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Research Paper

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Epidemiological and clinical profile of patients with periodontal disease and cardiovascular disease: Study conducted at the periodontology department-CHU Tlemcen-Algeria

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Summary :

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Introduction/Problem:

Since the pioneers, Mackenzie and Millard, Syrjänen, Matilla, and DeStefano, evoking the alliance periodontal disease -cardiovascular diseases, especially ischemic, synonymous with atherosclerosis, studies have continued to flow from all over the world, leading to the same conclusion which proved the regularity of the association. But what about the situation in Algeria?

It is to answer this question that we have chosen to address this theme with the aim of describing the epidemiological and clinical status of periodontal diseases in patients with cardiovascular diseases.

#### Materials/Methods:

This was a cross-sectional descriptive study, with analytical purposes, over a period of three years (October 1, 2015 until October 31, 2018), at the CHU Tlemcen periodontology department, among patients meeting our criteria. inclusion.

Consultation trays containing Williams periodontal probes were used. The C-reactive ultra-sensitive protein (CRP<sub>us</sub>), a micro-index of the inflammatory process, in which periodontal disease occurs, and at the same time an indicator of cardiovascular risk, represented the biological parameter of our study. It was carried out by nephelometry from blood samples.

#### Results/Discussion:

75 patients were recruited. The average age was  $48.64 \pm 1$  years. The sex ratio was 1.12. According to the socio-economic position index, the lower middle class was the most prevalent (43.1%). 30.7% of our patients presented a CRP<sub>us</sub>  $\leq 1$  mg/l, i.e. a low cardiovascular risk, compared to 34, 7% for a CRP<sub>us</sub> between 1-3 mg/l, or greater than 3 mg/l, characterizing a risk moderate, severe cardiovascular. CRP<sub>us</sub> was linearly

proportional to the gingival index (GI), pocket depth, attachment loss, confirmed by Pearson's linear correlation coefficient  $r$  (0.8, 0.5, 0.6) attesting to the strength of the 'association.

Conclusion :

The results obtained by our study highlight the predominance of periodontitis and the potential role that it could play in the crescendo increase in cardiovascular risk. The implementation of a program to promote oral health, and therefore periodontal health, which is undoubtedly inseparable from cardiovascular health, must prevail in our prevention strategies.

Key words: periodontitis, cardiovascular diseases, cardiovascular risk.

Article :

Introduction/Problem:

Since the pioneers, Mackenzie and Millard, Syrjänen, Matilla, and DeStefano and their studies considered until then "princeps" (1), evoking the alliance periodontal disease - cardiovascular diseases, especially ischemic, synonymous with atherosclerosis, the work has not people stopped arrivingentire, to reach the same conclusion (2), (3), reinforced by the report of the European Federation of Periodontology (EFP) and the American Academy of Periodontology (American Academy of Periodontology-AAP) in 2013, then in 2020 which proved the regularityof the association(4),(5). But what about the situation in Algeria?

It is to answer this question that we have chosen to address this theme with the aim of describing the epidemiological and clinical status of periodontal diseases in patients with cardiovascular diseases.

#### Materials/Method:

Our study was of a transversal descriptive type with analytical aim, carried out in the periodontology department of the CHU-Tlemcen-Algeria, spanning a period of 3 years, from October 2015 until October 2018, meeting our criteria of inclusion and non-inclusion:

#### § Inclusion criteria:

- Subjects with cardiovascular diseases confirmed by the cardiologist;
- Female and male subjects;
- Subjects aged 16 and over;
- Toothed subjects (at least 1/3 of the teeth).

#### § Non-inclusion criteria:

- Subjects with heart disease at major infectious risk (requiring antibiotic prophylaxis);
- Subjects with a general pathology other than cardiovascular disease;

- Subjects who smoke;
  
- Subjects with obesity;
  
- Pregnancy ;
  
- Subjects who have received periodontal treatment during the 6 months preceding the study;
  
- Subjects who have received treatment with antibiotics, antiseptics, anti-inflammatory or immunosuppressants for less than 3 months;
  
- Non-cooperating subjects in the study.

