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The prevalence of periodontal disease in diabetic patients treated at a dental specialty center in a city in the state of Pará

A prevalência da doença periodontal em pacientes diabéticos compensados em um centro de especialidades odontológicas em uma cidade do estado do Pará

Prevalencia de enfermedad periodontal en pacientes diabéticos atendidos en un centro de especialidades odontológicas de un municipio del estado de Pará

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ABSTRACT

Objective: To analyze the prevalence of periodontal disease in patients with diabetes mellitus registered at the Type III Dental Specialty Center in a municipality in the state of Pará. **Methods:** In this study, we will analyze the bidirectional relationship between the two, since one influences the development of the other. The methodology applied was a field study with a descriptive, retrospective approach and quantitative analysis, with 60 medical records from the CEO - Specialized Dental Centre, in the city of Santarém - PA. The descriptive procedures were analyzed using absolute and relative data (frequencies and percentages), and measures of central tendency (mean) and variability (standard deviation and minimum and maximum values). The study took into account age, gender and systemic condition to ascertain the prevalence of periodontal disease in diabetic patients **Results:** With the help of 60 medical records, 30 diabetic and 30 non-diabetic patients, we obtained a marked result in poor oral health (60%) in diabetics and 43.44 % in patients without diabetes. **Conclusion:** Due to the significant results reflecting poor oral hygiene, there is a gap in knowledge about oral hygiene and its relationship with systemic disease, not only among patients, but also among the multi-professional team responsible.

Keywords: Periodontitis, Diabetes Mellitus, Disease severity.

RESUMO

Objetivo: Analisar a prevalência da doença periodontal em pacientes portadores de diabetes mellitus cadastrados em um centro de especialidades odontológicas tipo III em uma cidade do estado do Pará **Métodos:** a metodologia aplicada foi uma pesquisa de campo com abordagem descritiva, retrospectiva, de análise quantitativa, com 60 prontuários do local de pesquisa CEO - Centro Especializado Odontológico, na cidade de Santarém - PA. Os procedimentos descritivos foram analisados por meio dos dados absolutos e relativos (frequências e porcentagens), e medidas de tendência central (média) e variabilidade (desvio-padrão e valores mínimo e máximo). O estudo levou em consideração a idade, sexo e condição sistêmica, para averiguar prevalência da doença periodontal em pacientes diabéticos. **Resultados:** com o auxílio de 60 prontuários, sendo 30 pacientes diabéticos e 30 não diabéticos, obtivemos um resultado acentuado em saúde oral deficiente (60%) em diabéticos e 43,44 % nos pacientes sem diabetes. **Conclusão:** Devido a resultados expressivos que refletem má higiene oral, nota-se uma lacuna no conhecimento sobre higiene oral e relação com doença sistêmica, não só dos pacientes, mas também da equipe multiprofissional responsável.

Palavras-chave: Periodontite, Diabetes Mellitus, Severidade da doença.

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RESUMEN

Objetivo: Analizar la prevalencia de la enfermedad periodontal en pacientes con diabetes mellitus registrados en el Centro de Especialidades Odontológicas de tipo III de um município del estado do Pará. **Métodos:** La metodología aplicada fue una investigación de campo con enfoque descriptivo, retrospectivo y de análisis cuantitativo, utilizando 60 historias clínicas del lugar de estudio, el CEO – Centro de Especialidades Odontológicas, en la ciudad de Santarém PA. Los procedimientos descriptivos fueron analizados mediante datos absolutos y relativos (frecuencias y porcentajes), así como medidas de tendencia central (media) y de variabilidad (desviación estándar y valores mínimo y máximo). El estudio consideró variables como edad, sexo y condición sistémica, con el objetivo de verificar la prevalencia de la enfermedad periodontal en pacientes con diabetes. **Resultados:** Con la ayuda de 60 historias clínicas, siendo 30 de pacientes diabéticos y 30 de pacientes no diabéticos, se obtuvo un resultado marcado de salud bucal deficiente en el 60 % de los pacientes diabéticos y en el 43,44 % de los pacientes sin diabetes. **Conclusión:** Debido a los resultados expresivos que reflejan una mala higiene bucal, se observa una brecha en el conocimiento sobre la higiene oral y su relación con las enfermedades sistémicas, no solo por parte de los pacientes, sino también del equipo multidisciplinario responsable.

Palabras clave: Periodontitis, Diabetes Mellitus, Gravedad de la enfermedad.

