Self-perceived oral health status in institutionalized elderly in Brazil

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A B S T R A C T

This study aims to identify self-perceived oral health status in institutionalized elderly in Brazil, using the Geriatric Oral Health Assessment Index (GOHAI) and to seek associations with objective and subjective conditions and behavior related to oral health, individual traits, and environmental factors. A cross-sectional study using census with institutionalized elderly in Brazil. A total of 1192 individuals were evaluated, and 587 (49.2%) responded to the GOHAI. A questionnaire and an epidemiological survey were applied. The Mann–Whitney, Kruskal–Wallis, Fisher's exact, chi-square, and multiple logistic regression tests were performed. Mean age was 74.98 ± 9.5 years, 51.4% (302) were male. The mean DMFT-index (DMFT = decayed, missing, filled teeth) was 28.8 ± 5.5 and 54.5% (320) of the elderly were toothless. Categorized GOHAI showed that 75% (440) of the individuals had positive self-perception of oral health status. Multiple logistic regression demonstrated that the last visit to the dentist (adjusted prevalence ratio = PR = 4.058; confidence interval = CI = 1.526–10.789), presence of gingival problems (adjusted PR = 5.703; CI = 1.754–18.544), and self-rating of teeth, gums, or prosthesis (adjusted PR = 19.514; CI = 5.075–75.041) remained significant in the model. Predominance of positive self-perception of oral health status was observed despite poor oral conditions. Thus, for the institutionalized population, the present study recommends epidemiological and self-perception surveys to ensure adequate planning of oral health strategies.

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1. Introduction

Self-perceived health status is the interpretation that individuals make of their health status and daily life experiences. This process requires knowledge about health and disease, mediated by prior experience as well as the social, cultural, and historical context in which individuals live (Gilbert, 1994).

With respect to the health management process, self-perceived health status in a population helps guide political and social conditions aimed at improving both health and quality of life. Therefore, identifying the determining factors involved in self-perceived oral health status is essential to understand behavior and how to assess individual needs (Martins et al., 2009).

In evaluating oral health status, knowing the perspective of individuals about their own health is an important prerequisite for increasing adherence to healthy behavior (Benyaminy et al., 2004; Ferreira et al., 2006; Piuvezam et al., 2006). In the case of the elderly, this aspect becomes even more relevant, since, even in countries with programs directed specifically to this age group, the main reason these individuals do not seek dental treatment is their not recognizing the need for oral health care (Silva and Fernandes, 2001).

Historically, oral health conditions have been assessed with the help of epidemiological surveys. As a result, quantitative and objective indicators are the most widely used. However, measures of quality of life are currently being used to assess oral health status (Atchinson and Dolan, 1990; Locker, 1997; Llewellyn and Warnakulasuriya, 2003; John et al., 2004; Reis and Marcelo, 2006; Miura et al., 2010). Among the elderly, subjective aspects have been gradually increasing in importance, given that oral problems have psychological and nutritional reper-cussions (Sheiham and Steele, 2001; Sumi et al., 2009, 2010). In this respect, epidemiological criteria have proven to be insufficient in indicating the level of well being in these individuals in terms of oral health.

Self-perceived oral health status reflects subjective well-being in functional, social, and psychological dimensions (Piuvezam et al., 2006; Reis and Marcelo, 2006). To that end, several instruments were developed to measure the impact of oral health conditions on daily life, the most commonly used with the elderly being the GOHAI (Atchinson, 1997).

The GOHAI was designed to determine oral health status at two levels. At the individual level, the literature (Mathias et al., 1993; Atchinson, 1997; Dolan, 1997; Pinzón-Pulido and Gil-Montoya,

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1999; Athieh, 2008) has shown that it can be used as a predictor of the need for a complete oral examination, besides providing information on symptoms and functional and psychological problems. At the collective level, it can be an effective, low-cost instrument for gathering information about oral problems in an elderly population (Pinzón-Pulido and Gil-Montoya, 1999).

Thus, the aim of this study was to identify self-perceived oral health status in institutionalized elderly in Brazil, using the GOHAI, and to seek associations between this self-perception and objective and subjective oral health conditions, behavioral factors, individual traits, and environmental factors.