To do this, consultation trays containing Williams periodontal probes were used for measuring periodontal parameters: gingival index (GI) of Silness and Løe, depth of periodontal pockets, loss of attachment (6), (7 ).

The socio-economic position index (IPSE) was used for the description of socio-economic status(8), and a visual numerical scale for the assessment of stress.

CRPus, a micro-index of the inflammatory process and at the same time an indicator of cardiovascular risk, represented the biological parameter of our study. It was carried out by nephelometry from blood samples.

Values <1mg/liter(L) reflect a low cardiovascular risk, between [1mg/L-3mg/L] a moderate cardiovascular risk, > 3mg/L a high (severe) cardiovascular risk (9).

The Pearson chi-square (X<sup>2</sup>) test was used to compare qualitative variables (a value of a p value < 0.05 was considered statistically significant, a value < 0.01 as statistically very significant).

Pearson's r test of linear correlation for that of quantitative variables (a positive value was considered statistically significant “< 0.5 weak, ≥0.5 strong”).

#### Results/Discussion:

Our study allowed the enrollment of 75 patients constituting our sample (n=75), out of 90, i.e. a participation rate of 83.33%.

The prevalence of CVD in this setting corresponded to 2.63%.

The male sex was the most predominant (53%), i.e. a sex ratio of 1.12. This result coincides with that reported by Tang in China in 2011 (10), Wick in Switzerland in 2011 (11), Gomes-Filhos in Brazil in 2011 (12), Kumar in India in 2014 (13), Arregoces in Colombia in 2014 (14), Etemadifar in Iran in 2015 (15), Malgouyres in France in 2016 (16), Liljestrand in Finland in 2017 (17), or even Bozoglan in Turkey in 2017 (18), but differs from what was reported by Lopez in Chile in 2009 (19), and Deo in India in 2010 (20). This difference can certainly be explained by the difficulty in certain cases for men, caught up in their professional activities and family obligations, which can dissuade them from consulting or even benefiting from rigorous medical monitoring.

The age of our patients ranged from 16 to 72 years, with a mean of 48.64±1.68 years. The most representative age group was that between 50-60 years old at 37%. Our results corroborate with those reported by Lopez, Tang, Wick, Arregoces, Etemadifar,

Bozoglan, however they are below the results reported by Gomes-Filhos, Malgouyres, Liljestrand as well as Wojtkowska and her study carried out in Poland in 2021(21) ,and greater than those of Deo. The particular context of each study (“Gomes-Filho” myocardial infarction, “Liljestrand, Wojtkowska” coronary syndrome, “Malgouyres” atherosclerosis), generally characterizing more advanced age groups seems to be the most plausible explanation for this difference. , except for Deo's study, where even in the context of atherosclerosis, the average age observed was much lower ( $44.56 \pm 0.11$  years), than that found in our study, and even that described by Malgouyres ,this can undoubtedly be due to the emergence of other risk factors increasingly known among the Indian population.

Still in the sociodemographic framework, we were interested in the geographical location of our patients, those living in Tlemcen city represented the majority 49.3%, followed by Ouzidane at 6.7%, and Boudjlida, Remchi, Sebdou at 5.3 %. By studying globally the percentage of patients living in Tlemcen city and its surrounding areas, we realized that the latter still shared the same percentage of 49.3%. Far from being negligible, this point concerns us. on the virtual absence of doctors cardiologists, as well as periodontologists practicing in these regions, whether in a state or private capacity, pushing these patients, despite the burden as well as the constraints linked to their general condition, to travel in search of treatment. specialized load.