INTRODUCTION

Lifestyle changes, lack of information, and even low motivation have increasingly contributed to the emergence of chronic diseases in society. One of the most pressing public health concerns today, due to its rising prevalence, is diabetes mellitus (DM) - a chronic condition that affects approximately 422 million people worldwide. It is considered one of the most serious and significant public health challenges, characterized by high blood glucose levels. Hyperglycemia can cause tissue damage without clinical symptoms for many years before diagnosis; however, in cases of severe hyperglycemia, symptoms such as polydipsia, polyuria, polyphagia, and weight loss may occur (SOUSA JNL, et al., 2014).

As an autoimmune chronic condition, the immune system attacks the body's cells, compromising the immune response and the ability to eliminate pathogenic microorganisms. This predisposes diabetic individuals to numerous complications within a relatively short period, making them more susceptible to infections and, consequently, to periodontal lesions, often resulting in unfavorable treatment responses (RODRÍGUEZ V, et al., 2019).

Oral alterations observed in patients with DM are commonly linked to poor glycemic control and the side effects of medications prescribed for disease management. Well-controlled diabetic patients may undergo routine dental procedures similarly to non-diabetic individuals. However, oral manifestations vary depending on the individual's glycemic condition. In uncontrolled diabetics, alveolar bone loss is generally more severe than in similar periodontal lesions in non-diabetic patients (OLIVEIRA FC, et al., 2017).

Periodontal disease (PD) encompasses a group of infectious inflammatory conditions—including gingivitis and periodontitis—that affect the supporting structures of the teeth. The primary etiologic factor is dental plaque, or microbial biofilm, composed of bacteria, salivary proteins, and desquamated epithelial cells (MENDES DC, et al., 2013).

According to Marcilio JF, et al. (2021), the onset and progression of PD are influenced by multifactorial conditions such as local, environmental, and genetic factors, along with systemic diseases, especially diabetes mellitus, which can exacerbate the host's inflammatory response. Damage to the oral tissues caused by PD has a clear negative impact on a patient's quality of life (IZU A, et al., 2010).

Over the past five decades, the relationship between DM and PD has been extensively studied, with numerous epidemiological investigations and literature reviews demonstrating significant increases in the prevalence and progression of both conditions (OLIVEIRA FC, et al., 2017).

Scientific evidence suggests that individuals with uncontrolled diabetes are more likely to develop gingivitis and periodontitis compared to those with controlled glycemia or healthy individuals. Thus, diabetes is considered a risk factor that contributes to the susceptibility, onset, and progression of periodontal diseases. Furthermore, PD may negatively impact glycemic control, as acute infection can induce insulin resistance, leading to chronic hyperglycemia (IZU A, et al., 2010).

A large number of diabetic individuals remain unaware that maintaining proper oral hygiene can assist in glycemic control and increase the longevity of their dentition. The lack of awareness among medical professionals regarding the bidirectional relationship between diabetes and PD may worsen this scenario. In this context, the role of the dental surgeon is crucial for preventing and treating these conditions, as well as for facilitating collaboration with the broader healthcare team to improve patient outcomes (SOUSA JNL, et al., 2014).

Brazil's Unified Health System (SUS) offers a set of public health strategies for the promotion, prevention, diagnosis, and treatment of diseases, including professional training focused on diabetic patient care. These actions are primarily managed at the municipal level through primary healthcare networks. Nonetheless, few diabetic patients receive dental care through primary care services, and active demand for periodontal treatment remains insufficient, considering its importance in glycemic control (MOLMELSTET KC, et al., 2016).

Given the high prevalence of diabetes mellitus, academic and healthcare professionals must deepen their understanding of this issue, which still requires further investigation. This study aims to demonstrate the relationship between DM and PD and to identify effective strategies to address challenges such as the lack of patient awareness regarding metabolic control and poor follow-up with dental professionals. In this context, the dental surgeon must play a proactive role in the therapeutic process—not only ensuring effective periodontal and glycemic control but also promoting interdisciplinary care aimed at improving patients' quality of life.

METHODS

This is a retrospective, quantitative, descriptive, and cross-sectional field study. To obtain the results presented, secondary data were used — specifically, 60 dental records of patients registered at a Type III Center for Dental Specialties. Among these, 30 records belonged to patients with diabetes mellitus, and 30 to non-diabetic individuals.

The research was conducted at the Center for Dental Specialties (CEO) located in a municipally in the state of Pará. The CEO serves all age groups, with patient referrals made through the primary care network for specialized services in Special Needs Dentistry, Endodontics, Minor Oral Surgery, and Prosthodontics (morning shift), as well as Pediatric Dentistry and Periodontics (afternoon shift). The unit operates from 08:00 to 18:00.

