



Apical periodontitis epidemiology: A population-based survey of students in Dakar, Senegal

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Objective: The objective of the present study was to determine the prevalence of apical periodontitis among students at a university in Dakar, Senegal and to assess the associated factors.

Methods: This was a cross-sectional, descriptive, epidemiological study conducted during the academic year 2016–2017 (December 2016 to May 2017). The study population consisted of students in the law faculty and the dentistry department of a university. The age of the subjects was between 20 and 42 years. Each student underwent a clinical examination and a cone beam computed tomography examination.

Results: The findings indicated that the prevalence of apical periodontitis was 12%. The lower first molar was the most affected tooth (33.33%). Defective endodontic treatment was the most common cause of apical periodontitis (42.8%).

Conclusion: The results of the present study showed that poor endodontic treatment was the most common cause of apical periodontitis. Greater knowledge of apical periodontitis and strategies to improve prevention are needed.

Keywords: Apical periodontitis; epidemiology; students.

Apical periodontitis is an inflammatory lesion of the periradicular deep periodontium, mainly in the periapical region.^[1,2] It results from different aggressions that can alter the dental pulp, including caries, surgical procedures, periodontal diseases, lack of tightness of endodontic fillings and coronal restorations associated with them, and trauma that can cause cracks or fractures with ligament and/or cementation tearing.^[3] It is often a fortuitous discovery following a dental visit.

Apical periodontitis is a major public health problem generally underestimated, and all studies underline their very high prevalence, varying between 15% and 75%, depending on countries and studied populations.^[4] Moreover, the prevalence of apical periodontitis is influenced by different factors, such as age with various etiologies and various studies.^[5–7]

In Senegal, because of the frequency of this condition and the lack of studies on its epidemiological aspect, this

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survey has been conducted to determine the apical periodontitis prevalence and risk factors in a student population of a university.

Materials and methods

This was a cross-sectional descriptive epidemiological study during the academic year 2016–2017 (from December 2016 to May 2017). The study population consisted of students from the Faculty of Law and the Dentistry Department of a university. Dentistry students having their clinical training in hospitals and 100 randomly selected students from the Faculty of Law participated in the study. The study was approved by the ethics committee at the College of Dentistry and conducted in full accordance with the World Medical Association Declaration of Helsinki. Written consent was obtained from each patient. Each student took, systematically, a cone beam computed tomography (CBCT; Imaging Sciences International, Hatfield, PA, USA) type digital radiography and then underwent questioning, followed by a clinical examination. Two observers, an endodontist and a radiologist, performed a radiographic data calibration. In case of disagreement regarding the periapical status, a third observer was consulted to reach a consensus. Following these two steps, if a tooth showed apical periodontitis signs, an electric pulp test (Parkell pulp vitality tester, Farmingdale, NY, USA) was performed.

Once the apical periodontitis is diagnosed, the following data were recorded on a structured form for each subject: patient's age and gender, overall health status, oral hygiene (assessed using the Silness and Løe index), apical periodontitis etiology, teeth type, and finally, the type of apical periodontitis were classified according to the American Association of Endodontists classification (Table 1).^[8,9]

Multirroot teeth were evaluated as a single unit.

Data were evaluated using the SPSS software version 20 (SPSS Inc., Chicago, IL, USA). Qualitative variables (patient's gender, overall health status, oral hygiene, api-

cal periodontitis etiology, teeth type, and type of apical periodontitis) were expressed as number and percentage (%), and quantitative variable (patient's age) was expressed as average and standard deviation. Qualitative variables were compared using the Fisher's exact test, and quantitative variables were compared using the Wilcoxon test. The univariate and multivariate logistic regression analyses were used to determine the prognostic value between the original variables and the apical periodontitis prevalence. A p value <0.05 was accepted as statistically significant.

Results

A total of 184 students were selected. The study included 127 (69%) male and 57 (31%) female students. The average age of the students was 23.83±2.36 years. Students aged between 20 and 25 years accounted for 119 (64.7%), between 25 and 30 years accounted for 64 (34.8%), and over 30 years accounted for 1 (0.5%). The difference was not statistically significant (p>0.05).

Of the 184 students, 22 had apical periodontitis, with a prevalence of 12%. There were 39 apical periodontitis-affected teeth. It was noted that all students with an apical periodontitis had an overall good condition. With respect to oral hygiene, among the 22 students who had apical periodontitis, 30.77% had an average oral hygiene, and 69.23% had a poor oral hygiene. The difference was statistically significant (p<0.05).

The apical periodontitis frequency according to tooth type showed that the lower first molars (33.33%), upper central incisors (17.95%), lower second molars (12.81%), and upper lateral incisors (10.25%) were the most affected teeth. The difference was not statistically significant (p>0.05).

The present study showed that failed endodontic treatment (42.8%) was the most common etiology, followed by caries (9%) and traumatic injuries (2.7%), similar to the lack of tightness of coronal restorations, as well as dental trauma (2.7%).

