



ORIGINAL ARTICLE

Evaluation of the incidence of gingivitis in individuals with diabetes and its correlation with glycosylated hemoglobin levels

Evaluación de la incidencia de gingivitis en individuos con diabetes y su correlación con los niveles de hemoglobina glicosilada

Jonathan Armando Yanza-Freire ¹✉ , Santiago Xavier Peñarreta-Quezada ¹ ,
Nancy Catalina Suárez-Andrade ¹ 

¹Universidad Regional Autónoma de Los Andes, Sede Ibarra, Ecuador.

Received: May 27, 2024

Accepted: June 6, 2024

Published: June 14, 2024

Citar como: Yanza-Freire JA, Peñarreta-Quezada SX, Suárez-Andrade NC, Evaluación de la incidencia de gingivitis en individuos con diabetes y su correlación con los niveles de hemoglobina glicosilada. Rev Ciencias Médicas [Internet]. 2024 [citado: fecha de acceso]; 28(S1): e6433. Disponible en: <http://revcmpinar.sld.cu/index.php/publicaciones/article/view/6433>

ABSTRACT

Introduction: gingivitis is characterized by inflammation of the gums without affecting the dental support tissues. Various symptoms are part of its clinical picture such as reddening, bleeding, increase in volume and in diabetic patients it tends to be more aggressive and of greater incidence.

Objective: to describe the prevalence of gingivitis in diabetic patients and the correlation with levels of glycosylated hemoglobin.

Methods: an observational, descriptive and cross-sectional study was carried out in patients with Diabetes Mellitus type II with gingivitis, from December 2022 to February 2023 at the IESS Ibarra Hospital, Ecuador. The universe was composed of 558 patients, a sample of 60 was obtained from a non-probabilistic intentional sampling, with established inclusion and exclusion criteria. Microsoft Excel and the statistical program Epi Info were used to process the data, for which the characteristics of the variables and their categories were considered. Percentages were used to determine prevalence.

Results: 48 % (29) were men and 52 % (31) were women. The average age of the men was 53 and of the women 54 years. The prevalence of gingivitis was 98 % (n = 59). The relationship between the presence of gingivitis and age was evidenced, determining that age is not a risk factor for the presence of gingivitis in patients with Diabetes Mellitus.

Conclusions: the identification of factors such as sex and age that may influence the occurrence of gingivitis provides valuable information for designing specific oral health interventions and improving the quality of life of diabetic patients in the region.

Keywords: Gingivitis; Diabetes Mellitus; Patients; Prevalence.

RESUMEN

Introducción: la gingivitis se caracteriza por una inflamación en las encías sin afectar los tejidos de soporte dental. Varios síntomas forman parte de su cuadro clínico como enrojecimiento, sangramiento, aumento de volumen y en pacientes diabéticos tiende a ser más agresiva y de mayor incidencia.

Objetivo: describir la prevalencia de gingivitis en pacientes diabéticos y la correlación existente con los niveles de hemoglobina glicosilada.

Métodos: se realizó un estudio observacional, descriptivo y transversal en pacientes con Diabetes Mellitus tipo II con gingivitis, comprendió el período diciembre de 2022 a febrero de 2023 localizado en el Hospital IESS Ibarra, Ecuador. El universo estuvo integrado por 558 pacientes, se obtuvo una muestra de 60 a partir de un muestreo intencional no probabilístico, criterios de inclusión y exclusión establecidos. Para el procesamiento de los datos se utilizó el programa Excel de *Microsoft* y el programa estadístico *Epi Info* para lo cual se consideraron las características de las variables y sus categorías. Para determinar la prevalencia se utilizaron porcentajes.

Resultados: el 48 % (29) fueron hombres y 52 % (31) fueron mujeres. La edad promedio de los hombres fue de 53 y de las mujeres 54 años. Se determina una prevalencia de gingivitis en el 98 % (n = 59). Se evidenció la relación de la presencia de gingivitis y la edad, determinándose que la edad no es un factor de riesgo para la presencia de gingivitis en pacientes con Diabetes Mellitus.

Conclusiones: la identificación de factores como el sexo y la edad que pueden influir en la aparición de la gingivitis proporciona información valiosa para diseñar intervenciones de salud oral específicas y mejorar la calidad de vida de los pacientes diabéticos en la región.

Palabras clave: Gingivitis; Diabetes Mellitus; Pacientes; Prevalencia.