When it comes to professional activity, housewives, followed by self-employment, were the two most common professional activities. Ease of access, as well as availability, seem to be the reasons. Conversely, Malgouyres described retirees as being the most representative at 36%, completely in correlation with the particular framework of his study (survey carried out among patients presenting for consultation at the atherosclerosis detection and prevention center ), mainly characterizing the most advanced age groups.

Concerning the description of socio-economic status, we preferred to use an index, making it possible to counter the subjectivity of this crucial parameter. Our choice fell on the IPSE, the most commonly used. Patients belonging to the lower middle class (the penultimate class) were the most predominant at 43.1%. Taking into consideration only professional activity, retirees at 36%, executives, and intellectual profession at 22% were the socio-economic categories most described by Malgouyres, making the comparison difficult. This reiterates the recurring concern about the difficulty, or even the

impossibility, of comparing results, however relevant they may be, in the absence of consensus governing the indices and parameters studied.

The reason leading patients to come to us has always aroused everyone's interest, referral by the cardiologist, or other doctor, was the most common in our study at 36%, followed after by pain (20%). The others patterns much more suggestive of the periodontal condition (bleeding, mobility, as well as halitosis) only occupied third position.

Only 2.7% of our patients came for periodic visits.

Arterial hypertension corresponded to the most recorded cardiovascular disease (CVD), in correlation with the conclusion of Berrouiguet, following his study on the prevalence of CVD risk factors in Tlemcen in 2008, placing the condition in the region among the most high in the country(22).

Coronary syndrome for its part occupied second position, well before valvular heart disease, comforting the epidemiological transition that developing countries are going through in this context, including Algeria.

In accordance with the most described CVD, antihypertensives, alone or combined with anticoagulants, were the most prescribed medications respectively at 28% and 30.7%.

47.7% of our population was taking calcium channel blocker treatment.

(amlodipine 69.3%, lercanidipine 5.3%).

62.7% of our patients were on anticoagulants, 42.7% on antiplatelet agents, 18.7% on antivitamin K agents, 1.3% on heparin.

Only 9.3% of our sample was on diuretics (furosemide or hydrochlorothiazide).



90.7% of our patients declared that they had no history of hospitalization, for the remaining 9.3%, the cardiovascular complication in the form of stroke was the main cause. Our results contrast with those of Millogo's study conducted in Burkina Faso in 2008 (23), where hemorrhage due to iatrogenic secondary to taking anticoagulants represented a reason for hospitalization at 8.26%. A priori, the completely different setting of the study could explain this divergence, since Millogo was exclusively interested in the etiologies of hospitalizations registered in the cardiology department (CHU Yalgado Ouédraogo-Burkina Faso), but with a little more perspective, the reasoned use of anticoagulants by our patients can be discussed more.

To our great relief, the majority of our patients (72%) described an average level of stress, none of which was high, unlike what was reported by Malgouyres, where a percentage of 7% was reported. The location of the study, namely "Atherosclerosis Detection and Prevention Center of Toulouse University Hospital", a much more medical setting than ours, undoubtedly more stressful, is certainly the cause.

Almost a third of our patients (30.7%) presented a CRP<sub>us</sub> ≤ 1 mg/L, i.e. a low cardiovascular risk, compared to 34.7% for a CRP<sub>us</sub> between 1-3 mg/L, or greater than 3 mg/L, characterizing a moderate, severe cardiovascular risk.

The average CRP<sub>us</sub> found in our study was 3.12±0.42 mg/L. Our results overlap with those of Lopez, Kumar, Arregoces, Etemadifar and Grudyanov in Russia in 2017 (24). They nevertheless differ from what has been noted in other studies where they are respectively lower than those mentioned by Gomes-Filhos, Wick (2.6 mg/L, 1.62 mg/L). CRP<sub>us</sub>, a marker of inflammation, therefore dependent among other things on periodontal parameters, is the most plausible explanation since in our study, the average pocket depth was 4.11±0.16 mm, compared to 2.9±0.7mm recorded by Gomes-Filhos. A percentage of only 19.5% of periodontal pockets ranging from 4-5mm was listed by Wick, compared to 57.3% found in our study.