2. Methodology

This is a cross-sectional, quantitative exploratory study conducted with institutionalized elderly in Brazil in 2007 and 2008. The research design was based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) protocol (Von Elm et al., 2007) for cross-sectional studies.

This investigation was approved by the Research Ethics Committee of the Federal University of Rio Grande do Norte (CEP-UFRN), under SISNEP 0033.0.051.000-06.

The study, characterized as a census of institutionalized elderly, was conducted with a sample of 11 medium and large Brazilian municipalities, equally distributed in the 5 geographic regions (North, North-East, South, South-East, and Mid-West).

Two cities were randomly drawn from each region, obeying two inclusion criteria: (1) municipalities with more than 100,000 inhabitants, according to IBGE (2004) for 2005; and (2) municipalities with an elderly population greater or equal to the median found in each geographic region. The long-stay institutions for the elderly (LSIE) studied were legally registered private and philanthropic entities.

The definition of elderly was based on chronological delimitation; that is, persons 60 years of age and over were selected, following legal norms established by the National Elderly Policy (Brazil, 1996).

Eligibility criteria for the elderly participants were (1) being institutionalized and (2) being present at the LSIE during the data collection period.

Elderly individuals who presented with impaired cognitive conditions according to the clinical diagnosis made by the LSIE doctor responded to the GOHAI (Atchinson, 1997). This index contains 12 questions about oral health, which are scored from 1 to 3, for a total score between 12 and 36, characterizing the worst and best assessment, respectively, of self-perceived oral health.

The GOHAI questions refer to three dimensions: the psychosocial dimension, encompassing aspects of concern over oral health status, self-image and awareness of health, and limitations of social contacts caused by oral problems; the physical dimension, involving aspects related to eating, speaking and swallowing; and the pain or discomfort dimension associated with oro-dental status. The GOHAI used in this study was the Brazilian version validated by Silva (1999), who obtained a Cronbach alpha of 0.65 and 0.76 for toothed and toothless individuals, respectively.

The dependent variable in this study was GOHAI, which was analyzed from three perspectives: (1) GOHAI expressed in absolute values (GOHAI-Ab), ranging from 12 to 36 points; (2) stratified GOHAI (GOHAI-St): low score (12–30), mean score (31–33) and high score (34–36), values proportionally equivalent to those proposed by Pinzón-Pulido and Gil-Montoya (1999); and (3) binary GOHAI (GOHAI-Bi) categorized into negative self-perception for individuals with 30 points or less and positive self-perception for individuals with scores above 31 points. This cutoff point was proposed by Silva et al. (2005), who identified the group of individuals with the lowest score in the lower quintile of the sample. In the present investigation, this value (30 points) corresponded to the lower quartile.

The elderly responded to a questionnaire containing 4 questions, 3 of which were related to oral health conditions such as the presence of dental or gingival problems and/or the subjects' opinion about their teeth, gums, and/or prosthesis, and 1 question about oral health behavior, expressed by the date of the last dental visit (Pinzón-Pulido and Gil-Montoya, 1999; Mesas et al., 2008; Martins et al., 2009).

An epidemiological survey of objective oral health conditions was conducted using the DMFT-index, community periodontal index (CPI), periodontal loss of attachment (PLA), prosthetic use, and needs according to criteria established by the WHO (1998). Data were collected by 5 dentists who underwent the intra- and inter-examiner calibration process.

Data on sex, age, and elderly dependence (dependent or independent) were also collected, according to the clinical diagnosis made by the LSIE doctor.

A previously elaborated questionnaire was applied to characterize the LSIEs with respect to the following aspects: location (North, South, South-East, North-East, or Mid-West), type of LSIE (philanthropic or private), coverage by the Family Health Strategy (FHS) program, and oral health activities developed with the elderly (preventive and curative activities).

Descriptive analysis was carried out using absolute and relative frequencies of the qualitative variables and means with respective standard deviations for the quantitative variables. The software Stata 10.0 (Stata Corp., College Station, TX, USA) was used for statistical analysis.

The Mann–Whitney and Kruskal–Wallis tests were used in bivariate analysis to determine the statistical significance between independent variables and outcomes. Likewise, the Chi–squared and Fisher exact tests were used to determine inter-variable associations. The magnitude of the effect of independent variables on outcome was expressed by the PR. A 95%CI was used for all the statistical tests.