The aim was to investigate diabetic patients with a high incidence of periodontal disease treated at the CEO in a municipality in the state of Pará, and to assess the relationship between disease occurrence and prevalence, considering age, sex, and disease severity. Medical records with incomplete information, those involving comorbidities that could compromise the analysis of the relationship between diabetes and periodontal disease, and patients with uncontrolled diabetes were excluded from the study. Inclusion criteria were: patients over 40 years of age, of both sexes, with a defined systemic health status, and with at least one tooth present.

Data were compiled in a database using SPSS Statistics for Windows, version 20.0, and analyzed using univariate and bivariate descriptive and inferential statistics. Descriptive analysis was performed using absolute and relative data (frequencies and percentages), central tendency measures (mean), and variability (standard deviation, minimum, and maximum values). Inferential analysis included adherence and Chi-square tests, which identify predominant responses among participants and assess associations between qualitative variables. Statistical tests were selected based on the nature of the variables (qualitative), and a 95% confidence interval with a 5% significance level ($p<0.05$) was applied to interpret the results.

Regarding ethical aspects, this study strictly followed the principles established by Brazilian National Health Council (CNS) Resolution No. 466/12, which outlines four core bioethical principles: autonomy, non-maleficence, beneficence, and justice. The resolution ensures the bioethical rights and duties of the scientific community, research participants (researchers and subjects), and the State. It is important to highlight that no direct contact occurred between researchers and participants.

This study adhered to all ethical research standards and ensured confidentiality and anonymity of personal data, using information strictly for scientific purposes. It was conducted only after approval by the Research Ethics Committee (CEP) involving human beings, registered under the CEP/CONEP System**.** Compliance with fundamental research terms was assured, including the use of the Authorization for Use of Research Files/Data**,** as the study utilized dental records, registries, databases, and documents**.** Due to its retrospective nature**,** this study was exempt from requiring Informed Consent (ICF), as no direct contact with patients occurred. The study was approved under CEP opinion number 7.457.939, CAAE: 80207224.2.0000.0341.

RESULTS

The present sample included 30 patients with diabetes and 30 individuals in the control group, of both sexes and aged between 40 and 75 years, who sought care at the Type III Center for Dental Specialties in a municipality in the state of Pará. **Table 1** presents, for diabetic patients, the recorded indices of the presence or absence of periodontal disease, number of missing teeth, oral hygiene status, and use of dental floss, according to the dependent variable of the study. **Table 2** presents the same indices for the control group (patients without diabetes). **Table 3** displays data on tooth mobility and the presence of dental calculus in diabetic and non-diabetic patients, respectively.

Table 1 - Analysis results for patients with diabetes mellitus.

Habits and characteristics	Subgroups	Male (F)	%	Female (F)	%	Total %
Periodontitis	Yes	7	23.33	11	36.67	60
	No	7	23.33	5	16.67	40
p = 0.2945						
Gingivitis	Yes	2	6.67	3	10	16.67
	No	12	40	13	43.33	83.33
p = 0.0097						
Healthy oral condition	Yes	2	6.67	0	-	6.67
	No	12	40	16	53.33	93.33
p = 0.9220						
Missing teeth	≤10	2	6.66	4	13.33	19.99
	>10	12	40	12	40	80
p = 0.7837						
Oral hygiene	Normal	1	3	0	-	3
	Regular	6	20	5	16.67	36.67
	Poor	7	23.33	11	36.67	60
p = 0.3956						
Use of dental floss	Yes	1	3.33	3	10	13.33
	No	12	40	9	30	70
p = 0.5265						

Source: Fontenelle SS, et al., 2025.

In this study, among diabetic patients (**Table 1**), 60% presented with periodontitis, while only 16.67% had gingivitis, and 6.67% showed no periodontal changes (healthy oral status). Most of them (80%) had lost more than 10 teeth due to periodontal disease. Furthermore, 60% were classified as having poor oral hygiene according to the available records. When asked about dental floss use, 70% reported not using it, although 5 patients did not answer this question.

Despite the relevance of these values, statistical analysis using the Chi-square test showed that p-values did not reach statistical significance for periodontal disease and healthy oral condition ($p > 0.05$), meaning that no strong association was confirmed at the 5% significance level.

Table 2 - Analysis results for control group patients.

