Prevalence of Clinical Attachment Loss in Adolescents in Santo Domingo, Dominican Republic

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Background: Data on periodontal conditions in adolescents in the Dominican Republic are scarce. The aim of the present cross-sectional study was to estimate the prevalence of periodontal attachment loss among Dominican adolescents. This study did not attempt to classify the disease into aggressive and chronic periodontitis.

Methods: A random sample of 2,007 Dominican adolescents was obtained. A probability, weighted sample was selected using a complex, multi-stage probability sampling design. The study was clustered in 26 schools and 106 classes. The study subjects were clinically examined under field conditions by a single calibrated examiner who measured gingival recession and probing depth at six sites per tooth, with subsequent calculation of clinical periodontal attachment level for each site.

Results: The prevalence of clinical attachment loss ≥1 mm was 49.5%, with the prevalence ranging between 48.7% and 50.2%, depending on age and gender. Clinical attachment loss ≥2 mm was found in 15% of the students and attachment loss ≥3 mm in 4.0% of the students. Logistic regression model revealed that only age significantly increased the probability of having clinical attachment loss.

Conclusion: We conclude that clinical attachment loss is common in adolescents in Santo Domingo, Dominican Republic, suggesting the necessity for improved standards of prevention, diagnosis, and treatment of these lesions. *J Periodontol 2005;76: 1450-1454.*

KEY WORDS

Adolescents; clinical trials, randomized; cross-sectional studies; Dominican Republic; periodontal attachment loss/diagnosis; periodontal diseases/adverse effects.

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Understanding the distribution of periodontal disease may reduce the direct and indirect costs of prevention and treatment programs, determine eligibility and coverage for insurance programs, and assist in the development of efficient designs in clinical trials in periodontal disease.[1] Epidemiological studies of periodontal diseases are complicated by the diversity of measures used to describe and quantify these diseases and the lack of consensus as to a uniform definition and classification of periodontal diseases.[1] The epidemiology of periodontal diseases is complicated by the fact that there are different diseases (gingivitis and periodontitis, with aggressive and chronic subgroups), different epidemiological measures (prevalence, incidence, extent, and severity), different methods of assessment (visual and probing) and measures (probing depth and attachment loss), and different sample populations.[2] Periodontitis is a destructive form of the disease characterized by inflammation of the periodontal tissue, leading to an apical migration of the epithelial attachment and loss of periodontal soft and hard tissues.[3]

Oral health survey data are essential for govermental decisions about dental care and prevention programs. Data on periodontal conditions in adolescents in the Dominican Republic are scarce. The aim of the present cross-sectional study was to estimate the prevalence of periodontal attachment loss among Dominican adolescents. This study did

not attempt to classify the disease into aggressive and chronic periodontitis.

MATERIALS AND METHODS

Study Population

The study sample was calculated according to the method described by Cochran[4] at 95% confidence interval with a 0.02% range of error and consisted of 2,007 adolescents. The prevalence of clinical attachment loss described by López et al.[5] was used to determine the sample size. The students in the study were selected using a multi-staged probability sample covering the high schools of Santo Domingo, Dominican Republic. School districts (primary sampling units) and school (second stage) were drawn from a national list of school districts and schools. The sampling units were weighted based on the selection probability and the weights were adjusted using data on the primary sampling units, school district, and the sampling unit. The third stage included selecting classes within each school from a list of classes by grade level. All students within the sampled classroom were candidates for examination. The study protocol was approved by the local Committee of Ethics of Catholic University, Santo Domingo, Dominican Republic and participating students gave their consent.

Examinations

Clinical attachment loss (CAL) was used to record periodontal conditions. The examination was carried out by a single well-trained and calibrated examiner (JC). On successive days, groups of 20 subjects were examined who had the full range of periodontal conditions expected to be assessed during the survey. Examinations (probing) were repeated until acceptable consistency was achieved (kappa = 0.61 and 0.80, considered to be good to excellent).[6] The examinations were carried out using headlamps, dental mirrors, and calibrated manual periodontal probes (tip diameter 0.5 mm). Assessment of the periodontal supporting tissues status was made by clinical measurement of the distance from the cemento-enamel junction (CEJ) to the free gingival margin (FGM), and the distance from the FGM to the bottom of pocket/sulcus. From these two measurements, the periodontal attachment loss (distance from the CEJ to bottom of pocket/sulcus) was calculated. Six sites (mesio-buccal, mid-buccal, disto-buccal, mesio-lingual/mesio-palatal, mid-lingual/mid-palatal, and disto-lingual/disto-palatal) of all first and second molars and all incisors present were examined.[5] All measurements were rounded down to the nearest whole millimeter.

