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EVALUATION OF CLINICAL AND RADIOLOGICAL PARAMETERS IN PATIENTS WITH PERIODONTAL PATHOLOGY

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Abstract: *The article presents a comparative study of clinical and radiological parameters assessed by orthopantomography and clinical examination in two groups of patients, which are homogeneous in terms of age group but differ in the presence or absence of carbohydrate metabolism disorders. The study supports the articles in the literature and highlights the fact that diabetes mellitus is an important factor in the development and progression of periodontal pathology.*

INTRODUCTION

Studies in specialized literature over the last decades have shown that a process as complex as dental caries is dependent on numerous aetiological factors that must act simultaneously to trigger the disease process, thus leading to the hypothesis of a triad of causal factors. Studies also include in this triad the background, as well as the microbial flora and nutrition. In addition to the action of food, which can occur both pre- and post-absorptive, the quantity and quality of the food principles influence the cariogenic potential of the food. König (1962) added to these three incriminated factors the time of action factor. The literature highlights that dental caries is a complex, non-inflammatory process that can lead to necrosis and destruction of the hard tissues of the tooth.(1) This may trigger periodontal disease and inefficient mastication due to the symptomatology it generates, and it will affect the process of cleaning and self-cleaning in the damaged area. Caries in the neck of the tooth retain mycobacterial plaque and induce the formation of tartar, an irritating element of the marginal periodontium, thus triggering periodontal diseases.(1,2)

The literature classifies aetiological factors as general, local or systemic, but the microbial factor is the main culprit in the aetiopathogenesis of chronic marginal periodontitis, along with other factors considered as favouring or predisposing. These conditions are caused by a complex of factors simultaneously present in a certain clinical context. Mainly, general factors are supported, and they aggravate periodontal disease by the presence of local factors represented mainly by mycobacterial plaque and dental calculus.(3) Other local factors that induce periodontal disease can be: dento-maxillary abnormalities (dental crowding increases the degree of plaque and tartar retention), parafunctions of the dento-maxillary apparatus (bruxism), tilting teeth, occupational tics, vicious habits, or alterations in the anatomical shape of the gums.(4) In order to identity these factors and to prevent the complications, it is essential to perform a correct clinical examination of the patient and a panoramic dental radiography, which cannot be excluded from the current practice of a dentist as it helps establishing a complete and complex diagnosis of numerous oral and oro-maxillo-facial conditions.(5) The technology for performing this type of radiography is based on the emission of X-rays that have the property of penetrating solid structures; thus an image is rendered in shades of white to black, white being the correspondent of dense radiopaque structures, grey representing the soft tissue structures and black the radiotransparent cavity structures.(6,7)

AIM

The aim of this study is to compare the clinical and radiological parameters evaluated in the subjects of the two studied groups. It intends to establish a complete and comprehensive diagnosis and identify possible risk factors for periodontal disease thus instituting prophylaxis and slowing down its progression.

MATERIALS AND METHODS

420 patients were considered for this study, divided into two groups as follows:

- A group of 210 subjects with periodontal pathology and diabetes mellitus which presented at the dental cabinet and in the University Dental Centre, between March 2018 - August 2020;
- The second group is the witness group consisting of 210 subjects with periodontal pathology, but without diabetes mellitus.

The inclusion criteria of the subjects in the present study are the following:

- Presence of clinical signs of periodontal disease:
  - Gum recession;
  - Bleeding gums;
  - Halitosis;
  - Bone retraction, bone pockets;
  - Tooth migration or mobility;
- Presence of an OPT radiography no older than 6 months;
- Age over 25.

The exclusion criteria are:

- Periodontal therapy in the last 12 months;
- Smokers;

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- Unbalanced cardiovascular diseases;
- Chronic respiratory or renal disease;
- Osteoporosis or rheumatoid arthritis;
- Pregnant or lactating women;
- Patients whose data are incomplete or who refuse to participate in the study.

The selection of patients was made according to the criteria adopted at the 1999 International Workshop for the Classification of Periodontal Diseases. All patients gave their consent for inclusion in the study.

