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Periodontal Status of Patients with Cardiovascular Diseases in the City of Yaoundé

État parodontal des patients atteints de maladies cardiovasculaires dans la ville de Yaoundé

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ABSTRACT

Introduction. Periodontal disease is an inflammatory disease that develops in permissive hosts. It is often found in individuals with a history of chronic disease such as cardiovascular disease. Numerous studies around the world have looked at the possible relationship between periodontal disease and cardiovascular disease. The aim of this study was to determine the periodontal status of patients suffering from cardiovascular diseases in two hospitals in the city of Yaoundé. **Methodology.** This was a cross-sectional study in two hospitals in Yaoundé. We observed the periodontal status of subjects aged 21 and over, suffering from cardiovascular disease. The cardiovascular diagnosis was made by the cardiologist following the recommendations of the European Society of Cardiology. **Results.** The study population consisted of 154 subjects. The female gender predominated, with 85 women recruited, for a percentage of 55. The most represented age group was that of 60-79 years with 79 subjects for a percentage of 51.3%. The most mentioned diagnosis was arterial hypertension that is 92 subjects for a percentage of 59.7% followed by heart failure, and stroke. Our results showed that the periodontal state of the subjects of our study population was altered. The mean plaque index of the study population was 1.3±0.48; the mean gingival index was 1.55±0.49; the mean attachment loss was 0.49±0.56. **Conclusion.** It appears from this study that half of the population with cardiovascular diseases in the city of Yaounde have a weakened periodontal state. A multidisciplinary approach including the oral component should be considered in order to improve the management of these patients.

RÉSUMÉ

Introduction. La maladie parodontale est une pathologie inflammatoire. Elle est souvent retrouvée chez des individus avec antécédent de maladie chronique telle que les pathologies cardiovasculaires. De nombreuses études se sont intéressées à la relation entre maladies parodontales et maladies cardiovasculaires. Le but de cette étude était de déterminer l'état parodontal des patients souffrants de maladies cardiovasculaires dans deux hôpitaux de la ville de Yaoundé. **Méthodologie.** Il s'agissait d'une étude transversale faite dans deux hôpitaux de Yaoundé. Nous avons observé l'état parodontal des sujets de 21 ans et plus, atteints de maladies cardiovasculaires. Le diagnostic cardiovasculaire avait été posé par le cardiologue selon les recommandations de la Société Européenne de Cardiologie. **Résultats.** La population d'étude était constituée de 154 sujets. Le sexe féminin prédominait, avec 85 de femmes soit 55%. La tranche d'âge la plus représentée était celle de 60-79 ans avec 79 sujets soit 51,3%. Le diagnostic le plus évoqué était l'hypertension artérielle soit 92 sujets pour pourcentage de 59,7% suivi de l'insuffisance cardiaque et l'accident vasculaire cérébral. Nos résultats ont montrés que l'état parodontal des sujets de notre population d'étude était altéré. L'indice de plaque moyen de la population d'étude était de 1,3±0,48 ; l'indice gingival moyen était de 1,55±0,49 ; la perte d'attache moyenne était de 0,49±0,56. **Conclusion**. Il ressort de cette étude que près de la moitié des patients atteints de maladies cardiovasculaires dans la ville de Yaoundé ont un état parodontal fragilisé. Un abord pluridisciplinaire incluant le volet devrait être envisagé afin d'améliorer la prise en charge de ces patients.

INTRODUCTION

According to the World Health Organization, periodontal disease affects approximately 14% of the world's adult population, or more than one billion people worldwide [1]. In Africa, their prevalence is one of the highest with 30% in Senegal, 33% in Ghana, and 27.5% in Nigeria [2]. Being of various etiologies, they have also been associated with certain systemic diseases such as cardiovascular diseases in recent years.

Cardiovascular disease (CVD) is a collection of disorders affecting the heart and blood vessels that includes coronary heart disease, cerebrovascular disease, rheumatic disease and other conditions. They are the

leading cause of death in the world; the estimated number of deaths attributable to CVD is around 17.7 million or 31% of global mortality. Of these deaths, 82% occur in low- and middle-income countries [3]. They have many common risk factors for periodontal disease including smoking, obesity and diabetes.

Many studies have described the relationship between oral disease and cardiovascular disease. These reports are more specific in the case of periodontal diseases. In Cameroon, these studies have focused on the possibility of a relationship between periodontal disease and certain specific cardiovascular pathologies. Ndongo et al, in 2018 and 2019, in comparative cross-sectional studies worked on groups with hypertension and coronary heart disease respectively. The data found in these studies were statistically significant and supported a possible relationship between periodontal disease and these cardiovascular diseases [4, 5].

