

Tooth loss and associated factors in adults and the elderly in Southeastern Brazil

Perdas dentárias e fatores associados em adultos e idosos da região Sudeste do Brasil

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ABSTRACT

Aim: The high number of Brazilians with tooth loss, the difficulties to control this aggravation, and the negative impacts on affected people's lives challenge public health to minimize such problems. The present study sought to analyze the relationship between tooth loss and sociodemographic, behavioral, and self-perception conditions in adults and the elderly in southeastern Brazil. **Methods:** A cross-sectional study was conducted with data from the SB Brasil Project (2010), which presented a sample of 2,895 subjects using Poisson Regression (RP) for statistical analyses between the outcome of tooth loss and independent variables: family income, years of study, last dental appointment, reason for the last appointment, toothache in the last 6 months, place of the last dental appointment, satisfaction with teeth and mouth, difficulty in speaking, embarrassment when smiling, and need for dental treatment. **Results:** The results showed a relation between tooth loss and economic, behavioral, and self-perception factors both in adults and the elderly. **Conclusion:** Sociodemographic and behavioral variables seem to be linked to tooth loss in both adults and the elderly, suggesting that the public policies that are equitable and seek to improve access to treatment and prevention must meet both age groups through health promotion and prevention measures.

Uniterms: Oral health. Tooth loss. Aged. Adults.

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INTRODUCTION

Tooth loss is still seen by many as a natural consequence of aging. Even in industrialized countries, such as the United States, where tooth loss has declined in adults, the proportion of edentulous elderly people remains high around 24%^{1, 2, 3}.

Tooth loss caused by extractions of teeth affected by dental caries in the later stages of this disease is still a major oral health problem among Brazilians, observed mainly in regions where a significant proportion of the population does not have regular access to actions for the promotion of oral health or to dental services⁴.

According to the National Survey on Oral Health (2010)⁵, known as the SB Brasil Project, a reduction in tooth decay was observed in Brazil when compared to the results of the SB Brasil Project (2003). Analyzing the adult group (35 to 44 years of age), it was observed that the DMF was reduced from 20.1 to 16.3, a decrease of 19%, and the "missing" component decreased significantly from 13.2 to 7.3. However, among the elderly (65 to 74 years of age), the DMF showed little alteration, from 27.8 to 27.5, still with a predominance of the "missing" component corresponding to 92%. Thus, the factors associated with tooth loss may present different patterns for adults and the elderly.

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In this sense, it was possible to observe that the adult population from 35 to 44 years of age, over the seven years between the two main national surveys, has been gaining greater access to conservative dental services⁵. This is a significant inversion of the trend recorded in the country; mutilating procedures, represented by tooth extractions, have been giving space to restorative treatments. In the elderly, the reduction of caries is less significant, because of the cumulative nature of the sequelae of this disease and the possible lack of access to health services.

In view of the reality of oral health and the ongoing demographic transition, in which the number of Brazilian adults and the elderly has been increasing, and considering the proportion of missing teeth observed in the last epidemiological survey in 2010, this study aimed to verify the association between tooth loss and sociodemographic, behavioral, and self-perception factors in these populations.

MATERIALS AND METHODS

This study had a cross-sectional quantitative design, using secondary data obtained from epidemiological surveys on oral health conducted by the Brazilian Ministry of Health, called National Survey on Oral Health (SB Brasil Project, 2010), for the Southeastern region of the country, by a probability sampling per conglomerates. The groups assessed were of adults ($n = 1,608$) and the elderly ($n = 1,287$), totaling a sample of 2,895 individuals. These patients were interviewed and examined by trained professionals with prior experience in surveys, to evaluate the prevalence and severity of the main oral diseases. Moreover, data on socioeconomic conditions, use of dental services, and health awareness were also collected⁵.

The result analyzed in this study was tooth loss, dichotomized into the loss of 0-19 teeth and 20 or more (reference category), considering the aims of the World Health Organization (WHO) and the World Dental Federation (FED) in 2000, where 75% of adults and 50% of the elderly were expected to have at least 20 functional teeth. The present study applied the following independent variables, since

they were widely analyzed with the outcome and presented important results⁴: family income (\leq R\$ 500.00 / $>$ R\$ 500.00), years of study (\leq 4 years / $>$ 4 years), last dental appointment ($<$ 1 year / \geq 1 year), reason for last appointment (prevention + treatment + other/pain/tooth extraction), toothache in the last 6 months (no/yes), place of the last appointment (public/others), satisfaction with teeth and mouth (satisfied + very satisfied/not satisfied or dissatisfied/dissatisfied + very dissatisfied), difficulty in speaking (no/yes), embarrassment when smiling (no/yes), and dental treatment need (no/yes).

