Science and Justice 50 (2010) 119–122

Contents lists available at ScienceDirect

Science and Justice

journal homepage: www.elsevier.com/locate/scijus

National survey of the incidence of missing anterior teeth: Potential use in bite mark analysis in the Brazilian context

Thaís Torralbo Lopez, Maria Gabriela Haye Biazevic *, Edgard Michel-Crosato

School of Dentistry, University of São Paulo (FOUSP), Department of Community Dentistry, Av. Professor Lineu Prestes, 2227 05508-000 São Paulo-SP, Brazil

ARTICLE INFO

Article history:
Received 2 July 2009
Received in revised form 26 November 2009
Accepted 4 December 2009

Keywords:
Tooth loss
Adult
Forensic dentistry

ABSTRACT

Bite mark analysis in forensic dentistry presupposes that the human dentition is unique and that its characteristics can be transferred precisely to several materials. The aim of the present study was to register the frequency of missing anterior teeth in the Brazilian adult population, discussing its potential importance in bite mark analysis. Data from the Brazilian Oral Health Survey were used; 13,431 male and female individuals aged 35 to 44 were examined according to the criteria of the World Health Organization. The analysis of Poisson regression was performed in order to calculate the rating ratios and the respective confidence interval at 95%. A total of 13,431 adults participated in the study. Among male individuals, 2063 (47.00%) were dentate and 2036 (46.40%) had at least one missing tooth. Only 254 (5.83%) were totally edentulous. A significant number of males and females presented 6 missing teeth in the same dental arch, revealing the poor state of oral health of adult Brazilians. Missing teeth were more frequent in the upper dental arch than in the lower arch. In the upper dental arch, the incisor group (central and lateral) was missing the most. In the lower dental arch, however, a certain lack of homogeneity was observed among the different dental groups as regards missing teeth. White individuals presented a smaller proportion of missing teeth compared to the other ethnic groups. Females were 1.61 (CI 1.50–1.73) times more likely than males to present missing teeth. The absence of upper teeth and the presence of lower teeth were observed in 16.10% of the individuals. Further research should also include an analysis of different age groups. This would increase the potential of applying this kind of information to bite mark analysis.

1. Introduction

Bite mark analysis in forensic dentistry presupposes that the human dentition is unique and that its characteristics can be transferred precisely to several materials, such as skin and food [1]. Its study refers, more often, to bite mark analysis of the skin [2], where the single dental characteristics of a suspect are compared to patterns observed on the bitten skin.

In the study of bite marks, the presence or absence of a tooth can be very useful in identifying specific dentition characteristics. Moreover, certain dental groups can be identified by their classification characteristics, where incisors produce rectangular injuries and canines, triangular injuries [3].

When comparing the national oral health surveys performed in Australia, the United States, Germany and United Kingdom, Crocombe et al. [4] analyzed the percentage of edentulous individuals and the average number of teeth present in these individuals, in addition to other clinical indicators, in different age groups. They reported that, in Australia, 2.1% (CI 1.8–2.4) of adults (age 35–44) were edentulous in the national survey conducted in 2004–2006. In the United Kingdom, 5.3% of adults presented a similar oral condition in 1998, and in Germany (2005), 2.7% also did. Among American adults with ages between 35 and 49, edentulousness occurred in 2.4% (CI 2.2–2.5) of the population [4].

Kouble and Craig [5] studied the frequency of missing anterior teeth in the United Kingdom with the aim of showing its potential usefulness in bite mark analysis. Patients aged 16 and over that sought care in a dental service located in South Yorkshire were invited to participate. A clinical examination was performed to register the presence or absence of anterior teeth. After evaluating 1010 patients, the authors found that 19% had one or more missing anterior teeth and that only 6% did not replace this absence with a prosthesis.

Few studies have systemically evaluated the incidence of missing anterior teeth on a population basis, and in-depth studies dealing simultaneously with dental loss and its contribution to forensic dentistry are not available. Thus, the aim of the present study was to assess the frequency of missing anterior teeth in the Brazilian adult population.

* Corresponding author. Tel.: +55 11 30917891; fax: +55 11 30917874.
E-mail addresses: thais.lopez@usp.br (T.T. Lopez), biazevic@usp.br (M.G.H. Biazevic), michelcrosato@usp.br (E. Michel-Crosato).

1355-0306/$ – see front matter
doi:10.1016/j.scijus.2009.12.001

Table 1
Number of males and females in the dentate, partially dentate and edentulous categories.

	Males	Females	Total
Dentate	2063	3514	5577
Partially dentate	2036	4517	6553
Edentulous	254	1047	1301
Total	4353	9078	13,431

Table 2
Tooth notation grid showing the number of missing teeth by tooth type.

Total	4988	6070	6151	6173	6122	4996
Males	1173	1607	1697	1700	1620	1179
Females	3815	4463	4454	4473	4502	3817
Tooth notation	*UR3*	*UR2*	*UR1*	*UL1*	*UL2*	*UL3*
Tooth notation	*LR3*	*LR2*	*LR1*	*LL1*	*LL2*	*LL3*
Females	1502	1376	1397	1406	1394	1436
Males	401	417	433	441	402	388
Total	1903	1793	1830	1847	1796	1824

UR3: upper right canine; UR2: upper right lateral incisor; UR1: upper right central incisor; UL3: upper left canine; UL2: upper left lateral incisor; UL1: upper left central incisor; LR3: lower right canine; LR2: lower right lateral incisor; LR1: lower right central incisor; LL3: lower left canine; LL2: lower left lateral incisor; LL1: lower left central incisor.