The values indicated by the other studies, on the other hand, remain significantly higher, here too these are the periodontal parameters with the same explanation which can be retained, since in Deo's study, the average of the pocket depth was 5.30± 0.71mm. Tang

and Bozoglan, quant to them based on the loss of attachment, the respectively described averages were  $4.26 \pm 1.21$  mm,  $4.25 \pm 0.59$  mm, compared to ours ( $2.86 \pm 0.17$  mm).

Through the study conducted by Montenegro in Brazil in 2018 (25), 43.6% of patients had a CRPus > 3 mg/L, compared to 34.7% observed in ours. In addition to the periodontal parameters, the difference in inclusion and non-inclusion criteria, and the fact that certain risk factors, also responsible for the elevation of CRPus, have not been ruled out, such as obesity, encountered in the study of Montenegro, Tang and Wojtkowska, or still certain general illnesses, notably diabetes, rheumatoid arthritis, present in Liljestrand's study also seem to be involved.

In our study, CRPus was linearly proportional to GI, confirmed by Pearson's r linear correlation coefficient ( $r=0.8$ ). This value highlights the strength of the association.

The other periodontal parameters also followed, where the CRPus was linearly proportional to the depth of the pocket, as well as to the loss of attachment confirmed by the linear correlation coefficient of Pearson's r respectively evaluated

( $r=0.5$ ,  $r=0.6$ ), attesting to the strength of the association.

Although conducted differently, our results corroborate with those of the previously listed studies concluding a positive association between CRPus and periodontitis.

According to the new classification of periodontal conditions "Consensus 2017", generalized stage IV periodontitis-Grade C was the most common (61.3%). Our observation was opposed to that reported by Wojtkowska where stage IV periodontitis only represented a percentage of 18%. The different socio-economic level of the study populations may justify this controversy.

It also seemed appropriate to us to take stock of our patients' knowledge regarding the association of periodontal disease (PD) - general diseases in a global manner, and more particularly PD-CVD.

The majority of our patients (88%) responded that they did not know that there was an association between PD and other general illnesses. Only the remaining 12% responded affirmatively.

The most cited example (8%) of the association of PD and other general illnesses was diabetes. 89, 3% of our patients were unable to provide an answer.

To the more directed question, concerning the MP-CVD association, only 1.3% of our patients responded in the affirmative. Our results were different from those of Malgouryes, where slightly more (24%) of patients responded that they knew that there was a relationship between CVD and periodontitis.

These results reflect the almost total ignorance of our patients regarding the influence of the periodontal state on their general health, particularly CVD, regardless of their socio-economic position. The X<sup>2</sup> test, with the respective values ( $p=0.6$ ,  $p=0.2$ ) confirms this.

In contrast to the previous two questions, regarding the signs of PD, the only affirmative responses were collected from patients belonging to the upper and upper middle class.

Redness was the most mentioned symptom (5.3%), followed by bleeding at only 1.3%. The other patients, 93.3%, having a lower socio-economic position, had no knowledge on the subject. The correlation between the IPSE and the state of knowledge of the patients concerning the signs of periodontal disease was therefore statistically positive (X<sup>2</sup> test " $p=0.01$ ").

Beyond these figures, reflecting the ignorance of our patients on the influence of the periodontal state on general diseases, more particularly CVD, we can only be concerned about our failure in terms of information, equally falling within our duty, to provide care. Due to the social involvement of our faculties and our departments, the promotion of information campaigns aimed at the general public thus becomes essential, and must occupy the first place of our concerns and our actions.

Poor oral hygiene was noted at 69.3%, confirmed by a plaque index (PI) according to Löe and Silness between 2-3, also at 69.3%. Conversely, good oral hygiene corresponded to at the lowest percentage (8%).