However, very few have explored the periodontal status of this population of patients with cardiovascular diseases in general and their distribution within cardiovascular diseases. This work was carried out in order to determine the periodontal status of patients suffering from cardiovascular pathologies in two hospitals in the city of Yaoundé.

METHODS

This was a cross-sectional study, lasting 07 months, which took place from November 19, 2019 to June 19, 2020, in the internal medicine department, respectively of the University Teaching Hospital of Yaoundé and the Central Hospital of Yaoundé. Our study population consisted of patients over 21 years old, consenting, suffering from a cardiovascular disease, who came for consultation or for a check-up at the internal medicine department respectively of the University Teaching Hospital of Yaoundé and the Central Hospital from Yaoundé. The diagnosis and follow-up of these patients were made according to the recommendations of the European Society of Cardiology of 2019 [6].

Patients who smoke or have diabetes were not included in our study. We excluded any patient with less than 50% teeth present in the mouth and those who refused to participate. We obtained informed consent from each participant.

Medical history

Age, sex, anthropometric data and history (medical, medication) were collected during the interview. The body mass index (BMI) was calculated.

Dental examination

The number of missing teeth was recorded.

Periodontal examination

Indicators of oral hygiene (gingival index and plaque index) and deep periodontal involvement (loss of attachment) were measured on the mesial, distal, labial/buccal and palatal/lingual surfaces of all teeth present in mouth during oral examination [7].

Plaque index according to Silness and Loë

This index assesses the accumulation of plaque on the dental surfaces of each tooth. It left 04 scores, ranging from 0 to 3. (0) absence of plaque, (1) plaque detectable after probing, (2) plaque visible to the naked eye at the cervical level of the teeth, (3) abundant plaque covering several dental face. A subject's final score was the average of the surface scores for all of the subject's teeth.

Gingival index according to Loë and Silness

This index assesses the inflammation of the gums and the tendency to bleeding. There are 04 scores, ranging from 0 to 3. (0) no inflammation, (1) mild inflammation without bleeding, (2) moderate inflammation with bleeding on probing, (3) severe inflammation with spontaneous bleeding. An individual score was made up of the average of the measurements for a given subject.

Loss of attachment

This gives an indication of the extent of the migration of the gingival attachment following the destruction of the gingival corium and the alveolar bone. It runs from the cemento-enamel junction to the bottom of the sulcus or periodontal pocket. These measurements will be taken using a periodontal probe graduated in millimeters (Williams probe). The individual score was made up of the average of the attachment loss measurements for a given subject.

To facilitate the periodontal examination and increase the precision of our study, 10 teeth out of a total of 32 teeth distributed per arch were retained. This is the partial registration technique. It was:

- In the maxilla, the following teeth were selected: 17, 16, 11, 26, 27.
- In the mandible, we had respectively the teeth bearing the codes 37, 36, 31, 46, 47.

These teeth were identified as the best, in the estimation of the worst periodontal conditions of the mouth. These teeth are located in front of the ostia of the various excretory ducts of the salivary glands. They are therefore the most susceptible to salivary changes and/or poor plaque control [7, 8].

The data was analyzed with SPSS software. The graphs were produced with Microsoft Excel 2015 software. Student's t test was used to compare means and medians. We compared the proportions using the chi-square test. A value of $p<0.05$ was considered statistically significant.

RESULTS

Our study population consisted of 154 people. The female sex was predominant, with 85 women recruited, for a percentage of 55.2; while men were 69 subjects, which is 44.8% (Table I).

Variables	Number	Percentage
Population	154	100
Women	85	55.2
Age range		
21-39 years	16	10.4
40-59 years	52	33.8
60-79 years	79	51.3
80 et plus	7	4.5
Alcohol	28	37.5
Overweight	51	31.1
Obesity	46	18.2
Sports activity	42	27.3

The most represented age group was that of 60-79 years with 79 subjects for a percentage of 51.3%, followed by the age group of 40-59 years, 52 subjects represented at 33.8%. The youngest subject was 24 years old while the oldest was 84 years old. The mean age was 59±14.49 years (Table I).

Concerning the body mass index 46 subjects that is 29.9% were obese and 51 subjects that is 33.1% of our population were overweight. In this study, only 42 subjects, that is 27.3% of the population, admitted to practicing a sports activity. There were 28 subjects that is 18.2% of our population who said they consumed alcohol frequently (Table I).