Statistical Analysis

Logistic regression models were used to assess the influence of the variables age, gender, and smoking on at least two teeth with CAL ≥1 mm or at least one tooth with CAL ≥3 mm. As clinical attachment loss in buccal sites might not be the result of an inflammatory disease process, but could result from traumatic injuries induced, for instance, by vigorous tooth brushing we repeated the above logistic regression analyses using the occurrence of at least two teeth with CAL loss ≥1 mm in interproximal sites, or at least 1 tooth with CAL ≥3 mm in interproximal sites.[5] Risk ratios were calculated with 95% confidence intervals (CI). Statistical significance was defined as $P < 0.05$.

RESULTS

A total of 2,007 students from 106 classes in 26 high schools were included in the study. Forty-four had no clinical attachment loss and were excluded from the study. Table 1 shows the distribution of the sample by age and gender. Overall, 49.5% of the students examined had at least one site with clinical attachment loss ≥1 mm, with prevalence ranging between 48.7% and 50.2%, depending on age and gender. CAL was ≥2 mm in 15% and ≥3 mm in 4.0% of the students.

More males than females were affected ($P < 0.05$) and prevalence was higher in students aged 18 to 21 ($P < 0.05$) (Table 1). The proportion of subjects with clinical attachment loss ≥2 mm and ≥3 mm was also higher in adolescents aged 18 to 21 ($P < 0.05$).

Table 2 shows the prevalence of CAL in interproximal sites by age and gender and the mean number of sites affected. Sites with CAL ≥1 mm were seen in 33.6% of the students, with the prevalence ranging between 29.1% and 34.9%, depending on age and gender. The prevalence of CAL ≥2 mm and ≥3 mm was seen in 10.9% and 3.5% of the students, respectively. The percentage of students with ≥3 mm attachment loss increased with age from 2.4% in the 12 to 14 year old group to 4.1% in the 18 to 21 year group ($P < 0.005$).

Logistic regression model was constructed to analyze the variables associated with higher probability of clinical attachment loss: age, gender, medication, smoking, and no dentist visit in the past year. Only age significantly increased the probability of having clinical attachment loss (odds ratio = 1.56; CI 1.02 to 2.24).

DISCUSSION

This survey has provided valuable data concerning adolescent periodontal status in the Dominican Republic. Although the adolescent surveyed in the present study do not represent the total adolescent Dominican population aged 14 to 21, the sample does represent this age group in Santo Domingo. The prevalence of CAL ≥1 mm in Dominican adolescents was 49.5%; ≥2 mm, 15%; and ≥3 mm, 4.0% of the students. Detailed information on the prevalence of clinical attachment loss

Table 1.

Prevalence of CAL by Age and Gender

Age (years)	Gender	≥1 mm			≥2 mm			≥3 mm		
		N sites	%	95% CI	N sites	%	95% CI	N sites	%	95% CI
12-14	Males	212	48.7 ± 15.4*	46.6-50.8	191	11.1 ± 11.3	9.5-12.8	58	3.0 ± 3.4	2.1-3.9
	Females	273	44.8 ± 16.8*	42.8-46.8	227	11.1 ± 10.9	9.6-12.5	53	3.0 ± 3.9	1.9-4.0
	Total	485	46.5 ± 16.3†‡	45.0-48.0	418	11.1 ± 11.1†‡	10.0-12.2	111	3.0 ± 3.6‖	2.3-3.7
15-17	Males	619	49.6 ± 17.7	48.2-51.0	563	15.7 ± 15.4	14.4-17.0	201	3.8 ± 5.0	3.1-4.5
	Females	591	50.3 ± 16.8	48.9-51.6	547	15.7 ± 14.0	14.5-16.8	221	4.2 ± 4.9	3.5-4.8
	Total	1,210	49.9 ± 17.3†§	49.0-50.9	1,110	15.7 ± 14.7†§	14.8-16.5	422	4.0 ± 4.9	3.5-4.5
18-21	Males	121	51.3 ± 20.5	47.6-55.0	114	17.2 ± 15.7	14.3-20.1	53	4.1 ± 3.4	3.2-5.1
	Females	157	53.6 ± 15.2	51.3-56.0	152	18.9 ± 14.8	16.6-21.3	80	5.2 ± 5.1	4.1-6.4
	Total	278	52.6 ± 17.7‡§	50.5-54.7	266	18.2 ± 15.2	16.4-20.0	133	4.8 ± 4.5‖	4.0-5.6
All ages	Males	952	49.6 ± 17.6	48.5-50.7	868	14.9 ± 14.8	13.9-15.9	312	3.7 ± 4.5	3.2-4.2
	Females	1,021	49.3 ± 16.8	48.3-50.4	926	15.1 ± 13.7	14.2-16.0	354	4.2 ± 4.8	3.7-4.7
	Total	1,973	49.5 ± 17.2	48.7-50.2	1,794	15.0 ± 14.2	14.3-15.6	666	4.0 ± 4.7	3.6-4.4

