Frequency and Factors Associated with Periodontitis in Congolese Patients: A Cross-Sectional Study

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Abstract

Background: Periodontitis is a multifactorial disease which is highly prevalent worldwide. The control of periodontal risk factor network is of paramount importance for the management of the disease. **Aim:** The aim of this study was to assess the frequency and identify the factors associated with periodontitis in Congolese patients. **Material and Methods:** This cross-sectional study was carried out in four medical centers in the city of Kinshasa between April 2017 and April 2018. The study included patients aged at least 12 years old who consulted the dental services of these centers and who met the inclusion criteria. The participants underwent a structured interview and a clinical periodontal examination. The latter involved the entire dentition, and periodontal pocket and attachment level measurements were taken at six sites per tooth. The plaque and bleeding index were recorded. Logistic regression was used to identify associated factors. The significance level was set at $p < 0.05$. **Results:** The study included 827 patients and 42% of them had periodontitis. The most represented age group was between 20 and 29 years old. In multivariate analysis, age greater than or equal to 35 years, OR = 2.45 CI 95% (1.77 - 3.45), and the amount of plaque expressed as plaque index ≥ 1, OR = 2 CI 95% (1.31 - 3.07) were factors associated with periodontitis. **Conclusion:** Factors associated with periodontitis found in this study are age ≥ 35 years and the amount of plaque expressed as plaque index ≥ 1. The latter reveals the importance of good oral hygiene.

1. Introduction

Periodontitis is a multifactorial disease characterized by loss of the tissues supporting the teeth [1]. It is triggered by dysbiosis of the oral microbiome leading to an inappropriate host response in the susceptible host [2]. Periodontitis is further characterized by its bi-directional relationship with non communicable diseases (NCDs) such as diabetes, cardiovascular diseases or chronic respiratory diseases. It is a potential risk factor or predisposing factor for premature deliveries and the low birth weight infants, cardiovascular diseases and others NCDs [3]. Its frequency varies from region to another and is dependent on the definition criteria and different periodontal examination protocols [4].

The frequencies reported in Africa are generally higher than those reported in the West [5]. Kamagate *et al.* reported a prevalence in Africa between 75% and 95% [5] whereas prevalence varying between 42% and 50% was reported in some countries in Europe and USA (Holde [6], Holtfreter [7], Eke [4]).

In the Democratic Republic of Congo, there is a paucity of informations about the prevalence of periodontal disease. Identifying the factors that can influence the disease allows the development of adequate prevention strategies and the implementation of effective measures for the promotion of the health [8].

The control of the periodontal risk network (true risk factors, risk indicators and predisposing factors) is the cornerstone of success in prevention and treatment [9].

The objective of this study was to assess the frequency of periodontitis and to identify the factors predisposing to periodontitis in Congolese patients in order to improve its management.

2. Material and Methods

2.1. Study Design

The subjects of this cross-sectional study were selected from patients who attended for dental services at any of four medical centres in Kinshasa, *i.e.*, the Biamba Marie Mutombo Hospital, Kinshasa University hospital, Ngaliema Clinic, or Boyambi Clinic, between April 2017 and April 2018 (Figure 1). The study protocol was approved by the ethics committee at the School of Public Health, University of Kinshasa (approval number ESP/CE/015/2017) and conducted according to the tenets outlined in the Declaration of Helsinki and to the STROBE guidelines.