The most mentioned diagnosis was arterial hypertension (HT) that is 92 subjects for a percentage of 59.7%. In addition, 28 that is 18.2% of subjects had heart failure and 23 subjects or 14.9% had a stroke. Only 7 subjects that is 4.5% had a rhythm disorder (RD), and 2 subjects that is 1.3%, respectively for each, had cardiomyopathy (CM) and cardiac valvulopathy (Table II).

Table II: distribution of cardiovascular diseases

Variables	Number	**%**
Hypertension	92	59.7
heart failure	28	18.2
Stroke	23	14.9
Arrhythmia	7	4.5
Cardiomyopathy	2	1.3
Heart valve disease	2	1.3

In our population, 31.2% of our population had a disease associated with hypertension. The most common cardiovascular pathology associated with hypertension was stroke in 25 subjects followed by heart failure in 19 subjects (Table III).

Table III: cardiovascular diseases according to hypertension.

	Stroke	heart failure	arrhythmia
Hypertension	25	19	4
No Cardiomyopathy No Valvulopathy			

Half of the study population, that is 77 subjects, had a twice-daily dental brushing frequency, while for 72 subjects, that is 46.8%, brushing was done only once a day. Only five subjects, that is 3.2% of our population, said they brushed their teeth after the main meals (Figure 1).

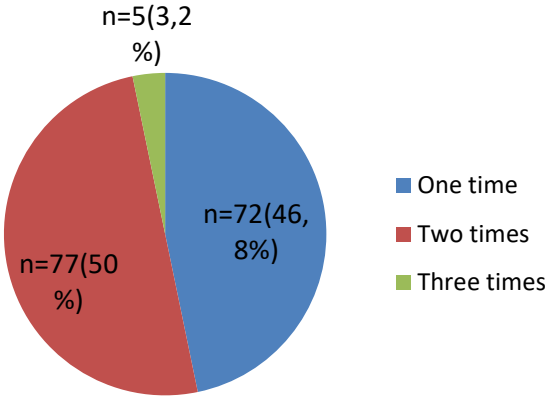

Figure 1: distribution of the population according to the number of daily brushings**.**

Regarding the time of dental brushing, 69 subjects that is 44.8% of participants brushed their teeth before meals, 61 subjects that is 39.6% before or after meals intermittently and only 24 subjects that is 15.6% brushed their teeth strictly after the meal (Figure 2).

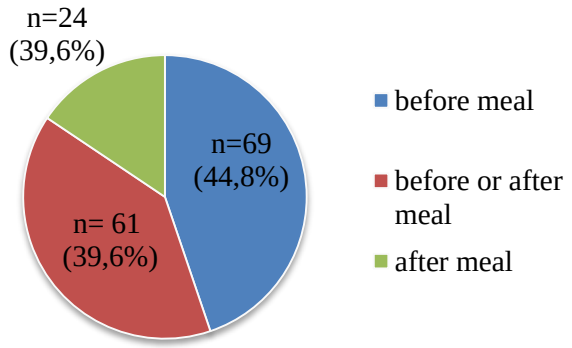

Figure 2: distribution of the population according to the daily brushing period.

The most used brushing technique was the horizontal technique at 53.9% that was 83 subjects, while 61 subjects that is 39.6% brushed their teeth in the vertical direction, and only 10 subjects that is 6.5% brushed their teeth with the mixed technique (Figure 3).

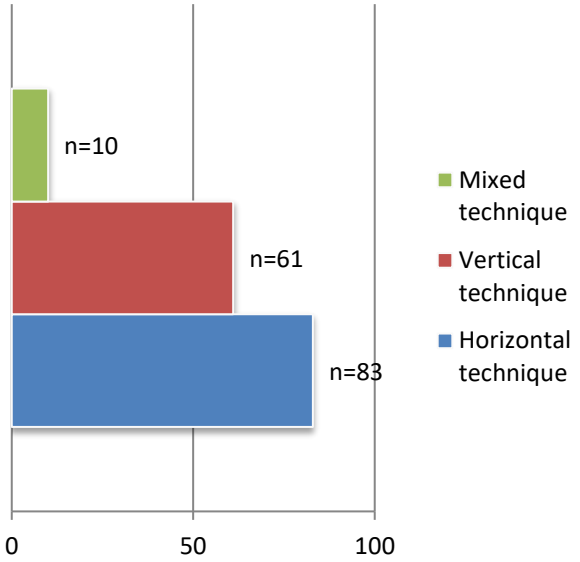

Figure 3: distribution of the population according to the brushing technique.