INTRODUCTION

Diabetes Mellitus is a chronic metabolic disease characterized by elevated blood glucose levels. According to the ADA 2023 (American Diabetes Association 2023) for the diagnosis of Diabetes Mellitus, the fasting glucose value is greater than or equal to 126 mg/dl; or random glucose greater than or equal to 200 mg/dl; or an A1C (Glycated Hemoglobin) greater than or equal to 6,5 %.⁽¹⁾

The World Health Organization (WHO) indicates that the number of people with diabetes in the world has increased from 30 million in 1995 to 347 million at present and it is estimated that by 2030 there will be 366 million people with Diabetes Mellitus.⁽²⁾

Diabetes Mellitus is a systemic disease that affects the whole body; patients are vulnerable to certain diseases especially in the oral cavity such as: xerostomia, gingival abscesses, alveolar bone absorption (causing tooth mobility and early tooth loss), as well as candidiasis, stomatitis, halitosis, geographic tongue, saburral tongue, gingivitis and periodontitis.⁽³⁾

Gingivitis is considered the most common periodontal disease in the world, with a prevalence of up to 80 %. Gingivitis is the initial stage of a periodontal disease characterized by signs such as inflammation, coloration, edema and gingival bleeding generated by the formation of a biofilm that causes the destruction of the supporting tissues of the tooth such as the gingiva, periodontal ligament, root cementum and alveolar bone.^(4,5)

According to Ochoa SP,⁽⁶⁾ considers that Diabetes Mellitus can be an important modulator of periodontal inflammation and an important cause of dental loss; describing a prevalence of bacterial plaque associated with gingivitis of 50 %, and concluding that dental loss is related to the low control of oral hygiene that was evidenced at the time of the survey.

Sid JM,⁽⁷⁾ determined a prevalence of 98 % of gingivitis in diabetic patients. For this reason, it was considered essential to determine the prevalence of gingivitis in people with diabetes, since it has a bidirectional relationship, leading to the fact that poor control of diabetes may be associated with an increase in the prevalence of gingivitis.

Most of the studies related to this topic have focused on type 2 DM as a risk factor for periodontal disease, probably because both diseases are historically seen in people between 40 and 50 years of age. Advanced periodontitis was only seen in the diabetic group. The two national studies mentioned above showed, independently of the type of DM, that periodontal disease and its severity is more common in people with DM when compared to those without DM (control group).⁽⁸⁾

In view of this problem, our objective was to describe the prevalence of gingivitis in diabetic patients and the correlation with glycosylated hemoglobin levels.

METHODS

An observational, descriptive and cross-sectional study was carried out in patients with Diabetes Mellitus type II with gingivitis, from December 2022 to February 2023 located in the Hospital IESS Ibarra, Ecuador. The universe was composed of 558 patients, a sample of 60 was obtained from a simple random sampling, inclusion and exclusion criteria established.

Inclusion criteria

Patients with Diabetes Mellitus Type II.

Patients with an age range of 35 to 75 years and agreed to participate.

Exclusion criteria

Patients with presence of diabetes mellitus type I and/or anemia.

Total edentulous and prosthesis wearers.

Patients who did not meet the established age range and did not agree to participate.

The variables studied were age, gender, presence of gingivitis and glycosylated hemoglobin value. The diagnosis of the presence of gingivitis was made by the degree of gingival recession present in the patients. The glycosylated hemoglobin variable was analyzed as a quantitative and qualitative variable taking into account the ADA 2023 guidelines to determine whether their pathology was controlled; patients < 65 years with $A1C \leq 7\%$ and patients older than > 65 years with $A1C \leq 8\%$.

The work dynamics used was similar to that described by Rosales S et al.,⁽⁹⁾ each patient underwent interrogation and meticulous clinical oral examination through the methods: observation, palpation and exploration. Gloves, oral mirror, forceps and explorer were used to identify the disease and its location.

An informed consent form was given to patients who agreed to participate in the study, informing them of the characteristics of the study and their willingness to participate in it. The Individual Clinical History of Stomatology was prepared according to the established instructions. This document contained most of the epidemiological clinical information necessary for the research.

Microsoft Excel and the statistical program Epi Info were used to process the data, for which the characteristics of the variables and their categories were considered. Percentages were used to determine prevalence.

The research was approved by the center's Scientific Council and the consent of the examinees was taken into account. The principles of medical ethics and the aspects established in the Declaration of Helsinki were complied with.

RESULTS

The age range was between 35 and 75 years. The average age of the 60 patients was 53. By gender, 29 (48 %) were men and 31 (52 %) were women. The average age of the men was 53 and 54 respectively. After the study, the prevalence of gingivitis was found to be 98 % (n = 59). The prevalence of gingivitis in adult patients with Diabetes Mellitus is also demonstrated (Figure 1).

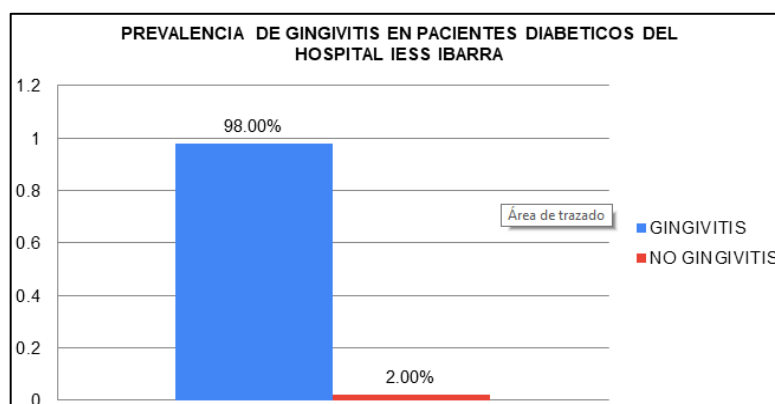


Fig. 1 Prevalence of gingivitis in the whole sample.

