Association between self-rated oral appearance and the need for dental prostheses among elderly Brazilians

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Abstract: We investigated the association between poor self-rated oral appearance and the need for dental prostheses among elderly Brazilians. National data from an epidemiological survey on oral health in Brazil conducted from 2002 to 2003 by the Ministry of Health (SB, Brazil) with a multistage random sample of 4,839 individuals aged 65–74 years in 250 towns were analyzed. The dependent variable was self-rated oral appearance, dichotomized into "poor" (poor/very poor) and "good" (fair/good/very good). The main independent variable was the need for an upper or lower dental prosthesis. Other variables included sociodemographic characteristics, approach to dental care, oral health conditions, and self-reported oral disadvantage. Data were analyzed using the chi-square test and Poisson regression models at a 95% significance level. The prevalence of poor self-rated oral appearance was 20.6% and was higher in the elderly who needed a partial or complete upper or lower prosthesis, independent of other variables. This prevalence was associated with age, the use of dental services, access to information about oral disease prevention, number of decayed teeth, self-perception of the need for treatment, dental pain, chewing ability, and the perception that oral health affects relationships with other people. The elderly who needed dental prostheses had a higher prevalence of poor self-rated oral appearance than those who did not need any.

Descriptors: Oral Health; Dental Prosthesis; Esthetics; Dental Care for Aged.

Introduction

Self-rated health corresponds to one's perception of personal health status in the social, cultural, and historical context.[1] It is a valid, reliable, and cost-effective indicator of perceptions of general and oral health.[2] Several studies have identified factors associated with self-rated oral health in the elderly, including self-esteem, life satisfaction, income, dental attendance, sex, perception of treatment need, dental pain, untreated caries, and prosthetic status and need.[3-6]

In 2003, a pioneering study in Brazil used self-rated questions to evaluate subjects' perceptions of oral health, chewing, speech, social networking, and appearance.[7] Using data from this survey, 3 studies investigated the factors associated with self-rated oral health in the elderly population and found that self-rated oral appearance was the variable most

strongly associated with self-rated oral health.[3-5] Another study evaluated the factors associated with poor self-perception of mastication.[8]

Elderly Brazilians were reported to have poor oral health, with a high prevalence of edentulism and need for dental prosthetics.[7] In 2003, approximately 50% of the elderly population required 1 or 2 complete prostheses. Tooth loss and the need for prostheses were associated with poor self-rated oral health and mastication.[3-5,8] However, to our knowledge, no studies have evaluated factors associated with self-rated oral appearance among the elderly.

Meng *et al.*[9] assessed the satisfaction with dental appearance in adults, adopting a multidimensional conceptual model of oral health. Their results demonstrated that satisfaction with appearance was associated with sociodemographic characteristics, approach to dental care, oral disease, and oral disadvantage.

Among the elderly, aesthetic rather than functional factors dictate a patient's subjective need to replace missing teeth.[10] Self-rated oral appearance has also gained increasing interest among researchers and dental clinicians because patients and dentists often evaluate dental aesthetics differently.[11] Considering the large numbers of teeth lost among Brazilian elderly[7] and the possibility of rehabilitation with a dental prosthesis, we investigated the association between poor self-rated oral appearance and the need for a dental prosthesis in the elderly Brazilian population.

Methodology

This cross-sectional study used the database of the epidemiological survey on oral health in Brazil conducted from 2002 to 2003 by the Ministry of Health. In total, 108,921 individuals participated in the survey. A multistage cluster sampling design consisted of a random selection of 250 towns from all the Brazilian states, stratified by Brazilian macroregions (North, Northeast, Midwest, Southeast, and South) and population size (< 5000 inhabitants, 5001–10,000, 10,001–50,000, 50,001–100,000, and > 100,001). The sampling was designed to obtain a representative sample of the Brazilian regions, towns, and age groups. A probabilistic sample selection method was adopted. We selectively analyzed the data of individuals aged 65 to 74 years, the age range recommended by the World Health Organization for assessing the oral health status of the elderly.[12] The data were collected by oral examinations and structured interviews conducted in-home by trained dental surgeons. The oral examinations were performed under natural illumination using flat mirrors, periodontal probes, and wooden spatulas.

The dependent variable was self-rated oral appearance (SROA), assessed by the question, "How would you classify the appearance of your teeth and gums?" The response options were "good" (fair/good/very good) or "poor" (very poor/poor). The main independent variable was the need for an upper and/or lower prosthesis; this variable was categorized on the basis of the results of oral examinations as follows:

- 0, does not need a dental prosthesis;
- 1, needs a fixed or removable prosthesis to replace 1 element;
- 2, needs a fixed or removable prosthesis to replace more than 1 element;
- 3, needs a combination of fixed and/or removable prosthesis to replace 1 or more elements; and
- 4, needs a complete prosthesis.