Our results showed that the periodontal state of the subjects of our study population was altered. The mean plaque index of the study population was 1.3±0.48; the mean gingival index was 1.55±0.49; the mean attachment loss was 0.49±0.56 (table IV).

Table IV: distribution of periodontal indices

Periodontal indices	Mean	Standard deviation
Plaque index	1.30	± 0.48
Bleeding index	1.55	± 0.49
Loss of attachment	0.49	± 0.56

Table V represents a cross-analysis between periodontal indices and cardiovascular diseases in order to have a more precise view of the distribution of these periodontal indices according to each cardiovascular disease found in our study population.

Table V: periodontal indices according to cardiovascular diseases

Periodontal indices	HT	Stroke	HF	RD	CM	CV	P
Plaque index	1,32	1,39	1,33	1,33	1,36	1,28	0,08
Bleeding index	1,45	1,72	1,51	1,17	1,15	1,13	0,09
Loss of attachment	0,47	0,38	0,56	0,83	0,92	0,5	0,08

HT: hypertension ; HF: heart failure ; RD: Rhythm disorder ; CM: cardiomyopathy ; CV: cardiac valvulopathy

DISCUSSION

This was a descriptive cross-sectional study with the aim of determining the periodontal status of patients suffering from cardiovascular diseases in two hospitals in the city of Yaoundé. Our sample consisted of 154 patients, recruited from the internal medicine and specialties department, in two hospitals in the city of Yaoundé, specifically the Central Hospital and the University Teaching Hospital of Yaoundé, over a period of 07 months from November 19, 2019 to June 19, 2020.

Our study population consisted of 85 women that is 55.2% and 69 men that is 44.8%, for a sex ratio of 0.82. These results are similar to those of Seck-Diallo et al in 2009 in Senegal who identified 59% women against 41% men [9]. More than half of our population, that is 51.3%, was between 60 and 79 years old, while a third of the population, that is, 33.8% was between 40 and 59 years old; the average age was 59 ± 14.49 years. These results would be due to the fact that cardiovascular pathologies affect older subjects more. Some authors claim that as we age, the cardiovascular system undergoes structural and functional changes that alter exercise capacity and increase the risk of exposure to cardiovascular disease, which could explain these results [10].

In this study population, 97 subjects that is 63% of the study population had a body mass index (BMI) higher than normal (>25Kg/m²), among which 51 subjects that is 33.1% were overweight and were 46 subjects that is 29.9% subjects were obese. These two variables, associated with sports inactivity (72.7%), are among the important risk factors for both periodontal disease and cardiovascular disease. The susceptibility of obese patients to periodontal disease involves a deleterious action, either directly of the inflammatory factors secreted by adipose tissue or indirectly by mechanisms linked to pathologies associated with obesity. Obesity promotes cardiovascular endothelial dysfunction and increases the risk of coronary artery disease, heart failure, atrial fibrillation, stroke and sympathetic autonomic dysfunction. It is estimated that weight reduction in a patient would reduce blood pressure in an individual [11, 12].

We should note that 31.2% of our population had one of the diseases diagnosed in association with high blood pressure. Arterial hypertension is a recognized risk factor in the onset and/or aggravation of cardiovascular diseases. Recent clinical studies have shown that maintaining good systolic and diastolic blood pressure can reduce the incidence of myocardial infarction by 20 to 30% and that of stroke by 30 to 40% [13, 14].

Regarding oral hygiene, twice-daily dental brushing was practiced by 50% of the study population, while 46.8% brushed once daily; only 3.2% of the population did not brush their teeth. Only 24 subjects that is 15.6% strictly brushed their teeth after meals. The most used brushing technique was the horizontal technic at 54%, while 40% brushed their teeth in the vertical direction and only 6% in mixed technique or roto-translation which is the appropriate technique. This would be due to the lack of information on oral hygiene. The majority of patients said they had not received adequate education on oral hygiene.