Analysis of the independent effect of intervening variables on outcome was performed using multiple logistic regression, with binary GOHAI as the dependent variable, and the forced entry method. All the independent variables with $p < 0.25$ on the association test were included in the modeling process. Model fit was determined by the Hosmer–Lemeshow test.

3. Results

The resident population at the LSIE during the study period numbered 1412 individuals. Of these, 1192 (84.4%) took part in this investigation, 587 (49.2%) of whom presented with improved cognitive conditions when responding to the GOHAI, according to the clinical diagnosis made by LSIE doctors.

These individuals lived in 36 LSIEs, distributed in 11 Brazilian municipalities. Slightly more than half (51.4%) were male and age ranged between 60 and 106 years, with a mean of 74.99 ± 9.50. For purposes of analysis, age was categorized based on the median (Table 1). In relation to the LSIEs, it was found that most of the elderly (94%) resided in philanthropic institutions and a minority (25.9%) in institutions covered by the FHS program. With respect to oral health action plans developed in the institutions, the study showed that less than half of the residents received oral health care such as preventive activities or curative measures (Table 1).

Questionnaire data about behavior and subjective conditions related to oral health showed that only 20% of the elderly had visited a dentist in the previous year. Questions about the presence of dental and gingival problems were responded to by 40.8% of the elderly. The low response rate is explained by the fact that only respondents who had at least one tooth were required to respond

Table 1
Characteristics of institutionalized elderly in Brazil, according to individual traits, objective and subjective conditions, oral health behavior, and external environment, *n* (%).

Variables		Variables	
Individual traits		**Objective oral health conditions**	
Sex		*Toothlessness*	
Male	302(51.4)	Yes	320(54.5)
Female	285(48.6)	No	267(45.5)
Dependence		**Functional toothlessness**	
Independent	435(74.1)	Yes	494(84.2)
Dependent	152(25.9)	No	93(15.8)
Categorized age		**Use of upper prosthesis**	
60–77 years	359(61.2)	Yes	269(45.8)
>78 years	228(38.8)	No	318(54.2)
Type of LSIE		**Use of lower prosthesis**	
Private	35(6)	Yes	152(25.9)
Philanthropic	552(94)	No	435(74.1)
Oral health behavior			
Last visit to the dentist		*Need of upper prosthesis*	
<1 year ago	127(21.8)	Yes	318(54.2)
>1 year ago	456(77.7)	No	269(45.8)
Subjective oral health conditions			
Dental problems		*Need of lower prosthesis*	
No	135(56.3)	Yes	435(74.1)
Yes	105(43.8)	No	152(25.9)
Gingival problems		*CPI*	
No	208(86.7)	Healthy	22(3.7)
Yes	32(13.3)	Bleeding	04(0.7)
Opinion of teeth, gums, prosthesis		Calculus	109(18.6)
Good or excellent	351(63.1)	Pocket 4–5 mm	49(8.3)
Fair	108(19.4)	Pocket ≥ 6 mm	25(4.3)
Poor or very poor	97(17.4)	Excluded sextant	378(64.4)
External environment		**PLA**	
Region		0–3 mm	47(8.0)
South	121(20.6)	4–5 mm	57(9.7)
Southeast	163(27.8)	6–8 mm	58(9.9)
Midwest	144(24.5)	9–11 mm	31(5.3)
Northeast	104(17.7)	>12 mm	16(2.7)
North	55(9.4)	Excluded sextant	378(64.4)
FHS coverage		**Categorized DMFT**	
Yes	152(25.9)	0–28.8	169(28.8)
No	435(74.1)	>28.9	418(71.2)
Oral health activity			
Yes	236(40.2)		
No	351(59.8)		

to these questions. Questions related to teeth, gums, and/or prostheses had 569 (96.9%) respondents, most of whom reported having a good or excellent opinion of their mouth.

With respect to the dependent variable, the GOHAI, results show that GOHAI-Ab obtained a median of 33 and that 25% and 75% of the individuals had scores of ≤30 and ≤35, respectively, indicating that most of the subjects obtained high GOHAI scores.

