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ORIGINAL ARTICLE

Confirmation of symmetrical distributions of clinical attachment loss and tooth loss in a homogeneous Mexican adult male population

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Background/purpose: To ascertain whether or not clinical attachment loss and tooth loss are present with similar severity and prevalence across the two sides of the mouth in a homogeneous sample of urban male adults.
Materials and methods: A cross-sectional study was carried out on 161 policemen (a largely homogeneous group in terms of ethnic background, socioeconomic status, sex, occupation, and medical/dental insurance) in Campeche, Mexico. Periodontal examinations were undertaken using the Florida Probe System in a dental chair by one trained and standardized examiner (kappa$>$0.60) to determine clinical attachment loss and tooth loss. We examined six sites in all teeth present in the mouth (a maximum of 168 sites, no third molars). Because of correlated data between observations, McNemar (for tooth loss) and Wilcoxon (for attachment loss) signed-rank tests were used to compare right and left sites within the same patient.
Results: The mean age was 38.4$\pm$11.0 years. The mean number of teeth present was 24.4$\pm$4.6; the mean number of periodontal sites/person was 146.7$\pm$27.8. All P values were $>$0.05 (except for attachment loss in the upper first premolars), suggesting that there were no statistically significant differences between the right and left sides for the frequency of presentation of these two conditions.
Conclusion: Tooth loss and attachment loss measurements largely resemble each other on both sides of the mouth.

Introduction

It is traditionally accepted in dental practice and oral epidemiology that the two main causes of tooth loss among adults are dental caries and chronic periodontal diseases (or clinical decisions made by dental professionals while managing such conditions).[1–7] Some reports suggest that molars are often

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extracted due to caries, whereas anterior teeth seem to be extracted primarily due to periodontal problems.[1,8] In keeping with international trends, such conditions appear to have a significant epidemiologic impact on oral health in Mexico,[9–16] in particular because of their long-standing, chronic evolution. The implications for epidemiologic surveillance for such disease patterns are important for health services planning and policy: the assumptions underlying the progression, regression, or quiescence of disease activity over time and over the lifespan might lead to the conditions being treated differently, depending on their presentation. One such consideration is whether or not epidemiologic evaluations ought to assume that disease levels on one side of the mouth resemble disease levels on the other side (symmetry). While scientific evidence suggests that dental caries experience in both the temporary and permanent dentition follows a bilateral occurrence,[17–21] similar patterns of chronic periodontal breakdown and of tooth loss have not been extensively documented. The objectives of the present study were to establish the existence of a similar, symmetrical occurrence of clinical attachment loss and tooth loss in a largely homogeneous sample of adult subjects. We limited the appraisal of the symmetrical distribution to the statistical, rather than clinical or epidemiologic, significance.

Materials and methods

This study complied with guidelines for the protection of study participants and ethical regulations in place at the University of Campeche in Campeche, Mexico.

Study design and subject selection

This was a cross-sectional study undertaken in 2003 in a sample of police officers affiliated with the city's police force (a largely homogeneous group in terms of ethnic background, socioeconomic status, sex, occupation, and medical insurance) in Campeche, Mexico (a coastal city and state capital in the eastern Gulf of Mexico, part of the littoral Yucatan Peninsula). Dental services were very limited through medical insurance, and most of the policemen used fee-for-item care in private practice, which is the dominant delivery model in Mexico. A complete description of the survey planning and methods have been previously published.[22] Inclusion criteria were male sex, age >20 years, and with at least six natural teeth present. Exclusion criteria were edentulous individuals, individuals whose limited ability to open the mouth impeded a clinical exam, those undergoing periodontal treatment, and those taking antibiotics. After explaining the study to the police officers and obtaining informed consent, the total sample was 161 subjects (100% accepted to be included in the study).

Data collection and variables included

Subjects were examined in a dental chair using a dental lamp. The clinical examinations were performed by a periodontal specialist, trained and standardized for detection of clinical attachment loss (kappa >0.60) using an electronic periodontal probe (Florida Probe System; Florida Probe Corporation, Gainesville, FL, USA) with a 0.45-mm tip diameter. The level of precision of the probe is 0.2 mm with a regulated pressure of 15 g. The examiner evaluated six sites (distobuccal, midbuccal, mesiobuccal, distolingual, midlingual, and mesiolingual) in all available teeth per subject, except for the third molars (for a maximum of 168 sites/subject). The variables used were clinical attachment loss (mm) and tooth loss (teeth missing after they had erupted).

