



Geriatrics, Gerontology and Aging

ISSN: 2447-2115

ISSN: 2447-2123

Sociedade Brasileira de Geriatria e Gerontologia, SBGG

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Geriatrics, Gerontology and Aging, vol. 17, e0230007, 2023

Sociedade Brasileira de Geriatria e Gerontologia, SBGG

DOI: <https://doi.org/10.53886/gga.e0230007>

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Oral health-related quality of life of older adults living in long-term care facilities and its association with dental prosthesis use and condition

Qualidade de vida relacionada à saúde bucal de idosos residentes em instituições de longa permanência: associação com o uso e condição da prótese

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Received on: 11/11/2022.

Accepted on: 01/17/2023.

Associate Editor in Charge: Patrick Alexander Wachholz

How to cite this article: Medeiros MMD, Pinheiro MA, Figueredo OMC, Oliveira LFS, Wanderley RL, Cavalcanti YW, Rodrigues Garcia RCM. Oral health-related quality of life of older adults living in long-term care facilities and its association with dental prosthesis use and condition. Geriatr Gerontol Aging. 2023;17:e0230007. <https://doi.org/10.53886/gga.e0230007>

Abstract

Objective: This cross-sectional study aimed to evaluate the association of oral health-related quality of life with prosthetic rehabilitation status and dental prosthesis condition in residents of Brazilian long-term care facilities.

Methods: The oral health-related quality of life of older adults (n = 194; mean [standard deviation] age = 78.93 [9.10]) was assessed by the Geriatric Oral Health Assessment Index and the Oral Health Impact Profile questionnaires. Prosthetic rehabilitation status was recorded according to the absence of teeth and use of dental prostheses. Dental prosthesis condition was considered good or poor based on stability, retention, occlusion, vertical dimension, and defects. Poisson regression models were plotted to analyze the data ($\alpha = 0.05$).

Results: Lower Geriatric Oral Health Assessment Index scores were associated with edentulism with denture use only on one jaw (B = -0.05) and poor dental prosthesis stability (B = -0.04). Similarly, edentulous participants with denture only on one jaw (B = 0.59) and those wearing dental prostheses with poor stability (B = 0.36) are more likely to achieve higher Oral Health Impact Profile scores. Also, lower Oral Health Impact Profile scores were associated with denture defects (B = -0.34).

Conclusion: In summary, the oral health-related quality of life of older adults living in long-term care facilities is negatively impacted by edentulism with denture only on one jaw and use of dental prostheses with poor stability. Therefore, long-term care facilities should provide oral health training to caregivers, include dental professionals in the staff, and articulate demands with oral health teams in the primary care system.

Keywords: aged; homes for the aged; dental prosthesis; dental prosthesis; dentures; quality of life.

Resumo

Objetivo: Este estudo transversal objetivou avaliar a associação da qualidade de vida relacionada à saúde bucal com o status de reabilitação protética e a condição da prótese em residentes de instituições de longa permanência no Brasil.

Metodologia: A qualidade de vida relacionada à saúde bucal dos idosos (n = 194; média [desvio padrão] idade = 78,93 [9,10]) foi avaliada pelos questionários Geriatric Oral Health Assessment Index e Oral Health Impact Profile. O status de reabilitação protética foi registrado de acordo com a ausência de dentes e uso de próteses dentárias. A condição da prótese foi considerada boa ou ruim com base na estabilidade, retenção, oclusão, dimensão vertical e defeitos. Modelos de regressão de Poisson foram plotados para analisar os dados ($\alpha = 0,05$).

Resultados: Como resultado, menores escores no Geriatric Oral Health Assessment Index foram associados ao edentulismo com o uso de dentadura em apenas uma arcada (B = -0,05) e ao uso de próteses com estabilidade ruim (B = -0,04). De forma similar, participantes edêntulos que usavam dentadura em apenas uma arcada (B = 0,59) e aqueles que portavam prótese com estabilidade ruim (B = 0,36) são mais propensos a ter maiores escores no Oral Health Impact Profile. Além disso, menores escores no Oral Health Impact Profile foram associados a defeitos na prótese (B = -0,34).



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Conclusão: Sumarizando, a qualidade de vida relacionada à saúde bucal de idosos residentes em instituições de longa permanência é negativamente impactada pelo edentulismo com o uso de dentadura em apenas uma arcada e uso de prótese com estabilidade ruim. Assim, instituições de longa permanência devem promover capacitação em saúde bucal aos cuidadores, incluir dentistas no quadro de funcionários e articular com as equipes de saúde bucal da Atenção Primária à Saúde.