Attachment loss ≥1 mm:
* Males versus females, 12-14, $P<0.05$.
† Total 12-14 versus 15-17, $P<0.0001$.
‡ Total 12-14 versus 18-21, $P<0.0001$.
§ Total 15-17 versus 18-21, $P<0.0001$.
Attachment loss ≥2 mm:
† Total 12-14 versus 15-17, $P<0.0001$.
‡ Total 12-14 versus 18-21, $P<0.0001$.
§ Total 15-17 versus 18-21, $P<0.0001$.
Attachment loss ≥3 mm:
‖ Total 12-14 versus 18-21, $P<0.008$.

Table 2.

Prevalence of CAL in Interproximal Sites by Age and Gender

Age (years)	Gender	≥1 mm			≥2 mm			≥3 mm		
		N sites	%	95% CI	N sites	%	95% CI	N sites	%	95% CI
12-14	Males	212	33.3 ± 10.4‡	31.9-34.7	187	8.0 ± 7.7	6.9-9.1	46	2.5 ± 2.4	1.8-3.2
	Females	273	30.5 ± 11.3‡	29.1-31.8	212	8.4 ± 7.8	7.3-9.4	50	2.3 ± 2.3	1.7-3.0
	Total	485	31.7 ± 11.0*†	30.7-32.7	399	8.2 ± 7.7†§	7.4-9.9	96	2.4 ± 2.3†¶	1.9-2.9
15-17	Males	619	33.8 ± 11.3	32.9-34.7	544	11.3 ± 10.5	10.5-12.2	170	3.4 ± 4.3	2.8-4.0
	Females	591	34.0 ± 11.2	33.1-34.9	538	11.4 ± 9.9	10.6-12.3	182	3.9 ± 4.2	3.3-4.5
	Total	1,210	33.9 ± 11.2*	33.3-34.6	1,082	11.4 ± 10.2§‖	10.8-12.0	352	3.7 ± 4.2¶	3.2-4.1
18-21	Males	121	34.4 ± 13.0	32.0-36.7	110	12.4 ± 10.6	10.4-14.4	48	3.4 ± 2.9	2.6-4.3
	Females	157	36.5 ± 10.0	34.9-38.1	152	13.8 ± 10.2	12.2-15.5	78	4.5 ± 4.3	3.5-5.4
	Total	278	35.6 ± 11.4†	34.2-36.9	262	13.2 ± 10.4†‖	12.0-14.5	126	4.1 ± 3.9†	3.4-4.8
All ages	Males	952	33.8 ± 11.3	33.1-34.5	841	10.7 ± 10.0	10.0-11.4	264	3.2 ± 3.8	2.8-3.7
	Females	1,021	33.5 ± 11.2	32.8-34.1	902	11.1 ± 9.7	10.5-11.8	310	3.8 ± 4.0	3.3-4.2
	Total	1,973	33.6 ± 11.2	33.1-34.1	1,743	10.9 ± 9.8	10.5-11.4	574	3.5 ± 3.9	3.2-3.9

Attachment loss ≥1 mm:
* Total 12-14 versus 15-17, $P<0.001$.
† Total 12-14 versus 18-21, $P<0.005$.
‡ Males versus females, 12-14, $P<0.05$.
Attachment loss ≥2 mm:
§ Total 12-14 versus 15-17, $P<0.005$.
† Total 12-14 versus 18-21, $P<0.005$.
‖ Total 15-17 versus 18-21, $P<0.005$.
Attachment loss ≥3 mm:
¶ Total 12-14 versus 15-17, $P<0.01$.
† Total 12-14 versus 18-21, $P<0.005$.