Analysis of GOHAI proceeded with categorization of the GOHAI-St index, using low (12–30), medium (31–33) and high (34–36) scores as parameters. In refinement analysis, it was categorized into two GOHAI-Bi categories of individuals with negative self-perception (≤30 points) and positive self-perception (>31 points). These analyses showed that 25% (147) of the individuals obtained low scores or negative self-perceived oral health status and that 75% of the elderly investigated had positive self-perception, 29.1% (171) with medium scores and 45.9% (268) with high scores.

Data on the objective conditions of oral health status showed that the mean DMFT was 28.8 ± 5.5. For analytic purposes this variable was categorized based on the mean (Table 1). About half of the individuals presented with total tooth loss and from the perspective of functional toothlessness, the situation was even more serious, with 84.2% of the elderly presenting with 20 or more teeth.

The results are more worrisome considering that prosthesis rehabilitation was inadequate. It was found that 54.2% and 74.1% of the individuals do not use any type of upper or lower prosthesis, respectively. In the case of elderly who use some type of upper or lower prosthesis, 40.9% (240) use total prostheses for the upper arch and 21.6% (127) for the lower arch.

With respect to the need for rehabilitation, results confirm that 45.8% did not need prosthesis in the upper arch, and of those needing one, 38.5% (226) were total prostheses and 14.1% (83) some type of fixed or removable prosthesis. In the lower arch, 25.9% did not need any type of prosthesis, and of those who did, 43.8% (257) needed total prostheses and 27.9% (164) needed fixed or removable prostheses.

Periodontal conditions were analyzed using CPI and PLA indices, which were identified by the unhealthiest sextants of each individual. Periodontal infirmity showed that 18.6% presented with calculus according to CPI criteria and 9, 9% had attachment loss of 6 to 8 mm, according to PLA results.

Bivariate analyses considered GOHAI-Ab, GOHAI-St, and GOHAI-Bi as dependent variables and the others as independent (Table 2).

Multivariate analysis followed, considering GOHAI as the dependent variable, divided into two categories: positive and negative self-perception (GOHAI-Bi). This variable was chosen because statistical refinement showed that combining the GOHAI index into two categories resulted in better classification of the individuals according to GOHAI.

Table 2 shows that absolute GOHAI contained 10 variables with statistical significance ($p < 0.05$). The number of variables with a statistically significant association in stratified GOHAI was 8,

considering those that were at the threshold of significance. The GOHAI-Bi contained only 6 statistically significant variables, indicating that GOHAI-Bi is more robust from the statistical standpoint, considering that the same variables were assessed in the three types of analysis.

Prior to conducting multivariate analysis, we found multico-linearity between candidate variables for the model, using the tolerance test and variance inflation factors (VIF). CPI and PLA determined such co-linearity and, according to the criterion established, both could take part in multivariate analysis, given their $p = 0.25$. However, owing to co-linearity and the fact that both assess periodontal conditions, the PLA variable was selected for its theoretical aspect, since it evaluates periodontal attachment loss over time. In the case of the elderly population, this variable more adequately represents the periodontal conditions of these individuals. The statistical aspect was also considered, since it showed better data distribution. PLA was recategorized in the logistic regression model to obtain a higher sample number in each category and to exclude the excluded sextant category, since it does not represent disease. Table 3 depicts the results of multiple logistic regression.

Thus, considering GOHAI Bi outcomes, analysis showed that the last dental visit (adjusted PR = 4.058; CI = 1.526–10.789), gingival problems (adjusted PR = 5.703; CI = 1.754–18.544), and opinion of teeth, gums, and prosthesis (adjusted PR = 19.514; CI = 5.075–75.041) remained significant in the model, irrespective of the other variables. Model fit, assessed using the Hosmer–Lemeshow test, showed a value of 0.630.

Table 2
Bivariate analysis of self-perceived oral health status according to the GOHAI-Ab and GOHAI-St values of institutionalized elderly in Brazil, n (%).