2.2. Selection of Study Population

The patients who were received the day of the passage of the investigator (odd
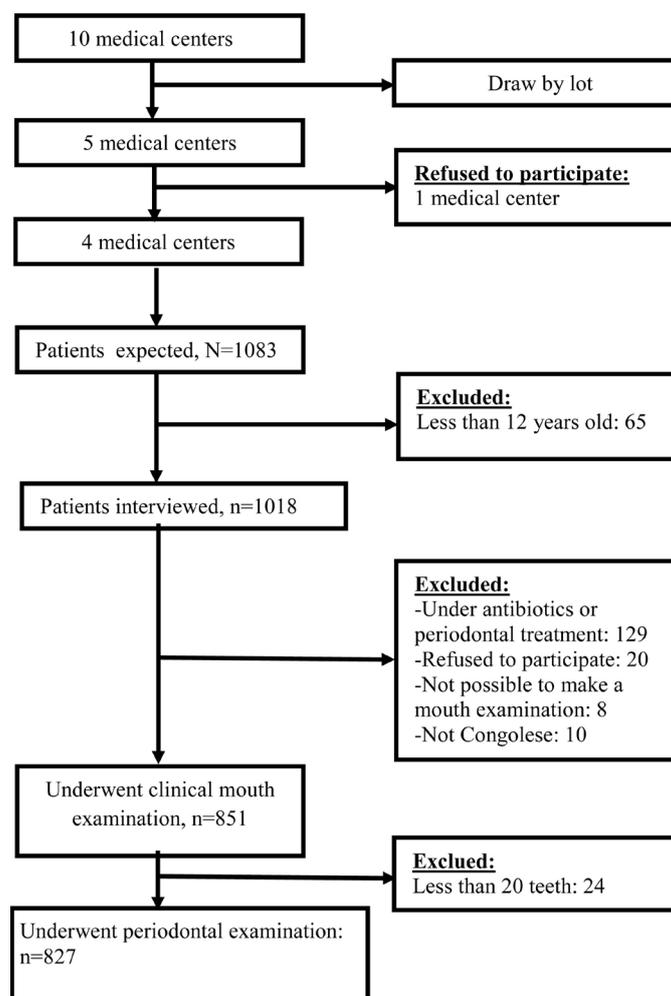
Figure 1. Flow chart of the selection of participants to the study (from the selection of medical centers to that of patients).

days) were selected if they met the inclusion criteria.

The study inclusion criteria were as follows: at least 20 teeth present; age 12 years or older. Patients who had taken antibiotics during the previous 3 months and those were receiving or had received periodontal treatment during the previous 6 months were excluded, as were patients who were pregnant (Figure 1).

Patients were interviewed and different socio-demographic and anamnestic informations were collected, then a clinical examination was performed.

Regarding the interview, the following variables were collected: age, sex, profession, level of education, tobacco consumption, systemic pathology, long-term medication, previous dental treatment, brushing teeth, type of tooth brush used, use of tooth paste, use of other hygienic devices, previous visit to the dentist, current reason for visit.

The interview and the completion of data were carried out by three dentists trained for this purpose.

A full mouth examination was then performed using a PCP 10 periodontal probe (Hu-Friedy, Chicago, IL, USA). All teeth, except for the third molars, were

examined. Teeth that were erupting, supernumerary, or partially impacted were also excluded. The periodontal probing depth (PPD) and clinical attachment level (CAL) were assessed at six sites (mesiobuccal, buccal, distobuccal, mesio-lingual, lingual and distolingual) per tooth. The plaque index and bleeding on probing (BoP) were also recorded. All measurements were performed by the same trained examiner (EKK); 20 patients were examined and re-examined one hour later. The kappa coefficients calculated for PPD and CAL were 0.82 and 0.84, respectively.

Periodontitis was defined as the presence of a pocket of at least 4 mm and an attachment level of 3 mm in at least two teeth located in two different quadrants.

2.3. Statistical Analysis

The statistical analysis was performed using Statistical Package for Social Sciences software, version 20.0 (IBM Corp., Armonk, NY, USA). Chi-square tests and logistic regression were used to identify factors associated with periodontitis. The significance level was set at $p < 0.05$.

3. Results

The study included 827 subjects, 304 males and 523 females. Their age varied between 12 and 84 years with an average of 36.01 ± 16.44 years.

Among them, 347 (42%) had periodontitis, including 309 with chronic periodontitis and 38 with aggressive periodontitis (Table 1). Subjects whose age was ranging between 20 and 29 years were the most represented (27.9%) followed by those aged 30 to 39 years (20.2%) (Table 2). Subjects aged 70 years and over were

Table 1. Periodontal clinical diagnostic.

Periodontal diagnostic	value	Percentage
Aggressive periodontitis	38	4.6%
Chronic periodontitis	309	37.4%
Other forms of periodontitis	0	0%
Healthy and gingivitis	480	58%

Table 2. Participants with periodontitis and without periodontitis according to age.

