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Research Article

Frequency of Periodontal Disease and its Relationship with Age and with Comorbidities of the Metabolic Syndrome in Inhabitants Between 20 and 79 years of Age in the Sierra Gorda, Querétaro, Mexico

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Summary

Aim

To evaluate the frequency of periodontal disease and its relationship with age and the presence of metabolic syndrome in a group of patients from Sierra Gorda, Mexico.

Methodology

A descriptive, cross-sectional and prospective study was carried out in 208 patients between 20 and 79 years of age, of both sexes. Prior to the epidemiological survey, a Dentist Surgeon was calibrated (Kappa=0.91; p=001). To measure the presence of periodontal disease (PD), the Community Periodontal Index (IPC) was collected. To measure the association between the study variables, the Likelihood Ratio values were calculated because in all cases some of the observed values were ≤ 5, considering a confidence level of 95%.

Results

Both Diabetes and Dyslipidemia were the two comorbidities that occurred most frequently, observing that the older, the higher the probability of finding subjects with some type of comorbidity (p=0.001). In patients who presented comorbidities, a higher frequency of moderate to severe gingivitis and mild periodontitis and cases of moderate to severe periodontitis were observed.

Conclusion

It is confirmed how aging and comorbidities are factors of great impact in the deterioration of tissues and dental support structures, which leads to a greater vulnerability to PD and its complications.

Abstract

Aim. To evaluate the frequency of periodontal disease and its relationship with age and the presence of metabolic syndrome in a group of patients from Sierra Gorda, Mexico. Methodology. A descriptive, cross-sectional and prospective study was carried out in 208 patients between 20 and 79 years of age, both sexes. Prior to the epidemiological survey, a Dentist Surgeon was calibrated (Kappa=0.91; p=001). To measure the presence of periodontal disease (PD), the Community Periodontal Index (IPC) was collected. To measure the association between the study variables, the Likelihood Ratio values were calculated because in all cases some of the observed values were ≤ 5, considering a confidence level of 95%. Results. Diabetes and Dyslipidemia were the two comorbidities that occurred most frequently, observing that the older, the higher the probability of finding subjects with some type of comorbidity (p=0.001). In patients who presented comorbidities, a higher frequency of moderate to severe gingivitis and mild periodontitis and cases of moderate to severe periodontitis were observed. Conclusions. It is confirmed how aging and comorbidities are factors of greatest impact on the deterioration of dental support tissues and structures, which leads to greater vulnerability to PD and its complications.

Introduction

Periodontal Disease (PD) constitutes a group of inflammatory diseases multifactorial chronicles Characterized by an abnormal host response to the challenge of specific bacteria and their residues [1-5] basically stimulated by the prolonged presence of the subgingival biofilm, the activation of the immune system, mainly for protective purposes, implies an unregulated secretion of chemical substances and inflammatory mediators 6 , which lead to the irreversible destruction of dental protection and support tissues [1-5,7,8]. This response may be influenced by a series of risk factors that modulate the susceptibility or resistance to the development of the disease, its rate of progression and even the response to treatment [9]. PD in its different stages is the second cause of oral morbidity worldwide, a fact that is equally present in Mexico, which is why it is considered a Public Health problem [10]. Given the emerging evidence on PD, efforts have been made to discover connections between periodontal disease and its potential effect on other diseases. In some studies it has been observed that the incidence of periodontal disease is higher when the metabolic syndrome is present, since this presents as an inflammation in the dental support tissues, where in this process it is believed that the migration of oral and by-products to the circulatory system, with a systemic dissemination of inflammatory mediators [15], sharing with non-communicable chronic diseases not only the factors but also their main risk indicators [1,6,11-19].