among adolescents is useful for two reasons. First, because most of the research effort in periodontal epidemiology has focused on middle-aged or older people. Second, understanding the epidemiology and clinical presentation earlier in the course of the disease may enable more timely and appropriate interventions in both the clinical and population levels to reduce the incidence and prevalence of periodontal loss of attachment.[7]

It should be noted, however, that it is not always feasible to compare the prevalence of disease reported by different studies due to differences in sampling and study design and the different classifications and diagnostic criteria for the disease.[8] Clinical measurements of periodontal attachment loss and/or radiographic assessment of alveolar bone loss at a given time point and/or longitudinally, as well as the age of onset of disease, are key parameters currently used for the identification and classification of cases. Most studies have used clinical and/or radiographical methods to assess the presence of periodontal tissue loss, customarily using a threshold of ≥3 mm to define periodontal tissues loss, although lower and higher thresholds have also been used. This lack of consistency undoubtedly is an important factor causing, at least in part, some of the differences in the occurrence of disease in different studies.[9] Gjermo et al.[10] used a convenience sample of 304 children, 15 years old, from a public school in a low socioeconomic area who were examined by bite-wing radiographics. Twenty-eight percent of the children had radiographic bone loss, and 2.6% were diagnosed as having aggressive periodontitis. Albandar et al.[11] studied 222 children aged 13 years from a private school in a relatively high socio-economic area in Sao Paulo using a similar examination method to that used by Gjermo et al.[10] They found that 5.4% of the subjects had vertical bone loss at one or more sites. Aggressive periodontitis, defined as vertical or arc-shaped bone loss on ≥2 first molars, was diagnosed in 1.3% of the children. Lopez et al.[12] studied the prevalence of aggressive periodontitis among students aged 15 to 19 years using a random sample of children representative of different socio-economic strata and ethnic groups in Santiago. In this study, children who had two or more teeth with >5.5 mm probing depth were invited for a radiographic examination consisting of bite-wing radiographs of first molars and periapical radiographs of incisors. The overall prevalence of aggressive periodontitis was 0.32%. A much higher prevalence was found in females than in males (7:1), and in subjects with a low socio-economic level.

The prevalence of clinical attachment loss ≥1 mm observed in the present study is lower than that observed among a population of Chilean adolescents, but similar at CAL ≥2 mm. Lopez et al.[5] described a large survey conducted in 1999 that used a multistage probability design to select 9,162 students, 12 to 21 years old, representative of high school students in the province of Santiago, Chile. They found that 4.5% of all students examined had clinical attachment loss of ≥3 mm: 3% in 12 to 14 years old, 4.5% in 15 to 17 years old, and 8.2 in 18 to 21 years old. Females had a slightly higher prevalence of disease than males (4.9% versus 4%). When attachment loss was assessed on the interproximal surfaces only, a slightly lower prevalence was reported (total: 3.7%; 12 to 14 years: 2.5%; 15 to 17 years: 3.7%; 18 to 21 years: 6.8%; females: 4.1%, males: 3.3%). The prevalence of clinical attachment loss ≥3 mm observed in the present study is higher than observed among Danish school children,[13] lower than observed among U.S. African-American school children,[14] and similar to that observed among Chilean adolescents.[5]

A wide range of demographic factors, such as age, gender, place of residence, educational level, and socioeconomic factors, have been identified as associated with chronic inflammatory diseases.[15-17] Age, gender, tobacco use, and diabetes mellitus have been consistently identified as important potential risk factors for destructive periodontitis.[18-20]

In the current study, the prevalence of clinical attachment loss increased with age, as has been found in many studies. Most epidemiological studies showed that periodontal disease is more severe in elderly people because of cumulative tissue destruction rather than an age-related intrinsic abnormality.[19,21-22]

This current study provides the first published detailed data describing the periodontal status in Dominican adolescents attending school and suggests this population has a relatively high prevalence of clinical attachment loss. The main emphasis should be on the application of preventive measures in school children, teenagers, and young adults so they can reach older age periodontally healthier than the current generations.

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