The other independent variables were combined into 4 subgroups according to the theoretical model proposed by Meng *et al.*[9] (Figure 1).
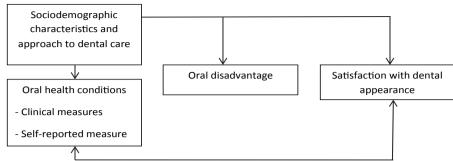
Sociodemographic characteristics:
- information on Brazilian macroregion,
- place of residence,
- age,
- sex,
- self-declared skin color,
- years of education, and
- per capita income in reais (US$1.0 = R$3.20).

Approach to dental care:
- type of dental service used,
- access to information about oral disease prevention, and
- time since the last dental visit.

Figure 1 - Conceptual theoretical model of Meng *et al.*[9].

Oral conditions:
- numbers of present and decayed teeth and
- perceived and actual needs for dental treatment. The need for dental treatment was evaluated according to the following criteria:[12]
  - 0, no need;
  - 1, restoration of 1,
  - 2, or more surfaces;
  - 3, crown placement for any reason;
  - 4, veneer placement;
  - 5, pulp treatment and restoration;
  - 6, extraction;
  - 7, remineralization of white spot; and
  - 8, sealant treatment.

The subjects with codes 1 to 8 were categorized as requiring dental treatment.

Self-reported oral disadvantages:
- Dental and gingival pain within the last 6 months was categorized as
  - absent (no pain) or
  - present (slight, moderate, or substantial pain).
- Chewing ability (good or poor) and damage to relationships with other people because of tooth or gum conditions were also considered.

The survey was approved by CONEP (Process no. 581/2000). Bivariate and multivariate analyses were conducted using a Poisson regression model to produce direct estimates of all prevalence ratios (PR; 95% CI) and the chi-square test for statistical significance. Variables with $p < 0.25$ in the bivariate analysis were included in the multivariate analysis in decreasing order of significance. In the final

adjusted model, only the variables significantly associated with SROA with $p < 0.05$, were used. All of the analyses were performed using the Predictive Analytics Software version 18.0 for Windows (IBM Corporation, Armonk, USA).

Results

A total of 5,349 people were interviewed and examined; of these subjects, 510 individuals did not report their SROA and were thus excluded from the analysis. The prevalence rates of poor and good SROA were 20.6% and 89.4%, respectively. Upper and lower prostheses were required in 31.3% and 55.7% of the patients, respectively (Table 1).

In the bivariate analysis, all independent variables were associated with poor SROA at $p < 0.25$ with the exception of the residence location (Table 2).

In the final model, the prevalence of poor SROA, independent of other variables, was higher among those who needed a partial or complete upper or

Table 1 - Distribution of the elderly population in Brazil in 2003 according to the need for a dental prosthesis.

Need for a dental prosthesis	Upper (%) (n = 4830)	Lower (%) (n = 4826)
Does not need	68.7	44.3
Fixed or removable partial prosthesis (RPP) to replace 1 element	1.3	1.6
Fixed or RPP to replace more than 1 element	6.3	13.6
Combination of fixed and/or RPP to replace 1 or more elements	9.2	18.3
Complete prosthesis	14.5	22.3

Table 2 - Prevalence of poor self-rated oral appearance among elderly Brazilians and the results of the bivariate analysis. *(continued on next page)*

	Total n	Prevalence of poor self-rated oral appearance		PR* 95% CI	p
		n	%		
Sociodemographic characteristics					
Brazilian macroregion					
• Southeast	958	144	15.0	1	
• South	1307	183	14.0	0.93 (0.76–1.14)	0.491
• Midwest	648	133	20.5	1.37 (1.10–1.69)	0.004
• Northeast	1256	345	27.5	1.83 (1.53–2.18)	0.000
• North	670	193	28.8	1.92 (1.58–2.32)	0.000
Residence location					
• Urban area	4222	873	20.7	1	
• Rural area	615	123	20.0	0.97 (0.82–1.15)	0.699
Age range, years					
• 65–69	2929	644	22.0	1	
• 70–74	1910	354	18.5	0.84 (0.75–0.95)	0.004
Sex					
• Female	2945	565	19.2	1	
• Male	1894	433	22.9	1.19 (1.07–1.33)	0.002
Self-declared skin color					
• White	2366	380	16.1	1	
• Nonwhite	2457	616	25.1	1.56 (1.39–1.75)	< 0.001
Years of education					
• ≥ 5	968	163	16.8	1	
• 1–4	2203	434	19.7	1.17(0.99–1.38)	0.060
• 0	1668	401	24.0	1.43 (1.21–1.68)	< 0.001
Per capita income in reais					
• ≥ 201.00	1441	211	14.6	1	
• 100.00 to 200.00	1906	370	19.4	1.33 (1.14–1.55)	< 0.001
• 0 to 99.00	1461	409	28.0	1.91 (1.65–2.22)	< 0.001
Approach to dental care					
Type of dental service used					
• Private	2414	368	15.2	1	
• Public	2026	474	23.4	1.54 (1.36–1.74)	< 0.001
• Never used	188	90	47.9	3.14 (2.63–3.75)	< 0.001
Access to information about oral disease prevention					
• Yes	1983	323	16.3	1	
• No	2853	675	23.7	1.45 (1.29–1.64)	< 0.001
Time since the last dental visit					
• ≤ 2 years	1442	257	17.8	1	
• ≥ 3 years	3195	647	20.3	1.14 (0.99–1.30)	0.055
• Never	188	90	47.4	2.69 (2.23–3.24)	<0.001