Multiple variables highlighting periodontal pathology were recorded in the patient's chart. Further on we will present some of them with highly significant statistic differences. For the presentation of the results of data analysis we have used indicators of current tendency such as mean, standard deviation (SD), median, interquartile range, (25th percentile - 75th percentile), minimum value (min) and maximum value (max) for quantitative data, and respectively for the number of cases and percentages for qualitative data. For the comparative analysis of the two groups (control group - C and control group - M) the Student T test or Mann-Whitney U test were used for the quantitative variables, and the Chi-Square or Fischer test for the qualitative variables. Software Excel and SPSS were used for data pre-processing and analysing.(7,8,9)

RESULTS

Following the clinical examination of the studied patients, we have observed statistically significant differences. The statistical analysis of data reveals that gum bleeding is statistically significantly higher (p=0.000<0.05) in the research group (C) as compared to the witness group (M). Thus, in the research group the bleeding was spontaneous and occurred in 70.48% of the patients, with only 0.95% with no bleeding, while in the witness group the gum bleeding was absent in 50% of the cases. The presence of calculus in the incisors was 53.81% up to the cervical third in the research group and 30.95% in the control group up to the cervical third. Regarding the absence of tartar, we found that 19.52% of the research subjects had no tartar compared to 41.43% of the control subjects (p=0.000).

Table no. 1. Descriptive analysis of the variable "gingival bleeding" for the two groups (group C or research group, group M or witness group)

		lot				p
		C		M		
		Count	Column N %	Count	Column N %	
Gingival bleeding	No bleeding	2	0,95%	105	50,00%	0.000
	spontaneous	148	70,48%	13	6,19%	
	touch	44	20,95%	50	23,81%	
	brushing	16	7,62%	42	20,00%	

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In the research group the presence of tartar in the molars is about 35% in both the cervical third (34.29%) and the middle third (34.76%), and in the control group the presence of tartar in the molars is about 18% in both the cervical third (18.57%) and the middle third (18.10%). Also, 20.48% of subjects in the research group have tartar in the incisal third compared to 6.19% of subjects in the witness group, and 2.38% of subjects in the research group have tartar at the occlusal surface while no subjects in the witness group have tartar at this level. (p0.000) As for the absence of tartar we found that only 8.10% of subjects in the control group had no tartar compared to 57.14% of subjects in the witness group (p=0.000).

Table no. 2. Descriptive analysis of the variable "incisal area tartar" for the two groups (group C or research group, group M or witness group)

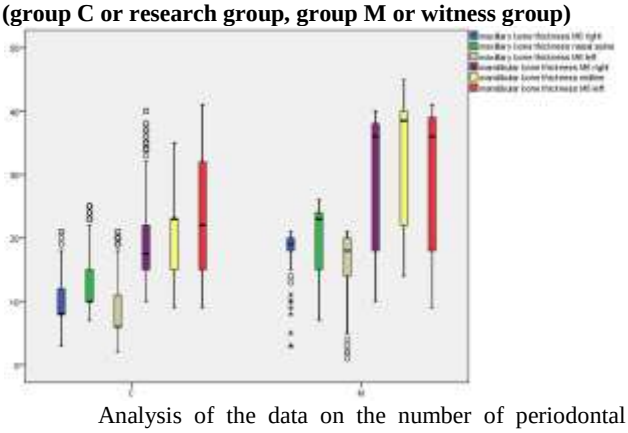
		lot				p
		C		M		
		Count	Column N %	Count	Column N %	
Tartar on incisors	No tartar	41	19,52%	87	41,43%	0.000
	Cervical third	113	53,81%	65	30,95%	
	Median third	41	19,52%	39	18,57%	
	Incisal third	15	7,14%	19	9,05%	

Table no. 3. Descriptive analysis of the variable "tartar lateral area-molars" for the two groups (group C or research group, group M or witness group)

		lot				p
		C		M		
		Count	Column N %	Count	Column N %	
Tartar on molars	No tartar	17	8,10%	120	57,14%	0.000
	Cervical third	72	34,29%	39	18,57%	
	Median third	73	34,76%	38	18,10%	
	Incisal third	43	20,48%	13	6,19%	
	Occlusal faces	5	2,38%	0	0,00%	

Following the statistical analysis of radiological parameters, we observed that the thickness of the maxillary bone at the level of the first molar on both sides (left and right) is significantly lower in the control group compared to the witness group (left: 8.98±4.32 vs. 16.63±4.48, p=0.000, right: 9.50±3.18 vs. 18.48±2.83, p=0.000). Also, the thickness of the maxillary bone at the level of the nasal spine is significantly lower in the control group (12.73±4.26) compared to the witness group (20.29±5.36) (p=0.000) Analysing the thickness of the mandibular bone, statistically significant changes were detected in the 36th, 46th and midline molars respectively (19.18±7.15 group C vs. 30.04±10.47 group M, right; 23.45±9.46 group C vs. 29.65±10.60 group M left; 18.96±5.72 group C vs. 31.97±9.76 group M midline) (p=0.000).