The Poisson Regression was applied for statistical analyses, using the Statistical Package for the Social Sciences (SPSS) software, version 18, with a 95% CI.

The SB Brasil Project (2010) has been submitted to the Research Ethics Committee of the Brazilian Ministry of Health, and was approved and recorded by the *Comissão Nacional de Ética em Pesquisa* (CONEP – Brazilian Committee for Ethics in Research), of CNS.

RESULTS

The mean age was 39 years for adults and 68 years for the elderly, while the mean for the years of study was 8.24 and 5.07, respectively.

According to Table 1, in the southeastern region, 1,608 adults and 1,287 elderly patients participated in the SB Brasil Project (2010), totaling 2,895 individuals. Most adults (66%) and the elderly (62%) were females; 53.3% of the adults declared themselves to be non-white, while 54.5% of the elderly declared themselves as white. Most individuals (87% of adults and 88% of the elderly) had an income higher than BRL 500.00.

Among the factors associated with tooth loss in adults who had 0-19 missing teeth, 71.9% had an income higher than BRL 500.00. Among them, 70.5% reported having difficulty in speaking.

Among the elderly, 86.6% of the individuals with 20 or more missing teeth had an income higher than BRL 500.00, and 61.6% sought out a dentist for prevention.

Table 1 - Number and percentage of adults and the elderly, according to sociodemographic, behavioral, and self-perception variables of adults and the elderly in Southeastern Brazil – SB Brasil Project 2010

	Adults (1,608)		Older adults (1,287)	
	n	%	n	%
Sociodemographic				
Sex				
Male	547	34	488	38
Female	1,061	66	799	62
Ethnic group				
White	751	46.7	701	54.5
Non-white	857	53.3	586	45.5

	Adults (1,608)		Older adults (1,287)	
	n	%	n	%
Sociodemographic				
Household income				
≤ R\$500.00	196	12.7	142	11.6
> R\$500.00	1,346	87.3	1,080	88.4
Behavioral				
Dentist Appointment*				
No	97	6.1	122	9.6
Yes	1,498	93.9	1,156	90.4
Attendance				
< 1 year	695	43.2	353	27.4
1 or +	913	56.8	934	72.6
Place				
Public	522	32.5	265	20.6
Others	1,086	67.5	1,022	79.4
Reason for the appointment				
Prevention	322	20	163	12.7
Treatment	679	42.2	430	33.4
Others	607	37.8	694	53.9
Self-perception				
Satisfaction with teeth and mouth*				
Satisfied	620	39.2	636	50.4
Neither satisfied nor dissatisfied	338	21.4	248	19.7
Dissatisfied	621	39.4	377	29.9
Difficulty in speaking*				
No	1,361	86	1,058	83.5
Yes	223	14	209	16.5
Embarrassment while smiling*				
No	1,163	72.8	1,017	79.8
Yes	434	27.2	257	20.2

* n does not correspond to 100%.

In Table 2, a greater prevalence of tooth loss was observed in adults that had lower incomes (PR = 1.99) and who were not aware of their dental treatment needs (PR = 2.59). By contrast, minor tooth loss was identified in those who had no difficulty in

speaking (PR = 0.60), who felt satisfied with their teeth and mouth (PR = 0.35), who consulted a dentist for prevention/treatment (PR = 0.56), and who had been to a dental appointment less than a year before (PR = 0.61).

Table 2 - Association between independent variables and tooth loss in adults of Southeastern Brazil – SB Brasil Project 2010

	Adults						
	0-19 missing teeth		≥ 20 missing teeth		PR Crude (95%CI)	PR Adjusted (95%CI)	p
	n	%	n	%			
Sociodemographic							
Household income							
≤ R\$500.00	160	11.3%	36	28.1%	2.49 (1.52-4.06)	1.99 (1.25-3.17)	0.004
> R\$500.00	1,254	88.7%	92	71.9%	1	1	

Behavioral							
Treatment need							
No	298	20.8%	44	35.5%	1.49 (0.94-2.36)	2.59 (1.62-4.15)	< 0.0001
Yes	1,137	79.2%	80	64.5%	1	1	
Last dental appointment							
< 1 year	661	48.0%	32	30.8%	0.56 (0.36-0.87)	0.61 (0.39-0.96)	0.03
≥ 1 year	716	52.0%	72	69.2%	1	1	
Reason for the appointment							
Prevention/treatment	974	70.4%	59	55.7%	0.35 (0.21-0.58)	0.56 (0.34-0.93)	0.02
Pain	246	17.8%	17	16.0%	0.49 (0.26-0.92)	0.63 (0.35-1.16)	0.14
Dental extraction	163	11.8%	30	28.3%	1	1	
Self-perception							
Satisfaction with teeth and mouth							
Satisfied/very satisfied	579	39.9%	41	31.8%	0.4 (0.24-0.66)	0.35 (0.19-0.65)	0.001
Neither satisfied nor dissatisfied	315	21.7%	23	17.8%	0.47 (0.26-0.84)	0.48 (0.26-0.87)	0.01
Dissatisfied/very dissatisfied	556	38.3%	65	50.4%	1	1	
Difficulty in speaking							
No	1,268	87.3%	93	70.5%	0.41 (0.26-0.66)	0.6 (0.38-0.96)	0.03
Yes	184	12.7%	39	29.5%	1	1	