2. Material and methods

This study was based on secondary data obtained from the Brazilian Oral Health Survey, which investigated 108,921 individuals ranging in age from 18 months to 74 years between May 2002 and October 2003 [6].

A probabilistic analysis was designed by defining a cluster sampling in 250 cities that contained populations of different sizes from all Brazilian states. Data collection involved calibrated dentists that followed the diagnostic criteria of the World Health Organization (WHO, *Oral health surveys: basic methods*, 1997 — 4th edition) [7].

A total of 13,431 male and female individuals aged 35 to 44 were examined. Intraoral exams were performed at the participants' homes with natural light and using a WHO community periodontal index (CPI) ballpoint probe, a flat mirror and tongue spatulas. Information about the conditions of the dental and periodontal crown was collected, in addition to occlusal disorders, dental fluorosis, and the need for a prosthesis. Information about socioeconomic condition, use of dental services and self-perception of oral health was also collected during an interview using a pre-tested questionnaire.

The dependant variable was tooth loss, obtained with the use of codes 4 (missing tooth due to caries experience), 5 (missing tooth due to another reason) and 8 (unerupted tooth). Each crown from the 12 anterior teeth examined (upper and lower anterior teeth) was then evaluated. The resulting variable was then dichotomized in the absence or presence of a missing tooth.

Gender and skin color variables were categorized according to the criteria of the Brazilian Oral Health Survey.

The most frequent dental combinations of presence and absence of upper and lower teeth were then described.

The data were analyzed by using the Stata 10.0 statistical package (Stata Corporation, College Station, TX, USA). Poisson regression analysis was performed in order to calculate the rating ratios and the respective confidence interval at 95%. The Brazilian Oral Health Survey was approved by the National Committee of Ethics and Research.

3. Results

A total of 13,431 adults participated in the study. Among male individuals, 2063 (47.00%) were dentate and 2036 (46.40%) had lost at least one tooth. Only 254 (5.83%) were totally edentulous. Female individuals were mostly partially dentate (4515, 49.53%) (Table 1).

When analyzing the dental group with the largest prevalence of absence of teeth, it was observed that the upper teeth were missing in larger numbers than the lower teeth. In the upper arch, the incisor group (central and lateral) was missing the most. In the lower arch, however, a certain lack of homogeneity regarding missing teeth was observed among the different dental groups. The left and right sides presented similar patterns of dental loss, in both male and female individuals (Table 2).

When tooth loss was analyzed regarding age, it was observed that the older the individual, the larger the proportion of missing teeth, in both male and female individuals (Table 3). Table 3 shows that the proportion of females that presented dental absence was larger than that of males, in all age groups. At the age of 37, females had a 1.26 (CI 1.11–1.42) times larger chance of presenting absence of teeth than male individuals. The largest rate of missing teeth was observed at age 41, when females were 1.61 (CI 1.50–1.73) times more likely to have tooth loss than males (Table 3).

Table 4 shows the number of males and females according to the number of missing teeth. Among females, 1109 (12.22%) had lost 6 lower teeth and 3296 (36.31%) had lost 6 upper teeth. Among males, 277 (6.36%) had lost 6 lower teeth and 910 (20.90%) had lost 6 upper teeth. These rates evidence the poor oral state of the Brazilian adult population.

Regarding ethnicity, the results showed that a loss of 6 teeth occurred in all the ethnic groups examined. White individuals presented a smaller proportion of missing teeth when compared to the other ethnic groups (Table 5).

Table 6 shows that the most frequent dental combination in the sampled population was the total absence of upper teeth and the

Table 3
Number of males and females with missing teeth and prevalence ratios grouped according to age.

Age	Males		Females		Taxes	
	No. of individuals (proportion of individuals with missing teeth — %) (a)	No. of teeth (proportion of missing teeth — %) (b)	No. of individuals (proportion of individuals with missing teeth — %) (c)	No. of teeth (proportion of missing teeth — %) (d)	Rating ratios (proportion of individuals with missing teeth) (c/a)*	Rating ratios (proportion of missing teeth — %) (d/b)*
35	713 (40.5)	8556 (15.6)	1686 (50.1)	20,232 (21.4)	1.24 (1.12–1.37)	1.37 (1.30–1.45)
36	408 (44.6)	4896 (15.7)	839 (53.3)	10,068 (25.2)	1.19 (1.05–1.35)	1.60 (1.49–1.73)
37	409 (44.6)	4908 (19.5)	840 (56.1)	10,080 (26.1)	1.26 (1.11–1.42)	1.34 (1.25–1.43)
38	425 (48.9)	5100 (19.3)	807 (60.7)	9684 (28.3)	1.24 (1.11–1.39)	1.47 (1.38–1.56)
39	386 (49.5)	4632 (19.6)	737 (60.6)	8844 (31.3)	1.23 (1.09–1.38)	1.60 (1.49–1.71)
40	372 (56.2)	4464 (25.9)	800 (63.5)	9600 (31.7)	1.13 (1.02–1.25)	1.22 (1.16–1.30)
41	286 (52.8)	3432 (22.1)	638 (65.0)	7656 (35.6)	1.23 (1.09–1.39)	1.61 (1.50–1.73)
42	363 (58.1)	4356 (26.0)	739 (66.4)	8868 (36.9)	1.14 (1.03–1.26)	1.42 (1.34–1.50)
43	381 (62.2)	4572 (29.7)	709 (71.2)	8508 (39.7)	1.15 (1.05–1.25)	1.34 (1.27–1.41)
44	577 (64.3)	6924 (30.3)	1244 (74.4)	14,928 (44.2)	1.16 (1.08–1.24)	1.46 (1.40–1.52)

* Poisson regression test.