Metabolic Syndrome (MS) refers to the pathological state of metabolic disorders in proteins, fats, carbohydrates and other substances in the body, that is, a systemic metabolic disease; PD is also part of the systemic inflammatory diseases, [20] since it can be related to functional alterations. A blood increase in chemical mediators of inflammation has been observed and verified in patients with untreated chronic PD, which negatively affects general health [2]. Several studies have shown that the prevalence of periodontitis and the degree of attachment loss increase considerably with age, but some of the studies have shown that the vast majority of PD patients suffer from some systemic disorder [22]. The common denominator among the group of pathologies that make up MS is oxidative stress and the consequent hyperinflammation that prevails in the chain of interactions and gives rise to serious systemic complications such as cardiovascular disease, or local complications such as periodontitis. The SM allows a pro-oxidative state in the periodontal tissues, altering the antioxidant defense mechanisms. This affects the tissue response to bacterial attack. On the other hand, periodontitis, being a great source of oxidative markers, promotes the beginning of insulin resistance, and the vicious circle characteristic of MS [11,23-24]. The objective of this work was to evaluate the frequency of periodontal disease and its relationship with age and the presence of metabolic syndrome in patients who attend primary care health units in some communities of the Sierra Gorda in the State of Queretaro, Mexico.

Material and Methods

Study design and participants

A descriptive, observational, cross-sectional and prospective study was carried out in a non-probabilistic convenience sample, selected by the researchers in a determined place and time based on the nominal census of the Chronic Disease Information System (SIC), of patients who were treated in outpatient clinics from March to May 2022 in the first level care health units of Sanitary Jurisdiction No. 4 of Sierra Gorda, Querétaro, Mexico. The sample initially consisted of 229 patients of both sexes, between 20 and 79 years of age; however, 21 patients were excluded from the study due to the following conditions: they did not authorize their inclusion in the study; They were not present on the day of the epidemiological survey, at the time of the examination they stated that they were under dental treatment, those who presented total edentulism , which is why the sample was finally made up of 208 patients.

Ethical and legal considerations of the study

The project was endorsed by the Bioethics and Biosafety Committee of the Dental Occlusion Research Line (LIFESZ-230506), attached to the Faculty of Higher Studies Zaragoza, of the National Autonomous University of Mexico (Of. LIFESZ-21-07). Likewise, the consent was requested under the information of each patient so that they could be included in the study. During the calibration of the examiner and the epidemiological survey, the provisions of the Technical Standard of the Mexican Ministry of Health (NOM013-SSA2-200635) were taken into consideration, which regulates the regulations for the prevention of infection transmission. In the handling of the data, the privacy, intimacy and confidentiality of the information collected was respected, as well as the preservation of anonymity, complying with the ethical principles of autonomy and non-maleficence.

Examiner Calibration

For the epidemiological survey, a Dentist Surgeon was calibrated through the indirect method in order to standardize the interpretation, application and uniform understanding of the criteria for the survey of the Community Periodontal Index (CPI). During the calibration, a total of 27 subjects from the State of Mexico were examined, with characteristics similar to those of the population of interest for the study. To measure the reliability of the observations, the values of absolute and relative concordances and the Cohen's kappa coefficient were calculated, thus avoiding that said coincidences were due to chance (C a =96%, C r =88 %, kappa = 0.91; p=0.001).

Variables and clinical assessment

The variables considered in the study were: age, periodontal disease, and the presence of comorbidities such as obesity, dyslipidemia, arterial hypertension, and diabetes mellitus. Prior to the epidemiological survey, health units were contacted to provide the database of registered patients with one or more metabolic syndrome comorbidities who underwent a home visit in which authorization was requested to include them in the study. study, likewise, they were told that they should present themselves on the day of the clinical examination without having consumed food in a period of no less than eight hours. On the day of the epidemiological survey, the nursing staff measured blood pressure and somatometry. The nutrition staff took samples of the fasting lipid and capillary profile. If they presented hyperglycemia, they were called on two different occasions to re-measure and be certain of the diagnosis.

Clinical examination (CPI survey)

Patient profile data such as age and presence of one or more comorbidities were recorded. The patient was examined comfortably semi-reclining in the dental chair with the head supported, in such a way that the patient's mouth coincided with the examiner's sagittal plane, illuminating the examination area with the dental unit's lamp. For the lifting of the CPI, a flat dental mirror of no. 5 was used, without magnification, and a periodontal probe brand Hu-Friedy® WHO type coded PCP11.5B6, which served as a sensitivity instrument to determine the presence and depth of the periodontal pockets, as well as the detection of subgingival calculus and the response to bleeding. During the exploration, the force exerted during the measurement was never greater than 20 grams. For subgingival calculus detection a very light force was exerted allowing the sphere at the tip of the probe to be around the tooth surface. both buccal and lingual or palatal, which allowed exploration according to the anatomical configuration of the tooth root surface. During the evaluation, the most unfavorable finding was considered according to periodontal integrity in each index tooth, which was coded according to the criteria established for the survey of the Community Periodontal Index (IPC) (Table 1), for which ten were examined. index teeth, five maxillae (17, 16, 11, 26 and 27) and five mandibular teeth (47, 46, 31, 36 and 37). If at the time of the examination any of them was not present, they were replaced by their counterpart.