Habits and characteristics	Subgroups	Male (F)	%	Female (F)	%	Total %
Periodontitis	Yes	6	20	9	30	50
	No	9	30	6	20	50
						p = 0.2733
Gingivitis	Yes	9	30	5	16.67	46.67
	No	6	20	10	33.33	53.33
						p = 0.1927
Healthy oral condition	Yes	0	0	0	0	0
	No	15	50	15	50	100
						p = 0.9850
Missing teeth	≤10	9	30	6	20	50
	>10	6	20	8	26.67	46.67
						p = 0.6530
Oral hygiene	Normal	1	3.33	1	3.33	6.66
	Regular	6	20	7	23.33	43.33
	Poor	8	26.66	5	16.67	43.33
						p = 0.9609
Use of dental floss	Yes	6	20	7	23.33	43.33
	No	9	30	7	23.33	53.33
						p = 0.9903

Source: Fontenelle SS, et al., 2025.

As seen in **Table 2**, 50% of control group patients presented with periodontitis, while 46.67% showed signs of gingivitis. Differently from the diabetic group, no individual had a completely healthy oral condition. Regarding tooth loss, 46.67% had lost more than 10 teeth, a percentage lower than that observed in the diabetic group (**Table 1**). Furthermore, oral hygiene conditions were relatively better in non-diabetic patients, with 43.33% classified as having regular hygiene and 43.33% as poor hygiene. In relation to dental floss use, 53.33% reported not using it, although one participant did not respond to this question.

Table 3 - Tooth mobility and presence of dental calculus in diabetic and control patients.

Mobility Degree	Diabetic Group (F)	%	Control Group (F)	%
Grade 0	12	66.66	5	33.33
Grade 1	2	11.11	10	66.66
Grade 2	3	16.66	3	20
Grade 3	1	5.55	2	13.33
Dental calculus				
Absent	0	0	3	10
Low	14	46.66	11	36.33
High	16	53.33	16	53.33

Source: Fontenelle SS, et al., 2025.

In **Table 3**, which analyzes the severity of periodontal disease in both groups, tooth mobility was lower in the diabetic group. Among the 18 diabetic patients diagnosed with periodontitis, only 6 exhibited some degree of mobility. In contrast, among 15 control patients with periodontitis, only 5 showed no signs of mobility. Regarding dental calculus, no diabetic patient was free from calculus. In this group, 53.33% had a high amount of calculus, and 46.66% had a low amount. In the control group, 10% had no calculus, while the percentage of patients with high levels of calculus remained elevated, also at 53.33%.

DISCUSSION

Diabetes complications are leading causes of hospitalization, limb amputation, and oral manifestations (SOUSA JNL, et al., 2014). Periodontal disease is an infectious process that results in a potent inflammatory response and is the most common dental manifestation in uncontrolled diabetic patients. Many of these patients present periodontal disease, characterized by increased alveolar bone resorption and gingival inflammatory changes (ARRUDA TM e RAIMONDI JV, 2018).

The association between systemic disorders and periodontal disruption is based on the scenario provided by periodontitis, which enables the transport of inflammatory mediators and periodontal pathogens via blood and saliva from periodontal pockets to healthy sites. Consequently, several studies have observed a relationship between the presence of periodontal disease and other disorders such as diabetes, cardiovascular diseases, neonatal malformations, osteoporosis, and cancer (SOUZA EQ, et al., 2016).

This study analyzed the association and prevalence of periodontal disease and diabetes mellitus based on retrospective data from a Type III Center for Dental Specialties in a municipality in the state of Pará. Variables were explored using the chi-square test to investigate possible associations.

Results were divided into control and diabetic groups, both presenting characteristics of poor oral hygiene, such as lack of dental floss use, presence of dental calculus, and tooth mobility, resulting in multiple tooth loss, as recorded in the patient files. Plaque accumulation was higher in diabetic patients compared to non-diabetic patients, whereas tooth mobility was significantly greater in the control group. This increasing rate of periodontal symptomatology is consistent with the literature (CORASSA RB, et al., 2022), where the pathology aligns with critical demographic and socioeconomic changes in Brazil. Similar to diabetes, gingivitis and periodontitis affect a large portion of the population, with estimates suggesting that approximately 80% suffer from gingivitis or moderate periodontitis, while 8% to 10% experience the most severe forms.

Regarding the findings, 60% of the sample was diagnosed with periodontitis (**Table 1**), supporting studies that consider diabetes a primary factor in the exacerbation of periodontitis. Additionally, most cases occurred in female participants. However, it is important to note the predominance of females over males in the sample, which may have influenced outcome distribution between sexes. Literature reports that, beyond biological factors, women's perception of symptoms and physical signs of disease, acquired knowledge through family caregiving roles, and more frequent diagnostic testing contribute to this elevated prevalence (SOUSA JNL, et al., 2014).