In Table 3, the elderly who showed a greater prevalence of tooth loss had lower incomes (PR = 1.27) and showed no pain in the last 6 months (PR = 1.21), while tooth losses were lower in people who had been to the dentist less than 1 year before (PR= 0.67), who had consulted a dentist for prevention/treatment (PR = 0.84) or pain (PR = 0.79), and who showed no embarrassment when smiling (PR = 0.85).

Table 3 - Association between independent variables and tooth loss in the elderly in Southeastern Brazil – SB Brasil Project 2010

	The elderly						
	0-19 missing teeth		≥ 20 missing teeth		PR Crude (95%CI)	PR Adjusted (95%CI)	p
	n	%	n	%			
Sociodemographic							
Household income							
≤ R\$500.00	24	7.0%	118	13.4%	1.28 (1.0-1.64)	1.27 (1.11-1.44)	< 0.001
> R\$500.00	319	93.0%	761	86.6%	1	1	
Behavioral							
Last dental appointment							
< 1 year	174	52.6%	179	23.9%	0.62 (0.52-0.75)	0.67 (0.58-0.77)	< 0.001
≥ 1 year	157	47.4%	570	76.1%	1	1	

Toothache in the last 6 months							
No	292	82.3%	714	90.6%	1.28 (0.99-1.67)	1.21 (0.99-1.48)	0.06
Yes	63	17.7%	74	9.4%	1	1	
Reason for the appointment							
Prevention/inspection/treatment	251	74.5%	493	61.6%	0.76 (0.64-0.92)	0.84 (0.76-0.94)	0.002
Pain	37	11.0%	59	7.4%	0.74 (0.54-1.02)	0.79 (0.64-0.98)	0.03
Dental extraction	49	14.5%	248	31.0%	1	1	
Self-perception							
Embarrassment when smiling							
No	299	83.5%	712	78.5%	0.89 (0.73-1.07)	0.85 (0.76-0.96)	0.01
Yes	59	16.5%	195	21.5%	1	1	

DISCUSSION

In this study, three variables were associated with both outcomes, one socioeconomic and two behavioral. As expected, the income and regular use of the service, especially for prevention and/or treatment, showed an association with tooth loss. Income was an important factor, since tooth loss is greater in the population with an income of lower than BRL 500.00, for both adults and the elderly. The total loss of teeth is still accepted by society as something natural with increasing age. This may also be interpreted as a reflection of the lack of more effective public policies in the field of oral health, geared primarily toward the adult population for them to keep their teeth until more advanced ages, as well as a means through which to improve access to information for prevention and dental treatments^{4,7}.

In 2002, the value of the missing component of the DMF-T was 20.3 for adults and 27.8 for the elderly⁸, while, in this study, the mean of the missing component was 24.1 in the elderly and 14.8 in adults. Thus, edentulism is still a serious problem in Brazil, especially among the elderly, and is considered the final result of the burden of the disease⁹, which translates into severe impacts on the individuals' quality of life, in turn affecting both esthetics and function.

Considering the current ongoing demographic transition in Brazil, where the number of elderly people in the population is increasing, this study is justified and contributes to better understand and contextualize actions aimed at dental losses by health services.

Studies suggest that tooth loss is directly related to the advancement of dental caries, the main cause of pain, in turn resulting in dental mutilation¹⁰. However, this study found that the minor prevalence of tooth loss of 20 or more teeth was associated with a greater possibility of pain, which was the reason for the elderly individual's last dental appointment, suggesting

that using health services promotes a greater sense of awareness, which, in turn, contributes to the increased awareness of the need for health services need¹¹.

In the behavioral aspect, adults who visited a professional less than a year before (43.2% adults and 27.4% the elderly) were those who showed a lower prevalence of more missing teeth. The analysis showed that the factor of recurring attendance in dentist appointments is a protection factor for tooth loss in the adult population (PR = 0.61), which is in accordance with a study conducted in Sweden. The search for dental services may reflect a desire to verify one's dental status, but is also a desire to receive preventive care^{12,13}. In the older population (PR = 0.67), such a condition was also associated with tooth loss, confirming the study of Renvert et al.¹⁴.