Table 1: CPI coding used in the epidemiological survey.

CODES					
0	**1**	**2**	**3**	**4**	**9**
CLINICAL CRITERIA					
no sign of disease	Gingival mucosa with presence of bleeding after probing	Presence of supra or subgingival calculus, overflowing restorations or crowns with margin defects.	Presence of moderate pocket (4-5 mm)	Presence of deep pocket (probe equal to or greater than 6mm)	Not registered
CLINICAL CONDITION					
Healthy periodontium, the colored area of the probe is fully visible.	Mild gingivitis, the colored area of the probe is fully visible but there is evidence of bleeding after probing	Moderate to severe gingivitis, the colored area of the probe is completely visible, there is calculus and/or misaligned restorations, there may or may not be bleeding	Mild periodontitis, the colored area of the probe is partially visible due to the presence of a pocket.	Moderate to severe periodontitis, the colored zone of the probe is practically not visible due to the presence of a deep pocket.	Used to indicate the presence of the following evidence, which must be specified separately: tooth mobility, furcation involvement, gingival retractions greater than 3mm and mucogingival problems.

Statistical methods

For the statistical analysis, the statistical package SPSS v.21.0 (IBM, USA) for Windows was used. To measure the frequency of comorbidities and periodontal disease, frequencies and proportions were calculated. To determine the frequency of periodontal disease and its possible association with age or with some type of metabolic syndrome comorbidity, the Pearson Chi-square value was calculated taking into account the condition that if the value observed in any of the cells was The Likelihood Ratio value was considered ≤ 5. In all cases it was contrasted with a confidence level of 95%. The tables were designed in Office Microsoft® Excel v.365.

Results

The study sample consisted of 208 individuals between 20 and 79 years of age, of which 26.4% presented metabolic syndrome (Table 2).

Table 2: Distribution of the study sample according to age and metabolic syndrome.

Metabolic syndrome						
	Absent		Present		Total	
Age group	F	%	F	%	F	%
20-39	111	53.4	4	1.9	115	55.3
40-79	38	18.3	55	26.4	93	44.7
Total	149	71.6	59	28.4	208	100

In relation to the cases of some type of comorbidity, both Diabetes and Dyslipidemia were the two entities that occurred most frequently compared to hypertension and obesity (Table 3).

Table 3: Distribution of cases according to the type of comorbidity.

Comorbidity		F	%
Diabetes	Absent	121	58.2
	controlled	43	20.6
	Not controlled	44	21.2
Hypertension	Absent	145	69.7
	controlled	40	19.2
	Not controlled	23	11.1
dyslipidemia	Absent	122	58.7
	controlled	5	2.4
	Not controlled	81	38.9
Obesity	Absent	168	80.8
	Present	40	19.2

Its distribution by age showed that the frequency of comorbidities of interest for the study was always higher in the age group of 40 to 79 years, with a statistically significant association in all the crossovers performed (p=0001), that is, the older the probability of finding subjects with some type of comorbidity was higher (Table 4).

Table 4: Distribution of comorbidity cases according to age group.

	Absent		controlled		Not controlled	
Age group	F	%	F	%	F	%
Diabetes						
20-39	104	fifty	4	1.9	1	0.5
40-7	17	8.2	39	18.8	27	13
						p=0001
Hypertension						
20-3	111	53.4	1	0.5	3	1.4
40-7	34	16.3	39	18.8	20	9.6
						p=0001
Dyslipidemia						
20-3	96	46.2	1	0.5	18	8.7
40-79	26	12.5	4	1.9	63	30.3
						p=0001
Obesity						
	Absent		Present			
20-39	110	52.9	5	2.4		
40-79	58	27.9	35	16.8		
						p=0001
Metabolic syndrome						
	Absent		Present			
20-39	111	53.4	4	1.9		
40-79	38	18.3	55	26.4		
						p=0001