Statistical analysis

We first carried out a univariate analysis reporting the summary measures: for nominal variables, we used frequencies and percentage; for continuous variables, we used measures of central tendency and dispersion. In the bivariate analysis, we respectively used the Kruskal-Wallis test and the McNemar and Wilcoxon test to account for the correlation between observations for tooth loss and clinical attachment loss on two sides in the same subject. Analyses were performed using STATA version 8.2 (StataCorp LP, College Station, TX, USA).

Results

We examined a total of 161 subjects; mean age was 38.3±10.9 years (range, 20–78 years). The mean number of teeth in the mouths was 24.4±4.6 (range, 6–28). Overall, 23,622 periodontal sites were available for analysis, and the mean number of sites/person was 146.7±27.8. Table 1 shows the clinical attachment loss data. The lower canines had the largest clinical attachment loss, and the lower first molars the smallest. With the exception of the upper first bicuspids, clinical attachment loss was not statistically significantly different ($P>0.05$) across the right and left sides.

The distribution of missing teeth is given in Table 2 and Fig. 1. The tooth that was missing most frequently was the lower left first molar (33.5%), and the tooth that was missing least frequently was the lower left canine (1.2%) (Fig. 1). When individual

Table 1. Symmetry in clinical attachment loss (sites scored in millimeters)

Type of tooth	Right side	Left side	P*
Maxilla			
Central incisor	10.82±8.16	11.11±8.05	0.5687
Lateral incisor	10.84±7.88	10.32±7.18	0.6669
Canine	11.72±7.14	12.44±7.85	0.1506
First premolar	10.73±7.74	9.88±7.88	0.0428
Second premolar	9.43±8.72	10.17±8.21	0.5766
First molar	11.46±10.23	11.75±10.14	0.3145
Second molar	14.12±8.68	13.40±9.72	0.5312
Mandible			
Central incisor	14.29±7.24	13.67±6.39	0.0929
Lateral incisor	14.31±6.43	14.17±6.80	0.6309
Canine	14.39±4.91	14.35±5.64	0.8779
First premolar	13.79±5.49	13.82±6.06	0.9589
Second premolar	12.75±7.67	13.23±7.19	0.5269
First molar	8.10±9.42	9.55±9.46	0.2545
Second molar	11.47±9.07	11.55±9.16	0.4941

*Determined using the Wilcoxon test.

Table 2. Symmetry of tooth loss

	Maxilla			Mandible		
	Present	Missing	Difference*	Present	Missing	Difference*
Central incisor						
Present	137	1	1.9%	153	0	0.0%
Missing	4	19	P=0.375	0	8	P>0.99
Lateral incisor						
Present	135	4	0.6%	154	0	0.6%
Missing	5	17	P>0.99	1	6	P>0.99
Canines						
Present	137	8	0.0%	157	1	0.6%
Missing	8	8	P>0.99	2	1	P>0.99
First premolar						
Present	125	12	1.9%	151	3	1.2%
Missing	9	15	P=0.664	5	2	P=0.727
Second premolar						
Present	117	6	5.5%	141	8	3.1%
Missing	15	23	P=0.078	3	9	P=0.227
First molar						
Present	108	17	3.1%	93	27	8.1%
Missing	22	14	P=0.522	14	27	P=0.061
Second molar						
Present	130	12	1.9%	118	14	0.6%
Missing	9	10	P=0.664	15	14	P>0.99

*Difference between percentages of teeth lost on the left and right sides.

missing teeth across the left and right sides were compared, no difference was statistically significant, i.e., the distribution was similar between the left and right sides (Table 2).