Table 2 - *(continued)*

	Total n	Prevalence of poor self-rated oral appearance		PR* 95% CI	p
		n	%		
Oral health conditions					
• Number of permanent teeth present**				1.02 (1.01–1.02)	< 0.001
• Number of decayed permanent teeth**				1.09 (1.08–1.10)	< 0.001
Need for dental treatment					
• No	3286	485	14.8	1	
• Yes	1553	513	33.0	2.24 (2.01–2.49)	< 0.001
Need for an upper prosthesis					
• Does not need	3320	449	13.6	1	
• Needs a fixed or RPP	809	285	35.2	2.61 (2.29–2.96)	< 0.001
• Needs a complete prosthesis	701	261	37.2	2.75 (2.42–3.13)	< 0.001
Need for a lower prosthesis					
• Does not need	2137	237	11.1	1	
• Needs a fixed or RPP	1615	461	28.5	2.56 (2.32–2.97)	< 0.001
• Needs a complete prosthesis	1074	295	27.5	2.48 (2.12–2.89)	< 0.001
Self-perception of the need for dental treatment					
• No	2161	210	9.7	1	
• Yes	2669	788	29.5	3.04 (2.64–3.50)	< 0.001
Self-reported oral disadvantage					
Dental and gingival pain within the last 6 months					
• Absent	3700	619	16.7	1	
• Present	1138	378	33.2	1.99 (1.78–2.22)	< 0.001
Chewing ability					
• Good	3643	350	9.6	1	
• Poor	1170	641	54.8	5.70 (5.10–6.38)	< 0.001
Oral health affects relationships with other people					
• No	3163	401	12.7	1	
• Yes	1240	477	38.5	3.03 (2.70–3.40)	< 0.001

*The reference category of the dependent variable was good SROA. **Mean (standard deviation) of the quantitative variables. Permanent teeth present: total sample, 5.75 (8.05); poor, 6.95 (7.78); and good, 5.43 (8.10). Decayed permanent teeth: total sample, 1.28 (2.98); poor, 2.60 (4.36); and good, 0.93 (2.39).

lower prosthesis and among those who never used dental services, visited a dentist more than 3 years ago, did not have access to information about oral problem prevention, had more decayed teeth, self-rated the need for dental treatment, reported dental and gingival pain within the last 6 years, showed poor chewing ability, or affirmed that their oral health affected their relationships with other people.

The prevalence of poor SROA was lowest among those aged 70–74 years. Two main associations were observed with the 2 variables reflecting the perception of health, i.e., poor chewing ability and self-perception of the need for dental treatment (Table 3).

Discussion

The prevalence of poor SROA, represented by

Table 3 - Final Poisson regression model.

	Adjusted PR (95% CI)	p value
Age range		
65–69	1	
70–74	0.87 (0.78–0.98)	0.021
Type of dental service		
Private	1	
Public	1.14 (1.02–1.29)	0.025
Never used	1.58 (1.26–1.98)	< 0.001
Access to information about oral problem prevention		
Yes	1	
No	1.14 (1.01–1.28)	0.034
Time since the last dental visit		
≤ 2 years	1	
≥ 3 years	1.20 (1.06–1.36)	0.003
Need for upper prosthesis		
Does not need	1	
Needs a fixed or RPP	1.33 (1.13–1.56)	0.001
Needs a complete prosthesis	1.18 (1.01–1.39)	0.042
Need for lower prosthesis		
Does not need	1	
Needs a fixed or RPP	1.21 (1.01–1.45)	0.042
Needs a complete prosthesis	1.25 (1.04–1.50)	0.019
Number of decayed teeth	1.10 (1.01–1.20)	0.022
Self-perception of the need for dental treatment		
No	1	
Yes	1.70 (1.46–1.98)	< 0.001
Dental and gingival pain within the last 6 months		
Absent	1	
Present	1.22 (1.08–1.37)	< 0.001
Chewing ability		
Good	1	
Poor	3.02 (2.57–3.54)	< 0.001
Oral health affects relationships with other people		
No	1	
Yes	1.37 (1.21–1.55)	< 0.001