Variables	GOHAI Ab			GOHAI St			
	Median	Q25–Q75	p	Low	Mean	High	p
Sex							
Male	33	30–35	<0.662[b]	72(23.8)	96(31.8)	134(44.4)	<0.341[a]
Female	33	30–35		75(26.3)	75(26.3)	135(47.4)	
Dependence							
Indep.	33	30–35	<0.016[b]	107(24.6)	117(26.9)	211(48.5)	<0.059[a]
Dep.	33	31–34		40(26.3)	54(35.5)	58(38.2)	
Categorized age, years							
60–77	33	30–35	<0.732[b]	94(26.2)	100(27.9)	165(46)	<0.606[a]
>78	33	31–35		53(23.2)	71(31.1)	74(45.6)	
Last dental visit, year ago							
<1	32	29–34.3	<0.056[b]	38(29.9)	43(33.9)	46(36.2)	<0.054[a]
>1	33	31–35		108(23.7)	128(28.1)	220(48.2)	
Dental problems							
No	34	32–36	<0.001[b]	21(15.6)	32(23.7)	82(60.7)	<0.001[a]
Yes	31	28.3–33		44(41.9)	38(36.2)	23(21.9)	
Gingival problems							
No	33	31–35	<0.001[b]	46(22.1)	60(28.8)	102(49)	<0.001[a]
Yes	30	26–32		18(56.3)	10(31.3)	4(12.5)	
Opinion of teeth, gums, and prosthesis							
Good or excellent	34	32–36	<0.001[c]	50(14.2)	95(27.1)	206(58.7)	<0.001[a]
Fair	32	29.8–34		42(38.9)	35(32.4)	31(28.7)	
Poor or very poor	30	27–32		50(51.5)	32(33)	15(15.5)	
Region							
South	33	30–35	<0.229[c]	31(25.6)	32(26.4)	58(47.9)	<0.785[a]
S-East	33	31–36		40(24.5)	45(27.6)	78(47.9)	
Midwest	33	31–36.8		34(23.6)	45(31.3)	65(45.1)	
N-East	33	31–35		23(22.1)	33(31.7)	48(46.2)	
North	32	29–35		19(34.5)	16(29.1)	20(36.4)	
Type of LSIE							
Private	34	33–36	<0.012[b]	4(11.4)	9(25.7)	22(62.9)	<0.072[a]
Philanthr.	33	30–35		143(25.9)	162(29.3)	247(44.7)	
FHS coverage							
Yes	33	31–35	<0.506[b]	36(23.7)	46(30.3)	70(46.1)	<0.885[a]
No	33	30–35		111(25.5)	125(28.7)	199(45.7)	
Oral health activity							
Yes	33	30–35.8	<0.824[b]	60(25.4)	66(28)	110(46.6)	<0.878[a]
No	33	31–35		87(24.8)	105(29.9)	159(45.3)	
Toothlessness							
Yes	33	30–35	<0.452[b]	77(24.1)	93(29.1)	150(46.9)	<0.803[a]
No	33	31–35		70(26.2)	78(29.2)	119(44.6)	
Functional toothlessness							
Yes	33	30–35	<0.704[b]	127(25.7)	139(28.1)	228(46.2)	<0.431[a]
No	33	31–35		20(21.5)	32(34.4)	41(44.1)	
Use of upper protesis							
Yes	34	31–36	<0.011[b]	87(27.4)	98(30.8)	133(41.8)	<0.101[a]
No	33	30–35		60(22.3)	73(27.1)	136(50.6)	
Use of lower protesis							
Yes	34	32–36	<0.001[b]	25(16.4)	42(27.6)	85(55.9)	<0.005[a]
No	33	30–35		122(28)	129(29.7)	184(42.3)	
Need of upper prótesis							
Yes	33	30–35	<0.011[b]	60(22.3)	73(27.1)	136(41.8)	<0.101[a]
No	34	31–36		87(27.4)	98(30.8)	133(50.6)	
Need of lower prótesis							
Yes	33	30–35	<0.001[b]	122(28)	129(29.7)	184(42.3)	<0.005[a]
No	34	32–36		25(16.4)	42(27.6)	85(55.9)	

Table 2 (Continued)