The mean A1c of the study was $8,34 \pm 2,7$ %. By gender, men presented an average A1c value of $8,21 \pm 3,01$ %; and in women an average A1c of $8,47 \pm 2,36$ %. The A1c variable was categorized according to the ADA 2023 criteria, determining that 20 (33 %) had an adequate A1c and 40 (67 %) had an inadequate A1c denoting poor metabolic control.

	GINGIVITIS		
	SI	NO	
MASCULINO	29	0	29
FEMENINO	30	1	31
	59	1	60

Fig. 2. Relationship between gingivitis and gender in the entire sample.

The relationship between the presence of gingivitis and age is evident. A RR 0,98 ($p=0,17$) of presenting gingivitis in relation to age is determined. Determining that age is not a risk factor for the presence of gingivitis in patients with diabetes mellitus (Figure 3).

	GINGIVITIS		
	SI	NO	
< 65 años	50	1	51
≥ 65 años	9	0	9
	59	1	60

Fig. 3. Relationship between gingivitis and age in the entire sample.

The relationship of the presence of gingivitis and A1c categorization according to the ADA 2023 criteria is evidenced. A RR 0.97 ($p=0,67$) of presenting gingivitis in relation to A1c level was determined. Determining that the A1c value is not a risk factor for the presence of gingivitis in patients with diabetes mellitus (Figure 4).

	GINGIVITIS		
	SI	NO	
A1c no controlada	35	1	36
A1c controlada	24	0	24
	59	1	60

Fig. 4. Relationship of Gingivitis with the variable A1c in the whole sample.

DISCUSSION

The present study shows a 98 % prevalence of gingivitis in diabetic patients, a prevalence very similar to that described by Sid et al.,⁽⁷⁾ and also correlates to that described by Matesanz P et al.,⁽¹⁰⁾ who describe a prevalence in favor of diabetic patients over non-diabetic patients. In light of the results, we consider gingivitis as part of the complications of Diabetes Mellitus; Matesanz P et al.,⁽¹⁰⁾ consider it as the sixth typical complication of Diabetes Mellitus.

Sid JM et al.,⁽⁷⁾ describe a prevalence of gingivitis in < 65 years old: 79,6 % and 20,4 % in > 65 years old. In the present study, the average age of the population studied was $53,7 \pm 9,01$ years; data very similar to those described by Cuesta RE and Pacheco Y.,⁽¹¹⁾ where it is evident that the ages at which the presence of gingivitis is described range between 38-53 years.

In relation to gender, the presence of gingivitis was associated with a RR 1,03 ($p=0.95$) with the female sex, a relationship very similar to that described by Sid JM.,⁽⁷⁾ et al where a prevalence of 73,47 % of gingivitis in the female sex is evidenced.

In diabetic patients, according to Navarro A et al.,⁽¹²⁾ periodontal disease and dental caries represent the most prevalent pathologies that affect the oral health of these patients.⁽⁹⁾ Cuesta RE and Pacheco Y.,⁽¹¹⁾ describe a bidirectional effect between diabetes mellitus and the presence of gingivitis. However, in the present investigation there is no evidence of a direct relationship between the glycosylated hemoglobin value and the presence of gingivitis, which leads to the conclusion that diabetes mellitus per se is an important factor for the development of gingivitis.

An interesting aspect that emerges from this study is the lack of a direct relationship between the A1c % value and the presence of gingivitis in these diabetic patients. A1c % is a key indicator of glycemic control in people with diabetes, and many might assume that worse control would be related to an increased risk of gingivitis. However, this study suggests that factors other than blood sugar levels may play an important role in the development of gingivitis in this population.

A relevant fact that has been observed is that gingivitis occurs more frequently in the female sex and in middle-aged patients. This may indicate that there are hormonal and aging factors that could be contributing to the prevalence of gingivitis in these specific groups. This information is essential to personalize strategies for the prevention and treatment of gingivitis in diabetic patients, as it allows more effective targeting of higher risk groups.

CONCLUSIONS

The research conducted in the city of Ibarra has yielded worrisome data on the prevalence of gingivitis in diabetic patients. The findings highlight the importance of addressing oral health in patients with diabetes, as gingivitis may not only affect the quality of life of these individuals, but may also have implications on their general health. The high prevalence of gingivitis in diabetic patients in Ibarra, along with the lack of direct correlation between A1c % and gingivitis, underscores the importance of proper dental care in this population.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Authorship contribution

JAYF: Formal analysis, research, original draft-writing, revising, and editing.

SXPQ: Formal analysis, research, review and editing.

NCSA: Formal analysis, research, review and editing.

Funding

None

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