a mean of 26.03 missing teeth, was low despite the overall poor oral health conditions of subjects. Elderly Germans also self-reported high satisfaction with their oral appearance[13] but had a lower median number of lost (14.2) and decayed (0.5) teeth than the Brazilian elderly.[14] In the United Kingdom, 80.3% of the population aged ≥ 55 years were satisfied with their teeth color;[15] however, aesthetics were addressed with preconceived standards of what is beautiful and acceptable. The low prevalence of poor SROA may be explained by the fact that 81.4% of the edentate elderly used an upper prosthesis and 62.8% used a lower prosthesis.[8] In a previous study, the importance of dental prostheses for enhancing appearance was observed because the elderly used these devices to create a satisfactory appearance even when they did not fit well.[16]

The present study confirmed the theoretical model of Meng *et al.*[9], as variables in all of the groups showed a significant association with SROA. The need for dental prostheses was associated with SROA, independent of other variables. Dental prostheses can restore oral appearance to an acceptable state[17] and minimize the adverse effects of tooth loss by improving self-esteem and interpersonal relationships[18] because the elderly associate good appearance with the ability to communicate and make social connections.[19] Furthermore, aesthetics are the main reasons for the use of prostheses among participants.[20] Thus, concerns about replacing lost teeth are greater when aesthetics are involved,[11] necessitating the consideration of the psychological and social aspects of dental loss during prosthetic rehabilitation for the elderly.

The number of decayed teeth and the self-perception of the need for dental treatment were also associated with SROA. Dissatisfaction with the appearance of teeth was previously associated with self-related anterior decayed,[21] stained, or broken teeth,[9] which may compromise self-perception of appearance and damage self-esteem. The significant and strong association between poor SROA and self-perception of the need for dental treatment was expected, as elderly people who perceive a need for dental treatment are likely to have other negative psychosocial effects of oral health conditions.

Age was the only sociodemographic variable associated with poor SROA, and SROA was lower among the subjects in the oldest age group. This finding may be attributed to the argument that younger people actively try to improve their physi-

cal appearance to obtain a better job and gain greater social acceptance.[15] Older people, on the other hand, may more easily incorporate poorer dental appearance in their self-image and may have a low desire to make changes.[15]

The 3 variables related to dental services were associated with SROA. Elderly adults who had never used dental services or used them infrequently were more likely to have a poor SROA. These variables were associated with poor self-rated oral health among elderly Brazilians.[4-6] Irregular or infrequent users of dental services had more carious teeth than regular users[22] and lost more teeth than regular users.[23] Thus, routine visits can help preserve functional dentition, thereby improving the perception of appearance. Moreover, dental visits might reassure and inform people, boosting their confidence regarding their oral health condition, rendering them more likely to report the positive aspects of their oral health.[24] Elderly people who used public dental services showed a higher prevalence of poor SROA. In Brazil, historically, this group did not receive public dental care service, except in cases of urgency, resulting in dental mutilation. Moreover, for many years, prosthetic treatment under public health services was not offered to the elderly population, thus worsening their oral health status.

The higher prevalence of poor SROA among those who felt that oral health affected interpersonal relationships highlights its importance in social interactions. Poor SROA was also greater among those who had experienced pain in the last 6 months or among those who were unsatisfied with their chewing ability. These individuals likely experienced a common oral health condition involving a lack of teeth or the presence of teeth in a precarious state, which had a negative impact on various aspects of oral health.

The advantages of our analysis are the large sample size and high response rate. The main methodological consideration involved sample selection using the cluster sampling technique. Although sample weights were not calculated, this procedure would not affect the magnitudes or direction of the identified associations.[25] The results of this study support the present oral health policy in Brazil, which aims to provide dental prostheses to all the elderly as part of the Brazilian public dentistry health service. Improvements in the quality of preventative information, access to dental services, treatment of decayed teeth, and rehabilitation with dental prosthesis may contribute to greater satisfaction with appearance, especially among those elderly who experience dental and gingival pain, those who perceive a need for dental treatment, and those with impaired chewing ability.

Conclusion

The elderly who needed dental prostheses showed higher prevalence of poor self-rated oral appearance than those who did not need any.

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