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Relationship Between Oral Health-Related Quality of Life, Oral Health, Socioeconomic, and General Health Factors in Elderly Brazilians

Relationship Between Oral Health–Related Quality of Life, Oral Health, Socioeconomic, and General Health Factors in Elderly Brazilians

Fabíola Bof de Andrade, PhD,[*] *Maria Lúcia Lebrão, PhD,*[*] *Jair Lício Ferreira Santos, PhD,*[†] *Doralice Severo da Cruz Teixeira, Msc,*[§] *and Yeda Aparecida de Oliveira Duarte, PhD*[‡]

OBJECTIVES: To assess the impact of oral health on quality of life in elderly Brazilians and to evaluate its association with clinical oral health measures and socioeconomic and general health factors.

DESIGN: Cross-sectional study.

SETTING: Population-based cohort study on health, well-being, and aging.

PARTICIPANTS: Eight hundred fifty-seven participants representing 588,384 community-dwelling elderly adults from the city of São Paulo, Brazil.

MEASUREMENTS: Self-perceived impact of oral health on quality of life was measured using the Geriatric Oral Health Assessment Index (GOHAI), with scores categorized as good, moderate, or poor, indicating low, moderate, and high degrees of negative impact on quality of life, respectively.

RESULTS: Nearly half of the individuals had good GOHAI scores (44.7% of overall sample, 45.9% of dentate participants, and 43.4% of edentulous participants). In the overall sample, those with poor self-rated general health and a need for dental prostheses were more likely to have poor and moderate GOHAI scores. Individuals with depression were significantly more likely to have poor GOHAI scores. No socioeconomic variables were related to the outcome, except self-perception of sufficient income, which was a protective factor against a poor GOHAI score in dentate participants.

CONCLUSION: Moderate and high degrees of negative impact of oral health on quality of life were associated with general health and clinical oral health measures, independent of socioeconomic factors. **J Am Geriatr Soc 60:1755–1760, 2012.**

From the [*]Department of Epidemiology, School of Public Health, [†]Department of Social Medicine, Ribeirão Preto School of Medicine, [‡]Nursing School, and [§]School of Public Health, Universidade de São Paulo, São Paulo, Brazil.

Address correspondence to Fabíola Bof de Andrade, Departamento de Epidemiologia, School of Public Health, University of São Paulo, Av. Dr. Arnaldo, 715, São Paulo, SP, Brazil, 01246-904. E-mail: fabiolabof@yahoo.com.br

Key words: oral health; self-perception; quality of life; aging

Clinical oral health measures have been used as the major way to assess oral health needs and planning public health interventions, but the evidence demonstrates differences between clinical and subjective oral health measures.[1] According to the evidence, "disease does not necessarily impinge on health and poor health may not have its origins in pathological conditions."[2] These differences may be related to the focus of each measure. Clinical measures assess morbidity,[3] whereas subjective measures represent perceptions and judgment regarding one's own health, which are individual and social.[4] Accordingly, subjective measures are proposed as a way of complementing clinical measures[5] to evaluate how individuals perceive their oral health[1] and how oral health affects functional and psychosocial well-being.[6]

There are a large number of multidimensional instruments designed to measure the subjective impact of oral health on quality of life, which are collectively called oral health–related quality of life (OHRQoL) instruments. Two such assessment tools have been widely used with elderly individuals: the Oral Health Impact Profile (OHIP)[7] and the Geriatric Oral Health Assessment Index (GOHAI).[8]

A negative impact of oral health on quality of life is related to number of teeth,[1,9,10] educational level,[10,11] use of dental prostheses,[11] dental caries,[12] and sex,[13] among other things, but these associations are not consistent across studies, and few investigations have been conducted with larger community-based samples, especially in developing countries.

The aim of the present study was to assess the impact of oral health on quality of life in a representative sample of community-dwelling elderly individuals in the city of São Paulo (Brazil) and to evaluate its associations with

clinical oral health measures and socioeconomic and general health factors.

METHODS

A cross-sectional study was performed with data from the second wave (2006) of the Health, Well-being and Aging (Saúde, Bem-estar e Envelhecimento; SABE) cohort study. The first wave was a multicenter project coordinated by the Pan-American Health Organization and conducted in seven countries in Latin America and the Caribbean (Argentina, Barbados, Brazil, Chile, Cuba, Mexico, and Uruguay). In Brazil, the study was conducted in the city of São Paulo from 2000 to 2001 and involved 2,143 elderly individuals aged 60 and older selected using multiple-stage sampling. In 2006, the survey was continued in São Paulo and was transformed into a cohort study. During this follow-up study, 1,115 of the elderly participants in the baseline study were located and agreed to undergo a further set of interviews using the same procedures. The participants were also asked to undergo an oral health clinical examination by trained and calibrated examiners (mean kappa index for interexaminer agreement = 0.90). The oral examination was performed based on World Health Organization criteria.[14] All data were collected at participants' homes and included an interviewer-administered structured questionnaire with items on socioeconomic variables, general health, living conditions, and a set of anthropometric measures.

