence of periodontal disease in females. This variance could

potentially be attributed to the limited sample size employed in our study, coupled with the utilization of a singular research facility.

Conclusion. The degree of the severity of periodontal disease was found to be directly associated with the controlled diabetes mellitus. Additionally, the poorer the glycaemic control, and the longer the duration of diabetes mellitus; the greater the increased risk and severity of periodontal disease.

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