Age (years)	No Periodontitis	Periodontitis	Total
12 - 19	88 (68.22%)	41 (31.78%)	129 (15.6%)
20 - 29	145 (62.77%)	86 (37.23%)	231 (27.9%)
30 - 39	102 (61.08%)	65 (38.92%)	167 (20.2%)
40 - 49	61 (40.84%	59 (49.16%)	120 (14.5%)
50 - 59	42 (45.16%)	51 (54.84%)	93 (11.2%)
60 - 69	28 (51.85%)	26 (48.15%)	54 (6.5%)
70 and over	14 (52.43%)	19 (57.57%)	33 (4.0%)
Total	480 (58.05%)	347 (41.95%)	827 (100%)

proportionally the most affected by periodontitis (Table 2). Smoking patients represented 6.8% of the participants. Among those with periodontitis, those aged 35 years and over were the most affected by periodontitis (Table 3). In multivariate analysis, socio-demographic factor such as age ≥35 years, OR = 2.45 CI 95% (1.77 - 3.45) was associated with periodontitis. The amount of plaque expressed as a plaque index ≥1 was also associated with periodontitis, OR = 2 CI 95% (1.31 - 3.07) (Table 4).

Table 3. Sociodemographic and lifestyle characteristics of the study population with and without periodontitis.

Characteristics	Study population	Periodontitis	No periodontitis	p
Age				
<35 ans	448 (54.2%)	158	290	<0.001
≥35 ans	379 (45.8%)	189	190	
Gender				
Male	304 (36. 8%)	130	174	0.778
Female	523 (63. 2%)	217	306	
Study level				
Low level	356 (43.0%)	164	192	0.037
High level	470 (56.8%)	183	287	
Smoking status				
Smoking	56 (6. 8%)	25	31	0.673
Non-smoking	771 (93.2%)	322	449	
Systemic disease				
Presence	164 (19.8%)	73	91	0.459
Absence	663 (80. 2%)	274	389	
Long term medication				
Yes	140 (16.9%	58	82	0.889
No	687 (83. 1%)	289	398	
Previous dental treatment				
Previous treatment	459 (55.5%)	167	292	0.001
No treatment	368 (44.5%)	180	188	
Tooth brushing				
Yes	827 (100%)	347	480	-
No	0 (0%)	347	480	-
Type of toothbrush				
Modern	827 (100%)	347	480	-
Traditionnel	0 (0%)	0	0	-
Use of toothpaste				
Yes	826 (99. 9%)	347	479	1
No	1 (0.1%)	0	1	

Continued

Use of other hygienic devices				
None	95 (11.5%)	42	53	0.718
Dental floss	51 (6.2%)	19	31	
Toothpick	681 (82.3%)	286	395	
Previous visit to the dentist				
Never	268 (32.4%)	126	142	0.041
Check-up et routine visits	559 (67.6%)	221	338	
Reason of consultation				
Dolor	687 (83.1%)	228	399	0.961
Others	140 (16.9%)	59	81	

Table 4. Factors associated with periodontitis.

Variables	Univariate analysis			Multivariate analysis		
	OR	CI (95%)	P-Value	OR	CI (95%)	P-Value
Age	1.826	1.381 - 2.414	**<0.001**	2.45	1.77 - 3.45	**<0.001**
<35 years						
≥35 years						
Study level	0.744	0.563 - 0.983	**0.037**	1.369	0.998 - 1.880	**0.050**
High level						
Low level						
Previous dental treatment	0.597	0.452 - 0.790	**<0.001**	1.445	0.948 - 2.202	0.087
Yes						
No						
Previous visit to Dentist	0.737	0.549 - 0.988	**0.041**	0.976	0.630 - 1.512	0.0912
Check up and other						
Never						
Plaque index	2.857	2.142 - 3.810	**<0.01**	2.00	1.31 - 3.07	**0.001**
<1						
≥1						
Number of missed teeth	0.566	0.383 - 0.836	**0.004**	1.433	0.916 - 2.242	0.115
0 to 2 teeth						
3 teeth and over						

4. Discussion

Several factors have been suggested to be associated with periodontal disease. Identification of these factors may help to target patients for prevention, and treatment strategies [10]. The aim of this study was to assess the frequency of

periodontitis and identify the factors associated with the occurrence of periodontitis in the Congolese patients in Kinshasa.