Regarding the severity of periodontal disease in relation to age, metabolic syndrome and the different types of comorbidities, it was observed that the severity of PD was more frequent and greater in the older age group, likewise, this The same behavior was shown in relation to each of the comorbidities under study, the severity of the PD being more serious when the subject had any type of comorbidity, evidencing a highly significant association in each of the comparisons made (age: likelihood ratio 83.039, p=0.0001; Diabetes: Likelihood Ratio 121.899, p=0.0001; Hypertension: Likelihood Ratio 89.808, p=0.0001; Dyslipidemia: Likelihood Ratio 86.900, p=0.0001; Obesity: Likelihood Ratio3,0.60.34. In patients without metabolic syndrome, two categories predominated: healthy periodontium and moderate to severe gingivitis, while in patients with comorbidities, a higher frequency of moderate to severe gingivitis and mild periodontitis and moderate to severe periodontitis cases were observed. In relation to the more severe cases of PD due to comorbidity, in patients diagnosed with Diabetes Mellitus, PD cases ranging from the presence of moderate to severe gingivitis to cases with moderate to severe periodontitis were observed. Finally, when comparing the severity of the periodontal disease of the patients with comorbidities, between the controlled and the uncontrolled, no statistically significant differences were observed in any of the comorbidities (Table 5).

Table 5: Severity of periodontal disease in relation to age, metabolic syndrome and the different types of comorbidities.

Community Periodontal Index (CPI)												
	Healthy		mild gingivitis		Moderate/severe gingivitis		mild periodontitis		Moderate / severe periodontitis		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%
Age												
20-39	65	56.5	3	2.6	Four. Five	39.1	2	1.7	0	0	115	100
40 or more	7	7.5	0	0	59	63.4	22	23.7	5	5.4	93	100
												p=0001
Metabolic syndrome												
Absent	72	34.6	3	1.4	70	33.7	3	1.4	1	0.5	149	71.6
Present	0	0	0	0	3. 4	16.3	twenty-one	10.1	4	1.9	59	28.4
												p=0001
Diabetes												
Absent	71	34.1	2	1	46	22.1	2	1	0	0	121	58.2
controlled	0	0	1	0.5	29	13.9	eleven	5.3	2	1	43	20.7
Not controlled	1	0.5	0	0	29	13.9	eleven	5.3	3	1.4	44	21.1
												p=0001
Hypertension												
Absent	72	34.6	3	1.4	63	30.3	4	1.9	3	1.4	145	69.7
Controlled	0	0	0	0	27	13	11	5.3	two	1	40	19.2
not controlled	0	0	0	0	14	6.7	9	4.3	0	0	23	11.1
												p=0001
Dyslipidemia												
Absent	68	32.7	two	1	49	23.6	3	1.4	0	0	122	58.7
Controlled	0	0	0	0	4	1.9	1	0.5	0	0	5	2.4
not controlled	4	1.9	1	0.5	51	24.5	twenty	9.6	5	2.4	81	38.9
												p=0001
Obesity												
Absent	71	34.1	3	1.4	76	36.5	16	7.7	2	1	168	80.8
Present	1	0.5	0	0	28	13.5	8	3.8	3	1.4	40	19.2
												p=0001

Discussion

In the results obtained, it was observed that in the study population the severity of PD is directly proportional to age; such as the studies reported by Nazir et al. and Anguiano et al. [25,26], in the first one it was found that IPC 3 (PD4≥5mm) and IPC 4 (PD 6≥mm) were highly concentrated among the elderly; and in the second it was described that a higher proportion of older people (65-74 years) exhibit periodontal pockets of 6 mm or more compared to adult populations in both developed and developing countries. Likewise, it coincides with López Silva et al. [27], since 92.5% of the population over 40 years of age suffered some degree of PD, among which 63.4% suffered from moderate to severe gingivitis, 23.7% suffered from mild periodontitis and 5.4% of the cases presented the most severe forms. severe, also agreeing with the fact that, in the 20 to 30-year-old group of the sample, there were only two cases of CPI 3 and no cases of CPI 4. Regarding the number of comorbidities in relation to age, a greater number of cases without comorbidities was found in patients under the age of 20 to 39, while in the age group of 40 years or older the variable with 3 comorbidities occurred more frequently. This association is shown in a similar way in the one-year longitudinal study by Adachi and Kobayashi, [28] where age and BMI were significantly associated with the development of one or more components of MetS.