Palavras-chave: idoso; instituição de longa permanência para idosos; prótese dentária; dentaduras; qualidade de vida.

INTRODUCTION

The Brazilian population is undergoing a remarkable demographic transition.¹ Older adults (aged 60 years or over) accounted for 9.70% of the Brazilian people in 2004;¹ currently, they are 14.70%² and are expected to reach 18.60% in 2030.¹ The increase in this age group comes with the need to establish who is responsible for caring for older people. According to Brazilian legislation (Law number 10.741/2003),³ family members should care for their older persons; however, institutionalization is accepted for those with no family members or needing specialized care to survive. Thereby, long-term care facilities (LTCFs) have become suitable places for older adults to live in.⁴

Besides housing and nursing, LTCFs also provide daily living assistance for older people, including oral care.⁵ However, most Brazilian LTCFs do not have a dental professional on staff.⁶ Consequently, caregivers and nursing aides are primarily responsible for the oral care of LTCF residents, although they frequently have no proper knowledge, education, or training in providing such care.^{5,7} Thus, they might face difficulties in identifying oral disorders, either dental or denture ones, which would require a dentist appointment.⁸ Considering these barriers, older adults living in LTCFs are more likely to have poorer oral health than community-dwelling ones.⁹

One of the main oral health problems in LTCF residents are missing teeth without dental prosthesis replacement (66.37%) and use of unsatisfactory dental prostheses (86.60% among denture wearers).^{10,11} These oral health problems are reported as negative predictors of masticatory function in nursing-home residents.¹⁰⁻¹³ Also, it is well-established that limited masticatory function is associated with worse oral health-related quality of life (OHRQoL).^{10,14,15} Therefore, the absence of teeth and dentures and the use of ill-fitting dental prostheses might negatively impact the OHRQoL of older adults living in LTCFs.

In this context, previous cross-sectional studies¹⁶⁻¹⁹ identified an association between worse OHRQoL and ill-fitting dental prostheses in nursing-home residents. However, these investigations only evaluated dental

prostheses according to the need for repair/replacement or retention. Thus, a study performing a detailed denture evaluation in terms of stability, retention, occlusion, vertical dimension, and defects may provide additional information regarding this association, which could be used for clinical decision-making for dental prosthesis replacement aiming a better OHRQoL. Therefore, this cross-sectional study evaluated the association of OHRQoL with prosthetic rehabilitation status and dental prosthesis condition in older adults living in LTCFs.

METHODS

This study was supported by the São Paulo Research Foundation (FAPESP, Process numbers 2018/06185-6 and 2021/02463-4) and Coordenação e Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Finance Code 001). The study protocol was submitted to a Research Ethics Committee. Following ethical approval (Protocol numbers 66122 917.6.0000.5188 and 66122917.6.3001.5418), the eligible volunteers were invited to participate in the study, and those who agreed to it signed a consent form.

This cross-sectional study consisted of a co-participation of 17 Brazilian LTCFs in southeastern (n = 10) and northeastern (n = 7) Brazil and was conducted between January and August 2019. The LTCFs were either non-profit (n = 10) or private (n = 7) facilities that offer residence, nursing services, and daily living assistance for 848 individuals in total.

To be included in the study, the volunteers must be 60 years of age or over and be edentulous or partially dentate with dental prostheses on at least one jaw. However, those with a communication disability (impaired hearing, speech, or voice), according to LTCF records, or with a cognitive impairment, according to the Mini-Mental State Examination (final score < 13 points),^{20,21} were excluded from the study. Thereby, 194 individuals met the eligibility criteria and participated in the study.

Age and sex were recorded, and the participants were evaluated for OHRQoL, prosthetic rehabilitation status, and dental prosthesis condition. OHRQoL was considered

the outcome measurement, and prosthetic rehabilitation status and dental prosthesis condition were the predictor variables tested.

Oral health-related quality of life

The Brazilian versions of the Oral Health Impact Profile (OHIP-14)^{22,23} and the Geriatric Oral Health Assessment Index (GOHAI)^{24,25} were used to assess OHRQoL. OHIP-14 measures the impact of teeth, mouth, or denture problems on well-being in the past 6 months across 7 dimensions (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap). A 5-point scale (0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often, 4 = very often) is used for each item. Finally, the 14-item scores are summed to obtain a total OHIP-14 score ranging from 0 to 56 points. Higher OHIP-14 scores mean worse OHRQoL.