This fully justifies the predominance of periodontitis in our sample. Gingivitis was only represented at 6.7%.

Also, the average CAOD described in our patients being  $13.01 \pm 0.062$ , the level of caries involvement in our population was considered "very high".

Faced with this observation, it seemed wise to us to evaluate the practice of hygiene among our patients:

- o 17.3% of our patients confirmed not to brush their teeth. 70.7% declared doing it irregularly, and only 12% regularly. For patients brushing their teeth, 73% said they did it once a day, and 9.3% twice a day. Less than 1 minute was the most reported duration. Our results differ from those of Malgouryes, where brushing at a frequency of twice/day was the most described, in half of the patients. That at a frequency of once/day was represented at 25%.

- o The horizontal technique was the most adopted (77.3%).

- o The soft manual toothbrush was the most used (49.3%) in comparison with the others, medium manual (2.7%), and hard manual (1.3%). 29.3% of our patients were still unable to provide answers as to the type of toothbrush used. Only 5.3% of our patients reported changing their toothbrushes every 3 months. 42.7% reported doing so beyond 3 months. When the toothbrush is worn out was the answer provided by the remaining 5.3%.

- o Interdental sticks with incorrect use were the most mentioned adjuvants (40%). Only 1.3% of our patients said they used silk floss.

These results highlight the neglect of oral hygiene practice among our patients. Faced with this, two elements of response can be put forward: on the one hand the still lack of their knowledge in the matter, in addition, their financial means relative to the socio-economic position, sometimes a real obstacle to the acquisition of means hygiene.

Whatever the explanations provided, here again, the promotion of awareness and education campaigns must occupy the first place of our objectives.

In order to evaluate the motivation of our patients, but this time in relation to the frequency of their visits to the dentist, the question was addressed. 96% of them claimed to go to the dentist only when necessary. Conversely, in Malgouryes' study, 95% of patients were followed up by a dentist at least once a year. These results say a lot about the motivation and interest in the oral and dental condition, particularly periodontal, in the eyes of our patients, and only reinforce the previous ones.

During our recruitment, we were confronted with a problem, which is prevalent and beginning to take on a disproportionate extent, represented by edentulism, affecting increasingly younger subjects.

A majority of 89.3% of our patients reported having already undergone a dental extraction, making the latter the most common dental history. The carious process, alone or associated with mobility, were respectively the two most cited reasons (52%, 33.3%).

The periodontics background particularly aroused our curiosity.

Scaling was the most described procedure (77.3%). Only 1.3% of our patients reported having benefited from more advanced treatment based on non-surgical therapy.

Only 1.3% of them claimed to have completed their periodontal treatment. The interruption of the latter, whether in the public sector or in the private sector, was noted respectively at 54.7%, 22.7%.

The multiplicity of sessions was the reason which most led (41.3%) to the interruption of this treatment. This opens the parenthesis to another concern, which increasingly tends to occupy a growing place in our practice, represented by the renunciation of care.

In this context, instead of the dial approach, global disinfection “Full mouth therapy” accompanied by optimal scheduling of appointments, seems to offer an interesting alternative.

Coming in second place was the cost at 18.7%, mentioned above all for the private sector. In relation to this, the promotion of a social security system, specific to this segment of the population, with different benefits, such as mutual insurance, offers itself as the solution of choice.

Finally, the distance and difficulty of access was mentioned, a real handicap for these patients, highlighting once again this recurring concern represented by the lack of doctors, especially in rural areas, or even the medical desert. The promotion of the training of qualified personnel, in particular specialist doctors, whether in cardiology or periodontology, civil service, telemedicine, home care, so many alternatives that could help remedy this burden.

Conclusion :

The results obtained by our study highlight the predominance of periodontitis and the potential role that it could play in the crescendo increase in cardiovascular risk. The implementation of a program to promote oral health, and therefore periodontal health, which is undoubtedly inseparable from cardiovascular health, must prevail in our prevention strategies.

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