In the study population, a frequency of PE similar to that reported by Foratori et al. [52] where it was determined that the prevalence of the most severe forms of PD was significantly higher in the MS group, the study population showed a higher frequency of cases with moderate to severe gingivitis and mild periodontitis (57.2% and 35.5%, respectively), while in the group of patients without MS there were cases of healthy periodontium more frequently (48.6%) than in the control group and it increased significantly due to various components of MS, thus associating MS with periodontitis, without coinciding with the results presented by Nascimento et al. [30]. In studies conducted by Kim et al. [16], Kumar et al. [18], Sakurai et al. [31] and Jaramillo et al. [32] PD is strongly and significantly associated with MS, since a higher frequency of any of its forms was shown; being moderate-severe gingivitis the most frequent, disagreeing with the findings of Texeira et al. [33], Valero et al. [34] and Gomes-Filho et al. [35], since they observed forms of periodontitis more frequently. Discussing the relationship between PD and MS comorbidities, it was observed that in the population that presented MS comorbidities, dyslipidemia was the one that presented most frequently, contrary to what was reported by Koo and Hong [14], since they report the HTA more frequently. However, both agree that DM is the second most common comorbidity. However, in patients with AHT it was observed that the moderate (CPI 2+3) and severe (CPI 4) forms of PD occurred more frequently among

the patients who suffered from this comorbidity, in this group there were no patients with healthy periodontium or mild gingivitis. Unlike Ortiz [4], who determined that 31.2% presented only gingivitis, 26.5% presented only periodontitis and 25.9% did not present any periodontal disease.

In the sample, 98.5% of the individuals with DM2 presented some degree of PD, disagreeing with the results obtained by Hasan et al. [36], Villegas et al. [3] and Singh et al. [15], who reported a lower prevalence of PD in patients with DM2. But, it agrees with the results of Sukhvinder et al. [24] because in patients with DM2 a higher frequency of codes CP2 and CP4 was observed in comparison with patients with other comorbidities; however, in this group with DM2 there was a higher frequency of moderate to severe gingivitis (62%) than mild periodontitis (24.4%), unlike Villegas et al. [3] who found a higher prevalence in benevolent forms of periodontitis (41.6%). 97.5% of the sample that suffers from obesity presented some degree of PD, these results represent a higher prevalence than that obtained by Kim et al. [16] and by Del Hierro et al. [11] also differs from this last study in the fact that the most frequent forms of PD in obese patients were moderate to severe gingivitis and mild periodontitis, instead of mild gingivitis and moderate to severe periodontitis. In other words, an association of MS and PD was observed in the studied population , as was also observed by Kumar et al. [18] and Khan et al. [19] because in this last study, PD was associated with dyslipidemia, obesity, and arterial hypertension.

It was observed that the severity of PD increased as the number of MS components increased, since among patients with healthy periodontium, 94.4% did not suffer from any comorbidity, coinciding with what was explained by Koo and Hong [14]. Where the difference in the number of MS criteria was statistically significantly higher in patients with periodontal disease versus without periodontal disease as reported by Kumar et al. [18]. Regarding the severity of periodontal disease in relation to the control of comorbidities, in the sample it was determined that the mere fact of presenting some comorbidity of MS already implied a risk of suffering from PD, whether the patient presented control or not, opposite to the results shown by Hasan et. to the. 36 who describe an increase in the odds of PE with unfavorable glycemic control and by Singh et al. [15] who observed a significant influence of worsening glycemic status on periodontal destruction.

Conclusion

Undoubtedly, aging is one of the factors with the greatest impact on the deterioration of tissues and organs, as it is on the supporting structures of the tooth, which leads to vulnerability to PD and its complications. For its part, PD is one of the main causes of dental loss, which has not been recognized as a disability, perhaps because its rehabilitation implies a high cost, or even worse, because culturally it is conceived as a natural process of aging and dental preservation is not important in the life of the individual. A relevant condition found during the documentary research was the small number of studies carried out on the relationship between PD and dyslipidemia, when this comorbidity is one of the most prevalent in Latin America.

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