The visit to the dentist for a routine review may avoid dental complications, including pain and tooth loss. The present study have found that the prevalence of a larger number of missing teeth was greater among adults who did not undergo routine dental inspections. This meets a percentage of 70.4% adults with present teeth who pursued prevention, inspection, and treatment. Cunha-Cruz et al.⁹ have found that among those who did not use the dental service in the year preceding the interview, the prevalence of edentulism increased nearly 7% throughout 30 years of assessment⁹.

On the other hand, the relation between the reason for seeking out dental treatment and tooth loss in adults represented a negative association (0.56) for treatment and maintenance, according to findings from other studies, where the number of visits to the dentist contributed significantly to explaining the variation in tooth loss, following the same relation found in this study¹⁵.

The elderly, when questioned about episodes of toothaches in the last 6 months, had a great prevalence of negative responses, both in people with 0-19 and 20

or more missing teeth: 82.3% and 90.6%, respectively. When verifying the relation between toothache and tooth loss, no association was observed between them.

The present study also observed that the elderly with 20 or more missing teeth were not embarrassed when smiling, indicating that the fact of not having any natural teeth does not unfavorably interfere in their everyday life, with an overall satisfaction regarding their lives, perhaps by accepting the loss of their teeth as a process inherent to aging or as a certain conformity, interfering in one's self-esteem, social relations, and quality of life^{1,16,17,18}.

In adults, a negative association was observed between difficulty in speaking and greater tooth loss, which confirms findings from Gibilini et al.¹, Vargas and Paixão¹⁹, Silva et al.²⁰, and Jorge et al.²¹, who found that adults reported no difficulty in speaking, thus influencing their behavior in daily life. It is important to consider that the changes related to speech patterns are expected in individuals with tooth loss, since the teeth are needed for the obstruction of air in the production of certain sounds^{19,21}.

Approximately one third (31.8%) of adults with 20 or more missing teeth reported satisfaction with their remaining teeth and mouth in relation to tooth loss, whereas 17.8% reported indifference, which proved to be associated with a greater prevalence of tooth loss regarding who felt dissatisfied. This result corroborates the findings of Araújo et al.²², in which 42% are dissatisfied, and of Silva et al.²⁰, which found that 64% of adults are dissatisfied, a result similar to that found by Colussi and Freitas²³.

Tooth loss can be seen as an important measure for the evaluation of dental services. This evaluation must include the perception of users regarding oral health, and the use of the services should be seen as the product of the interaction between individual determining factors (of the health system and social context) and knowledge of oral care, including past experiences of uses of the services^{24,25}.

One limitation of this study may be the inability to compare and contrast the outcome with periodontal disease and actions by health services for this important morbidity. Another limitation is the fact that it is a cross-sectional study, using an existing database, which does not allow for a causality to be established; hence, future studies of longitudinal designs should be constructed to verify this result.

CONCLUSION

Sociodemographic and behavioral variables seem to be linked to tooth loss in both adults and the elderly, suggesting that the public policies that are equitable and seek to improve access to treatment and prevention must meet both age groups through measures of health promotion and prevention.

RESUMO

Objetivo: O alto número de brasileiros com perda de dentes, as dificuldades para controlar esse agravamento e os impactos negativos na vida das pessoas afetadas desafiam a saúde pública para minimizar tais problemas. O objetivo deste estudo foi analisar a relação entre a perda dentária e as condições sociodemográficas, comportamentais e de autopercepção em adultos e idosos da região Sudeste do Brasil. **Métodos:** Estudo transversal, com dados do SB Brasil 2010, de uma amostra de 2895 sujeitos utilizando Regressão de Poisson (RP) para as análises estatísticas entre desfecho de perda dentária e variáveis independentes: renda familiar; anos de estudo; última consulta odontológica; razão para o último compromisso; dor de dente nos últimos 6 meses; última consulta odontológica; lugar do último compromisso; satisfação com dentes e boca; dificuldade em falar; constrangimento enquanto sorrindo e necessidade de tratamento dentário. **Resultados:** Os resultados mostraram relação entre a perda dentária e fatores econômicos, comportamentais e de autopercepção tanto em adultos quanto em idosos. **Conclusão:** As variáveis sociodemográficas e comportamentais parecem estar ligadas à perda dentária em adultos e idosos, sugerindo que as políticas públicas equitativas e voltadas para o acesso ao tratamento e prevenção devem atender a ambas as faixas etárias por meio de medidas de promoção e prevenção da saúde.

Descritores: Saúde bucal. Perdas dentárias. Idosos. Adultos.

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