The dependent variable was the self-perceived impact of oral health on quality of life measured using the GOHAI,[8] which consists of 12 items selected to assess oral health–related problems in three dimensions: physical function (concerns about eating, speech, and swallowing), psychosocial function (concerns about oral health, self-image, self-consciousness regarding health and avoidance of social contact due to oral health problems), and pain or discomfort.[8] The questions were answered using a 5-point Likert scale, with participants asked whether they had experienced the problems addressed always (coded as 1), often, sometimes, seldom, or never (coded as 5) in the previous 12 months. The final score for each participant ranged from 12 to 60 points, with higher scores denoting better self-rated oral health or a lower degree of negative impact on quality of life. The final GOHAI score of each individual was categorized as good (57–60), moderate (51–56) or poor (≤ 50),[8] indicating a low, moderate, and high degree of impact on quality of life, respectively.

Independent variables were sociodemographic characteristics (age, sex, self-perception of sufficient income, and schooling); general health factors (depression,[15,16] number of self-reported chronic diseases [diabetes mellitus, hypertension, heart disease, chronic obstructive pulmonary disease and arthritis], self-perceived general health (on a 5-point Likert scale and dichotomized as poor [fair/poor/very poor] vs good [good/very good] and smoking status), and oral health measures (number of teeth,[14] use of dental prostheses,[14] need for dental prostheses,[14] caries,[14] time elapsed since last dental visit).

Data analysis was restricted to participants with complete information on the dependent variable and without cognitive impairment.[17] One hundred twenty-six individuals with incomplete questionnaires and 132 with cognitive impairment were excluded. Data analysis involved descriptive and inferential analyses, with a 5% significance level and 95% confidence interval (CI). Associations between categorical variables were tested using the Rao-Scott test.[18] All independent predictors with $P < .20$ in the bivariate analysis were incorporated into a multinomial logistic regression model. Multinomial logistic regression analysis is an extended variation of binomial logistic regression in which the outcome variable has more than two categories. Because the outcome variable has k categories, the comparison of k−1 in multinomial logistic regression is performed with a reference category that the researcher defines. The model is adjusted in the same way as binomial logistic regression, allowing simultaneous comparisons of the effects of independent variables with the dependent variable categories.[19] Independent variables were included using a forward stepwise method in the following order: socioeconomic, general health, and oral health measures. Three different models were constructed for the overall sample, dentate individuals, and edentulous individuals. Stata 11.0 (StataCorp., College Station, TX) was used for the analyses, and a correction for the design effect was performed using the survey command for the analysis of data originating from a complex sample. New weights were calculated and used to maintain the 2006 wave of the SABE study representative of the population.

This study received approval from the Human Research Ethics Committee of the School of Public Health, Universidade de São Paulo (Brazil). Written informed consent was obtained from participants at the time of the interview.

RESULTS

The present study included 857 participants with complete GOHAI questionnaires, representing 588,384 elderly individuals in the city of São Paulo. Table 1 shows the description of the sample according to the three groups (overall sample, dentate and edentate individuals) and the bivariate analysis. In the overall sample, 60.6% were female, and mean age was 72.6 (median 73). With regard to schooling, 42.7% had less than 4 years of study, and 18.9% had 8 or more years. Only 51.2% reported having sufficient income for basic expenses. Low prevalences were found for smoking (10.8%) and depression (12.6%). Regarding oral health factors, 51.4% reported that 2 or fewer years had elapsed since their last dental visit, 85.8% used dental prostheses, 41.5% needed dental prostheses, and 48.5% were edentulous. Nearly half (44.7%) of the participants had a good GOHAI score, whereas 25.6% had a low score, denoting that oral health had a high degree of impact on quality of life.

As shown in the bivariate analyses (Table 1), GOHAI score was significantly associated with the same variables in the overall sample and dentate individuals: sociodemographic variable (self-perception of sufficient income), general health factors (depression and self-perceived general health), and oral health measures (number of teeth and need for dental prostheses).