Variables	GOHAI Ab			GOHAI St			
	Median	Q25–Q75	p	Low	Mean	High	p
CPI							
Healthy	33	30–35.3		8(36.4)	4(18.2)	10(45.5)	
Bleeding	35.5	34.3–36		0(0)	0(0)	4(100)	
Calculus	33	30–35	<0.109[c]	28(25.7)	33(30.3)	48(44)	<0.273[a]
Pocket 4–5 mm	33	31–35		10(20.4)	17(34.7)	22(44.9)	
Pocket ≥ 6 mm	32	26.5–35		10(40)	8(32)	7(28)	
Excluded sextant	33	31–35.3		91(24.1)	109(28.8)	178(47.1)	
PLA							
0–3 mm	33	30–36		15(31.9)	9(19.1)	23(48.9)	
4–5 mm	33	31–35		13(22)	19(32.2)	27(45.8)	
6–8 mm	33	31–35	<0.235[c]	13(22.4)	17(29.3)	28(48.3)	<0.216[a]
9–11 mm	31	32–34		7(22.6)	14(45.2)	10(32.3)	
>12 mm	30.5	25.3–34.5		8(50)	4(25)	4(25)	
Excluded sextant	33	31–35.8		91(24.1)	109(28.8)	178(47.1)	
Categorized DMFT							
0–28.8	33	30–35	<0.813[b]	40(23.7)	53(31.4)	76(45)	<0.733[a]
>28.9	33	30–35		107(25.6)	118(28.2)	193(46.2)	

[a] Chi–squared test.
[b] Mann–Whitney test.
[c] Kruskal–Wallis test.

4. Discussion

Data concerning the oral health status of the elderly population in Brazil are found in the National Survey of Oral Health Conditions in the Brazilian Population, called Project SB (Oral Health) Brazil 2003 (Ministério da Saúde, 2004). Although this survey is national in scope, they do not deal exclusively with the elderly institutionalized population. The present study investigated this population, considering its peculiarities, and identified a similar oral health status to that of non-institutionalized individuals.

According to data from Project SB Brazil 2003 (Ministério da Saúde, 2004), the elderly population showed mean DMFT of 27.8, similar to the result obtained here (28.8). With respect to rehabilitation, Project SB Brazil 2003 (Ministério da Saúde, 2004) showed that 66.54% and 42.57% of the individuals used some type of upper and lower prosthesis, respectively. In the study with institutionalized elderly, the findings were more worrisome, since only 45.8% and 25.9% of the elderly used upper and lower prostheses, respectively.

In relation to needing prosthesis, Project SB Brazil (Ministério da Saúde, 2004) results show that 32.4% and 56.06% of the elderly need some type of prosthesis for the upper and lower arch, respectively. Findings with institutionalized elderly show that 54.2% and 74.1% need prosthesis in the upper and lower arches, respectively. This suggests that institutionalized elderly either lack rehabilitative care or had removed them after enrolling into the LSIE. The results indicate that elderly Brazilians, institutionalized or not, are a toothless population in need of oral health care.

With respect to self-perceived oral health status in the elderly, the initial hypothesis of the present study was that the GOHAI index could precede the use of epidemiological examinations,

Table 3
Multivariate analysis of self-perceived oral health status according to the GOHAI-Bi, categorized as negative and positive values of institutionalized elderly in Brazil.

Variables	NSP (%)	PR	95%CI	p	Adj.PR	95%CI	p
Last dental visit							
<1 year	29.9	1.376	0.889–2.130	<0.151[a]	4.058	1.526–10.789	<0.005
Presence of dental problems							
	41.9	0.255	0.139–0.468	<0.001[a]	2.427	0.854–6.900	<0.096
Presence of gingival problems							
	56.3	0.221	0.102–0.478	<0.001[a]	5.703	1.754–18.544	<0.004
Opinion of teeth, gums, prosthesis							
Good or excellent	14.2	1			1		
Fair	38.9	0.261	0.160–0.426	<0.001[a]	19.514	5.075–75.041	<0.001
Poor or very poor	51.5	0.156	0.095–0.257		2.139	0.809–5.654	
Type of LSIE							
Philanthropic	25.9	0.369	0.128–1.064	<0.069[b]	0.835	0.041–16.878	<0.907
Use of upper protesis							
	22.3	0.762	0.522–1.113	<0.159[a]	5.882	0.766–45.186	<0.089
Use of lower protesis							
	16.4	1.980	1.229–3.191	<0.004[a]	3.553	0.224–56.459	<0.369
Need of upper protesis							
	22.3	0.733	0.501–1.072	<0.109[a]	0.228	0.033–1.590	<0.136
Need of lower protesis							
	16.4	0.505	0.313–0.814	<0.004[a]	0.895	0.077–10.412	<0.930
PLA							
0–3 mm	31.9	1			1		
4–8 mm	44.4	1.641	0.773–3.482	<0.285[a]	1.066	0.356–3.190	<0.908
>9 mm	72.6	1.000	0.758–1.319		2.473	0.643–9.507	