Table 1. Diagnostic criteria for different types of periodontitis

Periodontitis	Clinical signs	Radiological signs
Symptomatic apical periodontitis	Spontaneous pain +++ Pain on percussion +++ Pulp sensitivity +++ Apical palpation +++	Ligament thickening +++
Asymptomatic apical periodontitis	Pain in the apical palpation +++ Insensitivity ++	Bone lysis ++
Acute apical abscess	Swelling +++ Absence of pulp sensibility +++ Percussion pain +++	Bone lysis +++ Ligament thickening +++

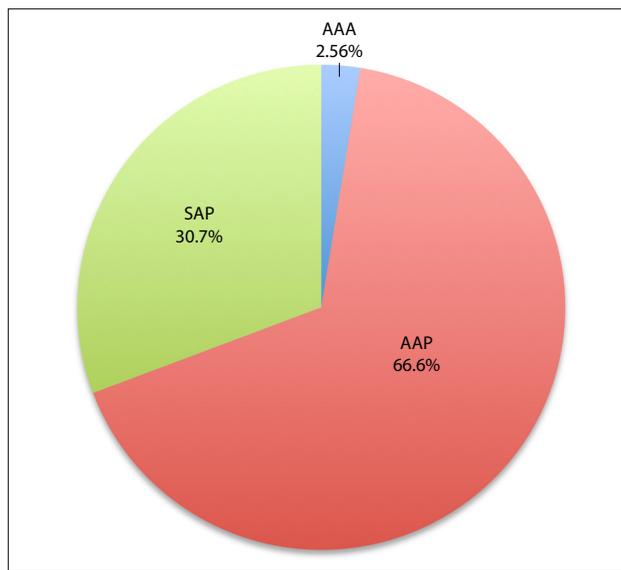


Fig. 1. Distribution of the different types of apical periodontitis. AAP: Asymptomatic apical periodontitis; SAP: Symptomatic apical periodontitis; AAA: Acute apical abscess.

CBCT showed that 32 (82.05%) teeth with apical periodontitis had apical bone resorption, and 4 (10.25%) teeth had no apical bone resorption. Ligament thickening was noted on 27 (69.23%) teeth. Three (7.69%) teeth had internal root resorption.

The most common semiological profile of periodontitis was asymptomatic apical periodontitis (66.6%), followed by symptomatic apical periodontitis (30.7%) and acute apical abscess (2.56%) (Fig. 1).

Assessing prognostic values showed that apical periodontitis was associated with neither age nor gender, tooth type, or overall health status ($p > 0.05$). On the contrary, it is strongly linked to defective endodontic treatment and poor oral hygiene ($p < 0.05$).

Discussion

The present study assessed the apical periodontitis prevalence, as well as different types in a student population in Dakar. This prevalence varies according to countries and studied populations. Studies conducted in other countries showed values varying between 15% and 75%.^[4] Touré et al.,^[10] in a study in a population in Dakar, Senegal, found a prevalence of 56.1%. This study detected a 12% rate that could be explained, in one hand, by the difference in methodology and, on the other hand, by the sampling size.

Results showed that apical periodontitis occurrence between men and women had no statistically significant difference. Gender has no influence on the periodontitis occurrence based on these findings. Regarding age, almost

all patients with apical periodontitis were aged between 20 and 30 years. A similar study conducted in Brazil showed a slight difference with aged between 30 and 49 years.^[5] This could be explained by a difference in selecting patient criteria. Indeed, the present study was conducted in the academic world, about a training-age population, in contrast to other studies that have been conducted on the general population.^[5-7,11,12]

Results showed no link between the overall condition and the apical periodontitis occurrence, even if earlier studies had linked them to cardiovascular diseases.^[2,13,14] Establishing this link is of utmost importance because chronic apical periodontitis is a dental infectious source that can, due to necrosis, cause diseases, such as Osler's endocarditis. This is the importance of screening in search of dental source outbreaks, especially in patients at risk of infection.^[13]

The Silness and Löe index was used to assess oral hygiene. Results showed that a significant number of students with apical periodontitis had a poor oral hygiene. This finding shows a link of oral hygiene to apical periodontitis occurrence.

Bearing in mind the type of most apical periodontitis-affected teeth, the present study showed that the lower first molars, as well as the upper central incisors, were the most affected by apical periodontitis; these results corroborate those by Kabak et al.^[15] Indeed, permanent first molars are the first teeth on the dental arch and the most susceptible to decay, whereas incisors, due to their front position on the arch, are the most affected during traumatic injuries affecting the tooth vitality which, when not treated, may evolve to necrosis and periodontitis.^[16]

Etiologically, CBCT showed that 42.8% of apical periodontitis was due to defective endodontic treatment. Thus, studies have shown that the prevalence of periodontitis increases considerably with defective endodontic treatment.^[17-19] Among them, Van der Veken et al.^[11] found a prevalence of 41% of apical periodontitis due to a failed endodontic treatment.

Indeed, patients with chronic apical periodontitis are often unaware of their disease which is progressing almost silently due the lack of pain. Thus, in most cases, it is accidentally discovered during a radiographic examination. These results about the apical periodontitis semiotic profile are consistent with those of an earlier study on the same population.^[20]

Conclusion

The present study showed that defective endodontic treatment was the most common cause of apical periodontitis.

Therefore, emphasis on the quality of work and continuing education in the field of Endodontology must be provided in Senegal. More studies in other Senegalese populations are necessary to supplement these results.

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