Regarding edentate individuals, a significant association was found between GOHAI score and two general

Table 1. Description of Sample and Associations Between Geriatric Oral Health Assessment Index (GOHAI) Scores and Independent Variables

Variable	Total Sample (%)	Total Sample (%)			Dentate (%)			Edentate (%)		
		Poor	Moderate	Good	Poor	Moderate	Good	Poor	Moderate	Good
GOHAI score		25.6	29.8	44.7	26.2	27.9	45.9	24.8	31.8	43.4
Male	39.4	41.9	37.1	39.4	52.1	44.1	45.7	30.2	30.5	32.2
Educational level, years										
0–3	42.7	44.7	46.8	38.8	38.4	44.9	36.7	51.9	48.6	41.2
4–7	38.5	41.2	38.4	37.0	44.1	34.6	33.8	37.9	41.9	40.6
≥ 8	18.9	14.1	14.8	24.3[a]	17.5	20.5	29.5[a]	10.2	9.4	18.3
Sufficient income	51.2	40.4	52.3	56.7[c]	37.9	49.5	63.3[d]	43.3	55.0	49.1
Smoking	10.8	15.1	9.2	9.5[a]	13.0	6.8	3.0[a]	17.5	11.4	17.0
Number of diseases										
0–1	50.0	47.8	45.0	54.6	56.5	51.3	59.5	37.9	39.1	50.0
≥ 2	50.0	52.2	55.0	45.4[a]	43.6	48.7	40.5	62.1	60.9	51.0[a]
Self-rated health										
Good	49.2	38.9	42.0	59.9	44.0	44.5	66.8	33.0	39.6	52.0
Poor	50.8	61.1	58.0	40.1[d]	56.0	55.5	33.2[d]	67.0	60.4	48.0[b]
Depression	12.6	21.8	13.1	6.9[d]	18.8	12.3	3.4[d]	25.3	13.8	11.0[c]
Time since last dental visit, years										
≤ 2	51.4	52.2	50.3	51.7	66.7	77.0	75.8	35.6	24.9	24.2
3	48.6	47.8	49.7	48.3	33.3	23.0	24.2	64.4	75.1	75.8
Use of dental prosthesis	85.8	87.9	83.4	86.2	81.1	70.6	76.2	95.6	95.2	97.6
Need for dental prosthesis	41.5	48.4	48.6	32.8[c]	59.1	61.6	45.7[b]	36.2	36.6	18.3[c]
Number of teeth										
0	48.5	46.8	52.5	46.9	–	–	–	–	–	–
1–10	24.2	33.4	21.2	20.9	62.8	44.6	39.4	–	–	
11–19	16.8	16.0	15.8	17.9	30.1	33.3	33.7	–	–	
≥ 20	10.5	3.8	10.5	14.3[c]	7.1	22.1	27.0[c]	–	–	–
Decayed teeth	20.3	26.0	18.0	18.4[a]	48.9	37.8	34.6[a]	–	–	–

$P <$ [a].20; [b].05; [c].01; [d].001.

health factors (depression and self-perceived general health) and one oral health measure (need for dental prostheses).

The final multinomial regression model for the overall sample (Table 2) demonstrated that no socioeconomic variable remained independently associated with poor or moderate GOHAI scores after the inclusion of oral health variables. Individuals with a poor GOHAI score were more likely to be depressed and rate their health as poor. Individuals with 20 or more teeth in the overall sample and among the dentate participants had a 75% and 83% less chance, respectively, of having a poor GOHAI score. Among the dentate individuals (Table 3), poor and moderate GOHAI scores were significantly associated with the same variables as those in the model for the overall sample, with the exception of income. Among the edentulous individuals (Table 3), poor GOHAI scores were independently associated with depression, poor self-rated health, and the need for dental prostheses, whereas moderate GOHAI scores were associated only with the need for dental prostheses.

DISCUSSION

One-quarter of the elderly individuals in the present study were classified as having low GOHAI scores, indicating a negative impact of oral health status on quality of life, which has also been reported in previous studies.[10–12] Nevertheless, although the sample had a high frequency of clinical oral health impairment, all three groups analyzed were more likely to have a good GOHAI score (44.7% of the overall sample, 45.9% of the dentate participants, and 43.4% of the edentulous participants) and therefore did not experience a negative impact on quality of life because of oral health problems, which also corroborates results described in the literature.[1,13] Nevertheless, this finding must be considered with caution, because it is unclear whether it is related to a specific cohort effect and whether it will persist in new elderly cohort generations. Tooth loss and the use of dental prostheses in elderly individuals are considered characteristics of the aging process[20] and may therefore exert an influence over self-perceived oral health in this population. In the present study, the need for dental prostheses and poor general health factors were strong independent predictors of a poor GOHAI score in all groups studied.