Notes: NSP: negative self-perception; Hosmer and Lemeshow test = 0.630.
[a] Chi–squared test.
[b] Fisher exact test.

thereby facilitating diagnosis of oral health status and action planning. This hypothesis is based on a number of literature findings reporting that self-perceived oral health status can predict the need for care and in turn be used for screening, in addition to helping in planning dental services (Pinzón-Pulido and Gil-Montoya, 1999).

Furthermore, the GOHAI has been considered by some authors as a significant predictor of self-reported dental appearance in the elderly population (Mathias et al., 1993). Sensitivity was assessed with other indicators of self-perceived oral health status and was determined because it is sensitive in identifying the need for dental treatment (Dolan, 1997; Athieh, 2008).

However, this investigation presents a divergent situation, since GOHAI analyses in absolute values indicate that the only objective oral health variables that showed statistically significant association were the use and need of upper and lower prosthesis. This indicates that individuals using or needing some type of prosthesis on the upper or lower arch obtained the best scores for absolute GOHAI.

Analysis of this index in the categorized form, stratified GOHAI (Pinzón-Pulido and Gil-Montoya, 1999), shows that in terms of objective oral health conditions, significance occurred only for the upper arch in the use and need of some type of prosthesis variables. However, after statistical analysis was refined and the index characterized into positive and negative self-perception, binary GOHAI (Silva et al., 2005), the surprising results show that there is no association between the GOHAI and objective oral health conditions.

This finding can be confirmed in the literature (McMillan et al., 2003; Abud et al., 2009). One example, the study conducted by Mesas et al. (2008) in Brazil, found no associations between negative self-perception identified by GOHAI and poor oral health conditions in the elderly. However, other factors in that study, such as the female sex and the presence of depression were associated with negative self-perception, suggesting that GOHAI was inadequate for identifying poor oral health conditions in the population studied.

Another Brazilian study was carried out by Abud et al. (2009), who compared two populations, one institutionalized and the other not. The GOHAI results showed that the institutionalized population obtained higher scores, even though it showed worse objective oral health conditions. This result was also found in a study performed in Hong Kong, which found low percentages of negative self-perception in institutionalized elderly, using the Oral Health Impact Profile (OHIP) index. These authors hypothesize that other factors such as social and cultural ones may influence self-perceived oral health status in the elderly (McMillan et al., 2003).

The results of the present investigation corroborate this assumption, indicating that an epidemiological survey, complemented by self-perception data, is needed for an institutionalized population, in order to determine objective oral health needs.

Moreover, self-perceived oral health status seems to be more rooted in multiple influences during the lifecourse or to the history of these elderly than objective oral health conditions themselves. This self-perception may change throughout life or even throughout the day or week, as a function of physical and psychological status and contextual conditions. Thus, identifying subjective elements of well-being and sickness, or trying to quantify what is subjective, becomes limited since it also involves feelings that are not always expressed (Piuvezam et al., 2006; Martins et al., 2009).

Innumerable studies using GOHAI or other indicators of self-perception (Kressin et al., 1997; Locker et al., 2000; Silva and Fernandes, 2001; Benyaminy et al., 2004; Nunes and Abegg, 2008; Martins et al., 2009), similarly to this study, generally showed a predominance of positive self-perception in both institutionalized and non-institutionalized populations. These findings are para-doxical, especially considering the poor subjective oral health conditions in the elderly. However, it should be pointed out that the subjects investigated lived in a time when tooth loss and oral conditions were precarious and falling ill was considered part of the normal aging process. These poor conditions seem to reflect the health care model adopted in the country, where access is restricted and unequal and basic health precarious and mutilating (Moreira et al., 2005; Piuvezam et al., 2006). Thus, positive self-perception of oral health status under such poor conditions may partially reflect an attitude of culturally instilled resignation (Silva and Fernandes, 2001).