GOHAI is a self-report 12-item index that assesses the presence of impairment in:

1. Physical function in terms of eating, speech, and swallowing;
2. Psychosocial function referring to concerns, self-image, self-consciousness, and social interaction; and
3. Pain or discomfort due to oral health problems in the past 3 months.

The items have 3 response options (always/often, sometimes/seldom, and never), corresponding to 1, 2, and 3 points, respectively. The points are summed to obtain the GOHAI score (12–36 points), and higher scores correspond to better oral conditions.

Prosthetic rehabilitation status

Prosthetic rehabilitation status was recorded according to the absence of teeth (edentulous or partially dentate) and use of dental prostheses (complete denture [CD] or removable partial denture [RPD]).¹¹ Thus, the participants were classified as

1. Edentulous or partially dentate with CD and/or RPD in both jaws;
2. Partially dentate with CD or RPD only on one jaw; or
3. Edentulous with CD only on one jaw.

Dental prosthesis condition

The assessment of dental prosthesis condition was performed by two trained examiners according to the Vigild method with some modifications.^{11,26} The proposed method evaluated the dental prostheses based on stability, retention, occlusion, vertical dimension, and defects. Stability problems

were recorded when the CD or RPD had a horizontal displacement under slight bilateral pressure on the posterior region. Similarly, retention problems were considered in case of vertical displacements during a slight pull on the CD anterior region (incisor region) and RPD clasps. The evaluation of dental prosthesis occlusion was slightly adapted from the Vigild method; it was based on the occlusal contact between artificial teeth or between artificial and natural teeth. Accordingly, dental prostheses with a lack of occlusal contact were recorded as poor occlusion conditions. Moreover, the vertical dimension was considered poor when, even in case of dental prosthesis use, the lower third of the face in the older adults seemed to be reduced. Dental prosthesis defects were considered when there were broken parts, missing teeth, or excessively worn teeth; however, in our study, those defects were individually recorded. Finally, dental prostheses showing problems in at least one of these criteria were considered in poor condition.

SPSS, version 20.0 (for Windows; SPSS Inc, Chicago, IL, USA), was used to perform the statistical analyses. Mean and standard deviation (SD) were obtained to describe the age and OHRQoL of the participants. Also, Poisson regression models were plotted to analyze the association of OHRQoL (outcome variable) with prosthetic rehabilitation status and dental prosthesis condition (predictors). Moreover, the Backward-Wald procedure was used to obtain an adjusted model. Variables with the highest p-value were removed stepwise until the remaining variables reached a p-value < 0.20.

For the OHIP-14 model, the sequence of excluded variables was broken parts, occlusion, missing artificial tooth, and retention of the dental prostheses. Thus, the adjusted OHIP-14 model included the following variables: prosthetic rehabilitation status, stability, vertical dimension, and excessively worn teeth in dental prostheses. The variables gradually excluded from the GOHAI model were broken parts, retention, vertical dimension, occlusion, missing tooth, and excessively worn teeth in dental prostheses. Thereby, the adjusted GOHAI model comprised prosthetic rehabilitation status and stability variables. After the adjusted models were obtained, regression coefficients (B) and confidence intervals (95%CI) were used to measure the associations, considering a significance level of 5%.

RESULTS

The participants' mean (SD) age was 78.93 (9.10) years. Most were middle-old (aged between 74 and 85 years, n = 71, 36.80%) and female (n = 133, 68.60%). In addition, they

reported a good OHRQoL according to the mean (SD) GOHAI and OHIP-14 scores of 32.53 (3.80) and 7.16 (8.17), respectively. Finally, OHRQoL values were similar across the age and sex groups (Table 1).

Regarding prosthetic rehabilitation status, 109 participants (56.20%) were edentulous or partially dentate with CD and/or RPD in both jaws. Also, 165 participants (85.10%) had dental prostheses in poor conditions due to stability ($n = 103$, 53.10%), retention ($n = 108$, 55.70%), occlusion ($n = 117$, 60.30%), and vertical dimension ($n = 108$, 55.70%) problems.