The presence of decayed teeth had no impact on OHRQoL, which is in contrast to findings described by other authors,[9,12,13] but is in agreement with findings reported in other studies.[1,21,22] According to the literature, individuals may base their oral health perceptions on factors related to functional concerns and may not identify early dental disease.[8] Clinical indicators of oral health conditions, such as caries and periodontal disease, do not heavily influence OHRQoL, because of the long latency period before the onset of symptoms, and because these conditions are cumulative, tooth loss is the condition that may result in greater functional impairment and therefore

Table 2. Final Logistic Regression Model for Impact of Oral Health on Quality of Life in Overall Sample

Factor	Model 1 Socioeconomic	Model 2 Adding Health	Model 3 Adding Oral Health
	Odds Ratio (95% Confidence Interval)		
Poor			
Sufficient income	0.55 (0.39–0.78)[b]	0.64 (0.44–0.93)[a]	0.71 (0.47–1.06)
Schooling, years (reference 0–3)			
4–7	0.98 (0.57–1.68)	1.07 (0.62–1.83)	1.06 (0.61–1.89)
8	0.57 (0.30–1.07)	0.68 (0.36–1.28)	0.90 (0.46–1.75)
Age	1.00 (0.97–1.03)	1.00 (0.96–1.02)	0.99 (0.96–1.02)
Depression		2.90 (1.59–5.30)[b]	2.81 (1.46–5.37)[b]
Poor self-rated health		1.81 (1.22–2.68)[b]	1.94 (1.28–2.94)[b]
Need for dental prostheses			2.02 (1.22–3.34)[b]
Number of teeth (reference 0)			
1–10			1.54 (0.96–2.47)
11–19			0.89 (0.48–1.63)
≥ 20			0.25 (0.09–0.70)[b]
Moderate			
Sufficient income	0.89 (0.59–1.33)	0.97 (0.66–1.43)	1.00 (0.69–1.44)
Schooling, years (reference 0–3)			
4–7	0.88 (0.59–1.32)	0.93 (0.62–1.40)	0.94 (0.61–1.44)
8	0.53 (0.31–0.89)[a]	0.60 (0.34–1.07)	0.73 (0.38–1.42)
Age	1.01 (0.98–1.05)	1.01 (0.98–1.04)	1.01 (0.98–1.04)
Depression		1.63 (0.90–2.96)	1.45 (0.71–2.95)
Poor self-rated health		1.84 (1.21–2.79)[b]	1.80 (1.18–2.76)[b]
Need for dental prostheses			2.09 (1.24–3.50)[b]
Number of teeth (reference 0)			
1–10			0.86 (0.54–1.36)
11–19			0.73 (0.38–1.39)
≥ 20			0.60 (0.31–1.17)

Reference: good (low impact of oral health on quality of life).
Final model n = 839, representing 588,384 elderly individuals.
Model $P < .001$.
$P <$ [a].05; [b].01.

have an impact on quality of life.[22] In agreement with this, poor GOHAI scores in the overall sample and dentate participants were significantly associated with number of teeth.

Associations between OHRQoL and functional dentition, as represented by denture status and number of teeth, have been explored.[9,10] Regarding number of teeth, some authors[9] found that more remaining teeth indicated a less-negative impact on quality of life, as measured by the GOHAI. Likewise, another study[10] observed that individuals with more missing teeth had a greater impact of oral health on quality of life, as measured according to the OHIP.

With regard to denture status, using the OHIP,[23] one study found that denture status was the strongest predictor of a negative impact on OHRQoL. Elderly individuals with dentures were more likely to have lower GOHAI scores than those without.[11] In contrast, the use of dental prostheses was not a significant predictor of the outcome, but rather the need for dental prostheses was significantly associated with moderate and high degrees of negative impact on quality of life in all groups, which corroborates findings from other studies.[22] The need for dental prostheses takes into account the quality of the prostheses (e.g., adaptation and retention) and may be a more reliable measure of functional oral impact than the use of dental prostheses, although few studies have used this variable.