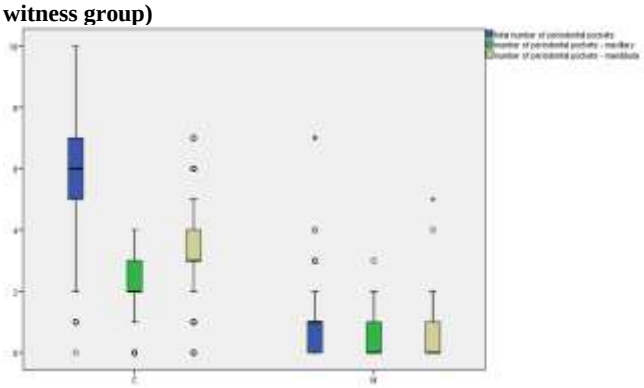
Figure no. 1. Graphical analysis of the variable "maxillary and mandibular bone thickness M6 left, right, and at the level of the nasal spine and midline" for the two groups (group C or research group, group M or witness group)



Analysis of the data on the number of periodontal pockets revealed statistically significant differences between the two groups involved in the study. The total number of periodontal pockets is significantly lower in the M group compared to the C group (0,91±1,06 vs. 5,81±2,04). The number of periodontal pockets, both upper (maxillary) and lower (mandibular), is significantly lower in group M compared to group C where the number is much higher 0.34±0.56 max, 0.58±0.72 and group M compared to 2.35±1.09 max and

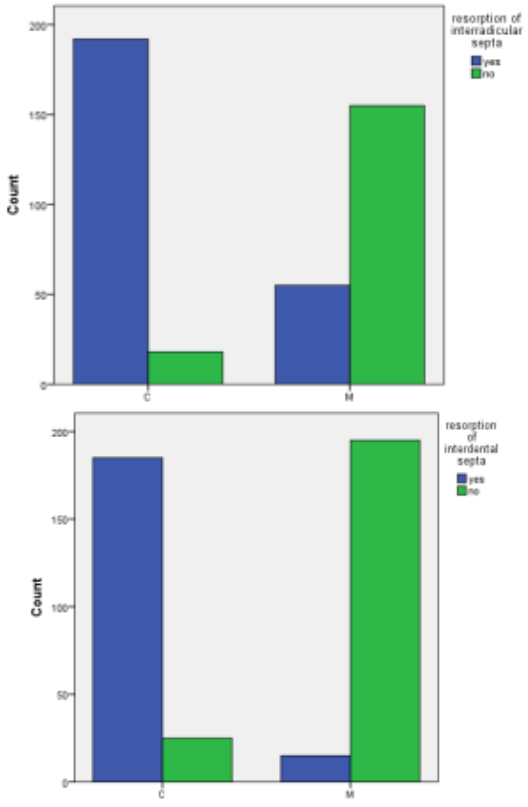
3.49±1.49 and group C.

Figure no. 2. Graphical analysis of the variable "total number of periodontal pockets, maxillary and mandibular" for the two groups (group C or research group, group M or witness group)



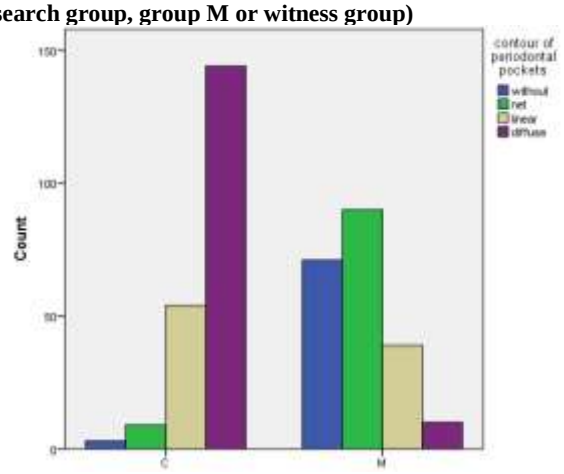
Statistical analysis of the data for interradicular and interdental septal resorption reveals statistically significant differences between the two groups. Of the subjects in the research group 91.43% (n=192) have interradicular septal resorption and 88.10% (n=185) have interdental septal resorption compared to 73.81 (n=155) in the witness group who do not have interradicular septal resorption and 92.86% (n=195) who do not have interdental septal resorption (p=0.000).