The frequency of periodontitis in the present study was close to that reported in 2012 in Kinshasa (41%) [11] and to those reported in the USA between 42 and 47% [4] [12] [13]. It is noteworthy that the criteria used in these studies carried out the USA were similar to those applied in the present study. However, this frequency is different from the results of other investigators in Africa that reported a frequency ranging from 75% to 95% [5]. As reported by others authors [14] [15], the variation of methodologies and diagnostic criteria used in periodontal research compromises comparison between studies and may explain in part this difference. Additionally, the studies evoked by Kamagate *et al.* had not reported clear methodology nor definition criteria.

In this study, the age group of participants between 20 and 29 years was the most represented followed by that of 30 - 39 years. This can be easily understood from the fact that the Congolese population, and in general, the population in Africa is young with a median age of 20 years. These results are in agreement with other studies carried out in DR Congo and in Africa where these age groups represented the most active population and the most consulting population [11] [16].

Age has been found to be a factor associated with periodontitis. People over 35 are 2.45 times more likely to develop periodontitis than those under 35 years. Periodontitis is a condition that increases in frequency with age [12]. Several authors have demonstrated this association between periodontitis and age [12] [16] [17]. But they also note that age should not be considered a determining factor in the occurrence of periodontitis, it is rather an aggravating factor in the fact that the cumulative effect of the disease during the life is measured.

The study level was associated with periodontitis in univariate analysis but was not determined as independent factor in multivariate analysis.

These results disagree with other studies which have reported low education associated with periodontitis [18] [19]. These authors mention in particular the fact that a higher level of education could favor a lower frequency of periodontitis as opposed to a low level of education which would increase the risk of periodontitis [20]. Possible explanation could be an indirect mechanism involving several aspects, including the fact that the less educated patients have a little knowledge of periodontal health [21] leading to less attention on this aspect of their health and consequently to the carelessness of oral hygiene measures application. In addition, the most educated would have more access to work and to remuneration allowing them to have access to a dentist.

In univariate analysis, subjects who received dental treatment previously and those who visited a dentist even for a check-up were less affected by periodontitis.

Receiving previous dental care or having consulted a dental practitioner would be a protective factor against periodontitis. This may have enabled these patients not only to receive proper treatment, but also to be made aware of pre-

ventive measures, including appropriate brushing techniques.

Regarding the clinical features associated with periodontitis, the amount of plaque expressed as the plaque index was associated with periodontitis with OR = 2. Subjects with a plaque index ≥ 1 were more likely to develop periodontitis than those with a plaque index < 1. The plaque index expresses the level of dental plaque. Microorganisms initiating the inflammation that can lead to periodontitis in susceptible hosts are organized into communities within dental plaque. Studies on experimental gingivitis [22] and on the process of dental plaque formation [23] have demonstrated the importance of this structure in the initiation of periodontal disease. There is a strong relationship between the level of oral hygiene, the increased accumulation of dental plaque, a high frequency and the severity of periodontal disease [24]. It should be noted, however, that this is not always the case, in some situations, namely in aggressive periodontitis, severe destruction is encountered in the presence of a very little amount of dental plaque [25] [26].

Bleeding on probing is a sign of inflammation of the gingival tissue [27]. Its presence can be considered as a predictor of the progression of periodontal disease [28], whereas its absence is a reliable predictor of the maintenance of periodontal health [29]. Bleeding on probing is currently the clinical sign of periimplant disease. In this study, the bleeding index, which measures bleeding on probing, was higher in patients with periodontitis than in those without periodontitis. In addition, the majority of patients with a bleeding index greater than or equal to 30% were expected to have periodontitis.

5. Conclusion

Within the limitations of the present study, it allowed, using logistic regression to retain that the age ≥35 years, and the amount of plaque expressed as dental plaque index ≥ 1 were factors associated with the occurrence of periodontitis in Congolese in Kinshasa dental hospitals.

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Conflicts of Interest

The authors declare that there are no conflicts of interest in this study.

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