Discussion

While it is already known that certain dental conditions (such as dental caries[17–21] and dental

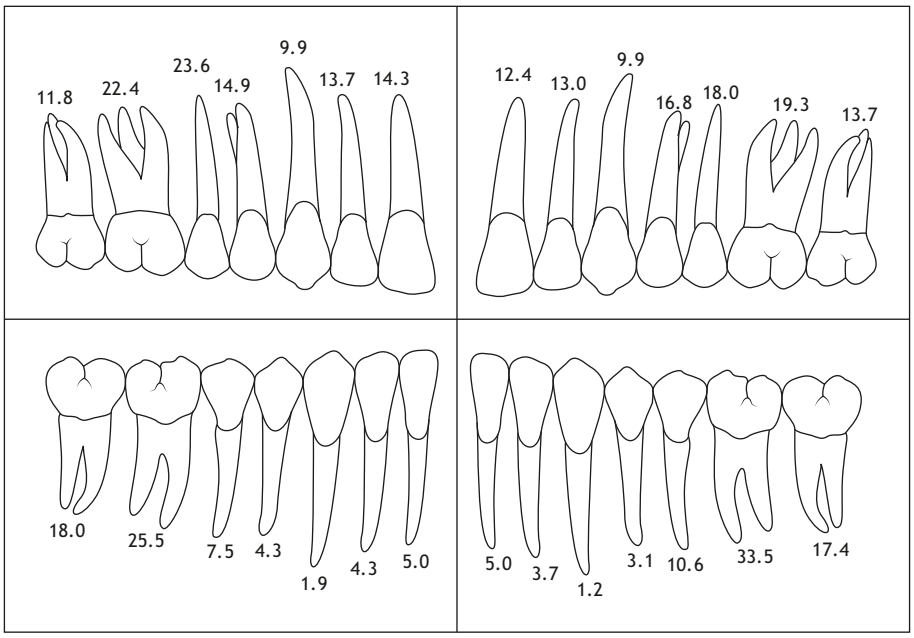

Fig. 1 Symmetry of missing teeth on the left- and right-hand sides for each individual tooth, in percentages. (In all comparisons with the McNemar test, P values were >0.05).

fluorosis[23,24]) tend to present symmetrically across the left and right sides of the mouth, the present study confirmed earlier reports that such a pattern is also applicable to certain periodontal features.[25–27] We found that tooth loss followed a similar pattern, although we were unable to objectively ascertain the reasons why individual teeth were absent or missing; we did not want to document self-reported diagnoses because of the unreliability of such information and the missing values that we would likely have obtained due to recall bias.

Owens et al.[27] found that contrasts between contralateral quadrants and whole-mouth assessments were a practical and acceptable improvement for periodontal examinations, while maintaining reasonably accurate measurements of periodontal conditions. Lower reliability was found when fewer sites or teeth were included. We expanded on that investigation by standardizing the probing force by means of an electronic probe, and by examining an urban population that was largely homogeneous. Previous findings were based on an indigenous group participating in a study in Guatemala (with essentially no dental/periodontal care services),[28] and long-standing research subjects making up a pool of participants for investigations addressing industrial dental products in Indiana, USA.[27] The latter study outlined the caveat that modifications of periodontal features that are ascribable to different populations (clinically naive, regular users of dental care, or infrequent users) make it advisable to corroborate such appraisals in more diverse population groups. In the medium term, further substantiation of trends for these features would strengthen or disallow protocols to simplify indices including fewer teeth/sites, driven by restrictions of time or budget.[29]

Some of the limitations of the present investigation are the lack of female participants because of the study population targeted (police officers), which is an occupation historically restricted to men. Also, the cross-sectional nature of the study did not permit an assessment of the evolution of tooth loss or clinical attachment loss, or link it to various diagnoses at different ages. Lack of reliable records to ascribe tooth loss to different interventions or the natural history of disease was mentioned above. Because of the lack of radiographic measurements in this rather "virgin" population in terms of periodontal/dental care, we could not attain a comprehensive appraisal of clinical conditions, an approach similar to other studies that used fairly small study populations. Finally, we emphasize that the study sample does not represent the entire Mexican population.

Our main conclusion with clinical and epidemiological implications is that tooth loss and clinical attachment loss follow symmetrical patterns in this rather homogeneous sample of Mexican adult males.

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