Regarding their periodontal status, the mean plaque index of the study population was 1.3±0.4; the mean gingival index was 1.55±0.49; the mean attachment loss was 0.49±0.56. This means that most of the participants had dental plaque more or less visible to the naked eye and inflammatory-prone gums. However, attachment loss in these subjects was not significant. Seck Diallo et al, in 2009 in Senegal found similar results: a high average gingival index (1.4±0.1) and the presence of plaque in more than 45% of subjects; the average attachment loss

was 0.8 ± 0.3 mm [9]. The high plaque index average could be justified by the fact that although practically all the participants brushed their teeth, most did not adopt the correct technique and sometimes used inadequate or traumatic tools for the periodontium. Regarding the bleeding index, we know that the installation of hypertension leads to changes in blood vessels. At the gum level, this modification of the microvessels would make it more fragile and therefore more vulnerable to bacterial attacks, hence the inflammatory state of the gums found in most of our patients [4, 5].

The plaque indices were substantially equal for all cardiovascular diseases and reflected the presence of plaque visible to the naked eye; gingival inflammation tended to manifest itself much more in stroke, HF and hypertension patients. However, these data were not statistically significant.

Our study took place in several hospitals in Cameroon. The periodontal examination was performed by a single examiner, which avoided inter-rater variations. However, the difficulty in recruiting our study population within the various recruitment sites due to the Covid-19 pandemic and the time allocated for our study did not make it possible to ensure a good representativeness of the general population.

CONCLUSION

It appears from this study that half of the population presented a weakened periodontal state, due to a lack of individual oral hygiene and/or assisted by a professional. Today several authors recognize the possibility of an increased risk of cardiovascular disease in patients with periodontal disease, independently of other cardiovascular risk factors. A multidisciplinary approach including the oral component of subjects with cardiovascular disease is important to improve the management of these patients.

REFERENCES

1. Global Burden of Disease Collaborative Network. Global Burden Study 2019. Seattle: Institute of Health Metrics and Evaluation; 2020. http://ghdx.healthdata.org/gbd-results-tool.
2. Kamagate A, Coulibaly NT, Kone D, Brou E, and Bakayoko-Ly R. Prévalence des parodontites: les parodontites en Afrique Noire, influences des facteurs socio-économiques et habitudes culturelles. Trop. Dent. J. 2001;37–41.
3. Organisation Mondiale de la Santé, Rapport sur la situation mondiale des maladies non transmissibles : Genève OMS, 2014.
4. Ndongo AS, Kwedi KGG**,** Nokam AME, Masa AJ, Mendomo EME, Bengondo MC. Relationship between parodontal diseases and essential hypertension. A cross sectional comparative study. Health Sci Dis 2018 ; 19 (1) : 88-91.
5. Ndongo AS, Kwedi KGG, Nokam AME, Nguibiti MOF, Bengondo MC. Relationship between periodontal disease and coronary heart disease within three hospitals in Cameroon. Revue de Med et Pharm 2019 ; 9(1) : 900-6.
6. Dörr R, Maisch B, ESC-leitlinien 2019 : seit 25 Jahren Konsens in Europa [2019 ESC guidelines : consensus in Europe for 25 years]. Herz 2019 ; 44(8) :674-675.
7. Bourgeois D, Bouchard P, Mattout C. 2007 Epidemiology of periodontal status in dentate adults in France, 2002-2003. J Periodontal Res 42 :219-227.
8. Ainamo J, Ainamo A. Validity and relevance of the criteria of the CPITN. Int Dent J 1994; 44:527-532.
9. Seck-Diallo A, Diouf A, Benoist HM et al. Maladie parodontale et affection cardiovasculaire en milieu hospitalier à Dakar, Rev. Iv. Odonto-Stomatol., 2009; 11(1) : 6-15.
10. Chahboune M, Elkhoudri N, Chebabe M, Benmoussa A, Tachfouti N. Estimation du risque cardiovasculaire chez les consultants aux établissements de soins de santé primaires de la ville de Settat. Revue marocaine de santé publique 2019 ; 6(9).
11. Rangé H, Huchon C, Poitou C, Ciangura C, Boillot A, Czernichow S, Chaussain C, Bouchard P. Risque parodontal chez le patient obèse. Obes 5, 2010 ; 67-73.
12. Poirier P, Després J-P. obésité et maladies cardiovasculaires. Médéine/sciences 2003 ; 19 : 943-949.
13. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ et al. 2017ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCN Guideline for the prevention, detection, evaluation and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018; 71(6):1269–1324.
14. Williams B, Mancia G, Spiering W, Rosei EA, Azizi M, Burnier M, Clement DL, Coca A, De Simone G, Dominiczak A et al. Guidelines for the management of arterial hypertension. J Hypertens. 2018 ; 36(2) :2284–2309.