Other considerations emerged from the research team's experience with this population, such as the question of "secondarization of oral problems" experienced by these elderly individuals, faced with all the other problems related to psychological, physical and social aspects. The term "secondarization of oral problems", proposed in this study, brings to light the dire need of care, especially from specialized and humanized multiprofessional teams.

Thus, the prevalence of inadequate objective conditions and positive self-perception of oral care, also reported by a number of authors (Locker et al., 2000; Silva and Fernandes, 2001), reflects the fact that these objective conditions are weakly associated with self-perception. One of the explanations is the fact that many diseases detected in dental examinations, which are related to the origins of "secondarization of oral health", are asymptomatic and unknown to the individual. Another explanation would be the assumption that objective indicators measure the disease, using the teeth as reference. For this reason, they lose discriminatory power since most elderly Brazilians are toothless and owing to the fact that subjective indicators evaluate human experiences and health (Locker and Slade, 1994). The elderly, however, tend to consider themselves ill when they experience acute manifestations of oral disease rather than the chronic and irreversible processes that lead to tooth loss.

Another element to consider is the fact that in the case of bed-ridden or dependent individuals, toothlessness can be interpreted as a more desirable situation, especially when these individuals receive no dental care, since dental problems cease to exist. In this investigation, only 25.9% of the subjects reside in long-stay institutions for the elderly (LSIE) where public dental care is provided by the FHS program. In a study conducted by Martins et al. (2009), results showed that the elderly evaluated their oral health more positively when they were free of carious teeth and possibility of disease than when they had a few teeth in poor condition and were unable to acquire prostheses to ensure efficient and comfortable mastication.

Subjective conditions were most associated with self-perceived oral health status. In multivariate analysis, the presence of gingival problems and opinion of teeth, gums, and prosthesis remained significant, despite all the other variables introduced into the model. It was found that the elderly with gingival problems had 5.7 times more negative self-perception. In the case of opinion of teeth, gums, and prosthesis, those with fair conditions had 19.5 times more negative self-perception, although accuracy of these data is limited. This situation indicates that questions related to the impact of oral status on the quality of life of individuals depend more on self-perception than on objective oral health questions.

These results, corroborated in the literature (Mathias et al., 1995; Silva and Fernandes, 2001; Martins et al., 2009) also suggest that these questions may serve to validate the GOHAI itself, given that individuals who report having gingival problems or that have a negative opinion of their teeth, gums, or prosthesis display negative self-perception.

Oral health-related behavior of institutionalized elderly and last dental visit remained significant in all GOHAI versions, and the

last dental visit shows that the individual who visited a dentist within the previous year had around 4 times more negative self-perception of oral health status, similar to that found in the literature (Pinzón-Pulido and Gil-Montoya, 1999; Silva, 1999; Mesas et al., 2008; Martins et al., 2009).

In this respect, the association between last dental visit and negative self-perception suggests that individuals who visited a dentist within the last year did so for oral health problems, possibly linked to a painful or uncomfortable experience. This hypothesis has been corroborated by other studies that show an association between pain sensitivity and negative self-perception of oral health (Nunes and Abegg, 2008; Martins et al., 2009).

It should be pointed out that in multiple logistic regression analysis there was a reduction in the number of individuals analyzed, owing to the exclusion of excluded sextants from the PLA variable. However, despite this reduction, sensitivity and specificity of the multivariate model was 63% and 86%, respectively. Furthermore, the study did not use sex and age as fit variables, since neither were statistically significant and also because there was a certain equalization of these variables in the institutionalized population.

Finally, these findings underscore that subjective aspects likely have greater impact on self-perceived oral health status than do objective clinical signs. It is therefore recommended that clinicians carefully evaluate the complaints of elderly patients, taking their frailty and comorbidities into consideration. In this respect, there is a need for a specialized multiprofessional approach to provide adequate diagnosis, planning, and treatment for this population.

Conflict of interest statement

None.

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