Figure no. 3. Graphical analysis of the variable "resorption of interradicular and interdental septa" for the two groups (group C or research group, group M or witness group)



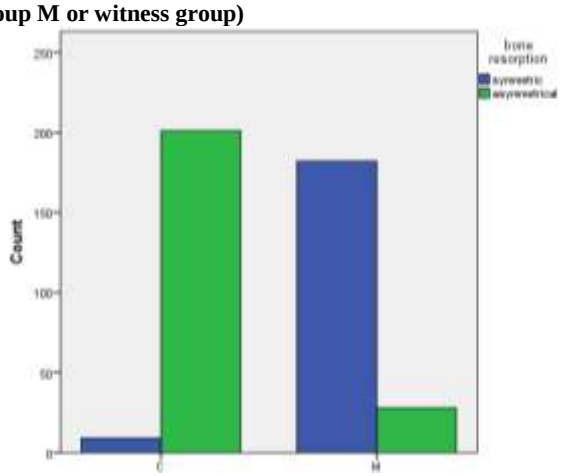
The analysis of periodontal pockets contour shows that in the control group it is mostly diffuse (n=144, 68.57%) compared to the witness group where it was predominantly net (n=90, 42. 86%) or linear (n=39, 18.57%) or without contour (n=71, 33.81%) (p=0.000).

Figure no. 4. Graphical analysis of the variable "contour of periodontal pockets" for the two groups (group C or research group, group M or witness group)



Bone resorption is 95.71% (n=201) asymmetric in the research group and 86.67% (n=182) symmetric in the witness group (p=0.000).

Figure no. 5. Graphical analysis of the variable "bone resorption" for the two groups (group C or research group, group M or witness group)



DISCUSSIONS

Periodontal disease has been reported since ancient times and is now among the most common dental diseases, affecting people of all continents, regardless of gender. Research carried out over time shows that around the age of 40 periodontal disease affects about 100% of the population, with varying degrees of severity.(10)

Vertical epidemiological studies have highlighted the role of various factors, local, general, hereditary predisposition and the multitude of characteristics of the oral environment, with its physicochemical factors and bacterial complexes involved in the onset of the pathogenic mechanism of periodontal disease. Regarding the effect of diabetes on periodontal health, many studies have found a positive relationship between patients with type-2 diabetes with low glycemic control and a high level of periodontal disease. A five-year longitudinal study found an increased loss of attachment in adolescents with diabetes, while non-diabetic subjects had a stable level of attachment.

A cross-sectional study of more than 1,400 subjects found that diabetics were 2.3 times more likely to lose attachment.(11) There is little evidence in clinical trials that diabetics need more detailed and aggressive periodontal therapy

than non-diabetics with periodontal disease. Once periodontal disease is under control, and the diabetic patient remains on a plaque maintenance schedule at three-month intervals, periodontal health will remain stable. Periodontal health may deteriorate more rapidly in diabetics with poorly controlled glycemic levels than in other patients, and may not respond as well to traditional therapy.(12)

We believe that it is very important to establish a complete and comprehensive diagnosis as well as to identify possible risk factors for periodontal disease in order to institute prophylaxis and slow its progression. Correct assessment of clinical and radiological parameters can highlight risk factors and allow the dentist to institute periodontal disease prophylaxis as well as slow down its progression, thus increasing the patient's quality of life.

CONCLUSIONS

In our study, the mean values of clinical and paraclinical parameters were significantly higher in the group of patients with diabetes and periodontal pathology than in the group of patients without diabetes but with periodontal pathology. The study supports the articles in the literature and highlights the fact that diabetes mellitus is an important factor in the development and progression of periodontal pathology, and the presence of factors such as plaque and tartar definitely influence the development of periodontal pathology.

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