Unlike self-perceived income, which was significantly associated with poor GOHAI scores in the final model in dentate individuals, OHRQoL was not associated with sex or schooling in the bivariate and multivariate analyses. The evidence demonstrates discrepancies with regard to factors related to OHRQoL. Using the GOHAI, one study[13] found that elderly women had twice the chance of having a negative self-perception of oral health, whereas another study[10] used the OHIP and found that women had less impact from oral health than men. In agreement with the present findings, these authors found no association between the outcome and educational level. Likewise, other evidence shows[23] that OHRQoL is not associated with socioeconomic or demographic factors, although other authors found a statistically significant gradient effect of educational level on GOHAI scores after adjusting for age, sex, and pension status.[11] In the present study, a possible explanation for the association between self-reported income and poor GOHAI score only in the dentate individuals may be related to the functional and psychosocial impact of the number of missing teeth on quality of life in individuals with different levels of income. Depending on the distribution of missing teeth, this condition may not represent a major problem for elderly individuals with low income, whereas the same may not be true for those with higher incomes, because self-perceived dental needs are culturally and behaviorally dependent[20] and rely on the ability

Table 3. Final Multinomial Logistic Regression Model for Impact of Oral Health on Quality of Life in Dentate and Edentate Individuals

Factor	Model 1 Socioeconomic	Model 2 Adding Health	Model 3 Adding Oral Health
	Odds Ratio (95% Confidence Interval)		
Dentate individuals[d]			
Poor			
Sufficient income	0.35 (0.21–0.60)[c]	0.42 (0.24–0.72)[b]	0.47 (0.26–0.84)[a]
Age	1.01 (0.97–1.06)	1.00 (0.95–1.05)	0.98 (0.94–1.03)
Depression		4.80 (1.62–14.20)[b]	4.53 (1.26–16.36)[a]
Poor self-rated health		1.89 (1.03–3.46)[a]	1.96 (1.04–3.72)[a]
Number of teeth (reference 1–10)			
11–19			0.62 (0.32–1.21)
≥ 20			0.17 (0.06–0.48)[b]
Need for dental prostheses			1.85 (1.06–3.24)[a]
Moderate			
Sufficient income	0.57 (0.33–0.99)[a]	0.65 (0.38–1.12)	0.62 (0.37–1.05)
Age	1.01 (0.97–1.06)	1.00 (0.96–1.05)	1.00 (0.96–1.05)
Depression		2.94 (1.07–8.08)[a]	2.40 (0.77–7.50)
Poor self-rated health		2.20 (1.26–3.85)[b]	2.01 (1.10–3.69)[a]
Number of teeth (reference 1–10)			
11–19			0.92 (0.44–1.88)
≥ 20			0.72 (0.34–1.52)
Need for dental prostheses			1.85 (1.09–3.16)[a]
Edentate individuals[e]			
Poor			
Sufficient income	0.80 (0.40–1.60)	0.94 (0.45–1.96)	1.05 (0.48–2.27)
Age	0.99 (0.96–1.03)	0.99 (0.95–1.03)	0.98 (0.95–1.02)
Depression		2.23 (1.15–4.34)[a]	2.19 (1.11–4.32)[a]
Poor self-rated health		1.98 (1.11–3.54)[a]	1.99 (1.08–3.66)[a]
Need for dental prostheses			2.44 (1.24–4.81)[a]
Moderate			
Sufficient income	1.25 (0.77–2.01)	1.35 (0.84–2.17)	1.52 (0.96–2.42)
Age	1.01 (0.98–1.05)	1.01 (0.98–1.05)	1.01 (0.98–1.04)
Depression		1.17 (0.59–2.33)	1.14 (0.54–2.41)
Poor self-rated health		1.73 (0.98–3.03)	1.74 (0.98–3.10)
Need for dental prostheses			2.68 (1.27–5.66)[a]

Reference category: good (low impact of oral health on quality of life).

P < [a].05; [b].01; [c].001.

[d] Final model for dentate individuals: n = 387, representing 303,796 elderly individuals; model P = .001.

[e] Final model for edentate individuals: n = 452, representing 284,588 elderly individuals; model P < .001.

to allocate time and money for this service, as well as priorities in terms of other needs that have a negative impact on activities of daily living.[24]

The association between poor self-perceived general health and a negative impact of oral health on quality of life highlights the role of oral health as being an integral part of general health and essential to well-being.[25] Moreover, depression was a strong predictor of poor GOHAI score in the present study. A number of authors have also found a greater chance of negative impact of oral health on quality of life in participants with depression using the same OHRQoL instrument.[1,13] According to the literature,[1] individuals with depression may exaggerate their perceptions of negative oral health status. Although this finding does not allow causal association to be determined, it underscores the need for further studies on this relationship to better evaluate OHRQoL, which may be overestimated when depression is not taken into account.

Despite the importance of the results of the present study, its cross-sectional design, which does not allow the identification of causal associations, limits the investigation.

Thus, evidence from longitudinal studies is needed to determine such associations.

The present study demonstrates that individuals with high and moderate degrees of negative impact of oral health on quality of life have similar predictors, which are related to general health and, more specifically, functional oral health measures.

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to be published. Duarte and Teixeira: Interpretation of data, critical review of the manuscript, and approval of the final version to be published.

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