It was found that 16.67% of the population had gingivitis, while 93.33% of all patients did not have a normal oral health condition. Furthermore, 80% of all individuals, male and female, lost more than 10 teeth, indicating a strong impact on oral health status. Supporting studies emphasize that due to systemic diseases, greater care is required in formulating the usual periodontal treatment plan. Diabetic patients need to be cautious and informed about the risk this disease poses to periodontal status and vice versa (MORETTO NUNES CM, et al., 2015).

In contrast, men showed better oral health regarding hygiene conditions (20% regular and 3% normal) than women (16.67% regular and 0% normal), although women demonstrated better dental floss usage (10%), consistent with previous studies suggesting women may have more regular oral hygiene habits compared to men (SOUSA JNL, et al., 2014). However, strict and regular oral hygiene habits in systemic patients are not always adequately conveyed, as noted (SARDENBERG CH, et al), who found that 54% of endocrinologists did not observe oral manifestations and believed greater collaboration between medical and dental professionals was necessary.

Analysis of the control group (**Table 2**), i.e., patients without systemic disease, showed that 50% had periodontitis. This indicates that despite diabetes being a known risk factor for periodontal disease, non-diabetic individuals also exhibit high prevalence of this condition. Besides poor oral hygiene, other systemic factors such as hypertension, cardiovascular diseases, and obesity—often associated with advanced age—are linked to increased periodontitis risk. The correlation between systemic pathologies and periodontal status is well established in the literature, recognizing that dental biofilm presence is higher due to host vulnerability, with diabetes among the diseases with a marked periodontal influence (MORETTO NUNES CM, et al., 2015).

The gingivitis percentage was higher in the control group (46.67%) than in diabetic patients (16.67%), mainly because severe disease phases decrease the number of patients in the control group while increasing in diabetic patients. This suggests that disease severity influences group distribution, with controls generally showing fewer advanced cases. Complementary studies demonstrate the impact of hyperglycemia on diabetic patients' bodies and the consequent predisposition to severe gingival disease due to reduced insulin secretion and cell insulin sensitivity, which impair healing by delaying cell proliferation and limiting collagen metabolism, glycoproteins, and mucopolysaccharides (PRESHAW PM, et al., 2012).

Other control group results (**Table 2**) compared to diabetics (**Table 1**) show a 30% increase in patients with tooth loss of up to 10 teeth and a 33.33% decrease in those with more than 10 teeth lost. Normal oral hygiene was higher in controls (6.66%) than in diabetics (3%), with regular and poor hygiene both at 43.33% in controls, still better than the 60% poor hygiene seen in diabetics. Dental floss usage was also higher in controls. These findings reinforce the importance of good oral hygiene for tooth preservation, especially in systemic disease patients, where symptoms tend to worsen (MEALEY BL e OATES TW, 2006).

Poor oral hygiene practices are well documented in the literature Moura Chaves MF, et al. (2024), which highlights deficiencies in knowledge regarding oral hygiene habits and the importance of oral health care in diabetic patients. The lack of attention to periodontal disease development during glycemic imbalance is also noted (TAYLOR GW e BORGNAKKE WS, 2008). Data show 76% of diabetic patients were unaware of necessary diabetes care, and 84.2% lacked knowledge about periodontal disease, underscoring the need for interdisciplinary care among patients and health professionals to prevent glycemic control complications (DE SÁ YSB, et al., 2023).

Regarding dental calculus (**Table 3**), 100% of diabetic patients were affected, whereas 89.66% of controls were affected, with 10% free of calculus. This is related to poor oral hygiene and supports findings that plaque accumulation around teeth and gingival sulcus affects supporting tissues, leading to initial gingivitis and later periodontitis (MENDES DC, et al., 2013). Regarding mobility, control patients exhibited higher indices: only 33.33% had no mobility, while 66.66% of diabetic patients showed no mobility. However, controls had a higher number of teeth present (**Tables 1** and **2**). This difference can be explained by delayed healing in diabetic patients, resulting in greater tooth loss (SOUSA JNL, et al., 2014).

CONCLUSION

Based on the results obtained, which demonstrate significant prevalence rates of tooth loss, periodontitis, and dental calculus, it is understood that gaps remain in knowledge regarding proper oral hygiene and rigorous dental follow-up in the context of periodontal disease and systemic health. These gaps stem not only from patients but also from healthcare professionals, highlighting the need for a multiprofessional approach. Therefore, greater integration and collaboration between physicians and dentists responsible for treatment planning in Primary Health Care Units is essential, taking into account socioeconomic and cultural conditions. The objective is to educate and regularly monitor patients to prevent possible complications and improve their quality of life.

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