A multivariate analysis revealed that edentulous participants with CD only on one jaw ($B = -0.05$, 95%CI 0.90 – 1.00) and those wearing dental prostheses with poor stability ($B = -0.04$, 95%CI 0.92 – 0.99) are more likely to present lower GOHAI scores (worse OHRQoL) (Table 2). The same associations were observed in the OHIP-14 regression model (Table 3). Higher OHIP-14 scores (worse OHRQoL) were associated with edentulism with CD use only on one jaw ($B = 0.59$, 95%CI 1.15 – 2.82) and use of CD or RPD presenting poor stability ($B = 0.36$, 95%CI 1.02 – 2.03). Also, lower OHIP-14 scores were associated with excessively worn artificial teeth ($B = -0.34$, 95%CI 0.52 – 0.96).

DISCUSSION

Missing teeth without denture replacement and use of ill-fitting dental prostheses may negatively impact OHRQoL. However, previous studies did not evaluate specific dental prosthesis conditions (stability, occlusion, and vertical dimension) and their association with OHRQoL in older adults living in LTCFs. This study investigated such aspect and revealed that the lack of dentures in edentulous individuals

and the use of dental prostheses with stability problems are major factors associated with poor OHRQoL. Based on these findings, to improve the OHRQoL of LTCF residents, edentulous older adults with no dentures should be prosthetically rehabilitated, and those wearing dental prostheses with poor stability should receive new and well-fitting ones.

The association between a poor OHRQoL and edentulism with CD use only on one jaw agrees with the well-known idea that absence of dentures in edentulous nursing-home residents compromises their masticatory function.¹⁰⁻¹² In addition, the lack of dentures, mainly on the upper jaw, affects aesthetics. Therefore, missing teeth without denture replacement impair mastication and/or aesthetics, leading to functional, psychological, and social problems, ultimately affecting OHRQoL.²⁷⁻²⁹

Our study also revealed that older adults wearing dental prostheses with stability problems are more likely to present a worse OHRQoL. OHRQoL comprises oral complaints or impacts on functional limitations, pain and discomfort, psychological function, social disability, and handicap.^{22,24} In LTCF residents, poor dental prosthesis stability is a predictor of functional disabilities (ie, chewing and swallowing difficulties).¹¹ Also, masticatory function disabilities are related to worse OHRQoL outcomes.^{10,12} Thus, masticatory function impairments might mediate the association between denture stability and OHRQoL.

Although denture stability is associated with poor OHRQoL, this study could not demonstrate an association with retention. Controversially, a previous investigation¹⁶ found an association between a poor OHRQoL assessed by OHIP-G49 and insufficient dental prosthesis retention (ie, denture loosened spontaneously or during functional movements). However, that study did not evaluate dental prosthesis stability. Conversely, we assessed retention and stability and included both in a multiple regression model to investigate their impact on LTCF residents' OHRQoL. Then, only stability remained a factor associated with OHRQoL. This finding suggests that dental prosthesis stability is more critical to OHRQoL than retention. Still, future studies should investigate the role of dental prosthesis retention in the OHRQoL of older adults living in LTCFs.

Concerning dental prosthesis defects, although the frequency of excessively worn teeth was low, this denture condition was associated with higher OHIP-14 scores. Nonetheless, this result should not be considered an indication that artificial teeth must be worn for a better OHRQoL to be obtained. Instead, it should be interpreted as a possible adaptation over time in older adults to excessively worn

TABLE 1. Oral health-related quality of life of older adults living in long-term care facilities according to age and sex.

Variables	GOHAI	OHIP-14
	Mean (SD)	Mean (SD)
Age (years)		
Youngest-old (60 – 74)	32.00 (4.00)	8.00 (9.00)
Middle-old (75 – 84)	33.00 (4.00)	8.00 (8.00)
Oldest-old (> 84)	33.00 (3.00)	5.00 (6.00)
Sex		
Female	32.00 (4.00)	7.00 (9.00)
Male	33.00 (4.00)	7.00 (8.00)

SD: standard deviation; GOHAI: Geriatric Oral Health Assessment Index; OHIP-14: Oral Health Impact Profile.

TABLE 2. Poisson regression models of the factors associated with the oral health-related quality of life (measured by Geriatric Oral Health Assessment Index) of older adults living in long-term care facilities.

Variables	Crude model				Adjusted model*			
	B	p-value	95%CI		B	p-value	95%CI	
			Lower	Upper			Lower	Upper
Prosthetic status								
Edentulous with CD only on one jaw	-0.05	0.06	0.89	1.00	-0.05	0.04†	0.90	1.00
Partially dentate with CD or RPD only on one jaw	-0.00	0.94	0.96	1.03	0.00	0.98	0.96	1.03
Edentulous or partially dentate with CD and/or RPD on both jaws	Ref.				Ref.			
Denture stability								
Poor	-0.03	0.15	0.92	1.01	-0.04	0.01†	0.92	0.99
Good	Ref.				Ref.			
Denture retention								
Poor	-0.00	0.79	0.95	1.04				
Good	Ref.							
Denture occlusion								
Poor	-0.01	0.69	0.94	1.04				
Good	Ref.							
Denture vertical dimension								
Poor	0.00	0.72	0.96	1.06				
Good	Ref.							
Excessively worn teeth in the denture								
Yes	-0.02	0.18	0.94	1.01				
No	Ref.							
Missing tooth in the denture								
Yes	0.03	0.47	0.94	1.12				
No	Ref.							
Broken denture								
Yes	0.00	0.96	0.96	1.04				
No	Ref.							

B: regression coefficient; CI: confidence interval; Ref.: reference category; *Performed with variables with $p < 0.20$ according to the Backward-Wald procedure; [†] p -value < 0.05 .

teeth on the dental prostheses. Because of this adaptation, perhaps this denture problem does not negatively affect OHRQoL anymore.

Overall, our findings about the association between OHRQoL and dental prosthesis condition are supported by previous studies of nursing-home residents.¹⁷⁻¹⁹ Klotz et al.¹⁷ assessed denture-related problems dichotomously (yes and no) and found an increased risk of compromised OHRQoL in participants with dentures needing treatment. In addition, Porter et al.¹⁸ reported that dentate participants with loose

or ill-fitting dentures were more likely to report at least one oral impact on OHRQoL than those with well-fitting ones. Moreover, Zenthöfer et al.¹⁹ revealed that wearing dentures needing repair (ie, at least one broken area/tooth or dentures loose) contributes to a worse OHRQoL. In summary, wearing poorly fitting dentures is a major factor for a compromised OHRQoL in LTCF residents.

Although this study provides crucial additional information for the association between OHRQoL and dental prosthesis condition, some limitations must be considered.

TABLE 3. Poisson regression models of the factors associated with the oral health-related quality of life (measured by Oral Health Impact Profile-14) of older adults living in long-term care facilities.

Variables	Crude model				Adjusted model*			
	B	p-value	95%CI		B	p-value	95%CI	
			Lower	Upper			Lower	Upper
Prosthetic status								
Edentulous with CD only on one jaw	0.62	0.00	1.16	2.95	0.59	0.01 [†]	1.15	2.82
Partially dentate with CD or RPD only on one jaw	0.14	0.47	0.77	1.73	0.13	0.51	0.76	1.70
Edentulous or partially dentate with CD and/or RPD in both jaws	Ref.				Ref.			
Denture stability								
Poor	0.27	0.26	0.81	2.11	0.36	0.03 [†]	1.02	2.03
Good	Ref.				Ref.			
Denture retention								
Poor	0.12	0.57	0.72	1.77				
Good	Ref.							
Denture occlusion								
Poor	0.06	0.79	0.63	1.79				
Good	Ref.							
Denture vertical dimension								
Poor	-0.30	0.26	0.43	1.25	-0.25	0.16	0.53	1.10
Good	Ref.				Ref.			
Excessively worn teeth in the denture								
Yes	-0.34	0.05	0.50	1.00	-0.34	0.03 [†]	0.52	0.96
No	Ref.				Ref.			
Missing tooth in the denture								
Yes	-0.16	0.76	0.29	2.46				
No	Ref.							
Broken denture								
Yes	0.05	0.80	0.66	1.68				
No	Ref.							

B: regression coefficient; CI: confidence interval; Ref.: reference category; *Performed with variables with $p < 0.20$ according to the Backward-Wald procedure; [†] p -value < 0.05 .

Importantly, we did not record the length of denture use. Commonly, older dental prostheses are more defective and less functional than newer ones, which affects denture satisfaction and, consequently, OHRQoL outcomes.³⁰ At the same time, if recorded, that data might have produced memory bias to the study because older adults do not accurately report the length of dental prosthesis use. In addition, we only evaluated individual factors related to OHRQoL and did not investigate possible factors mediating (eg, masticatory function) the association between OHRQoL and denture condition. Therefore, future investigations are

encouraged to assess the influence of contextual variables and mediating factors on the OHRQoL of older adults living in LTCFs.

Despite the aforementioned limitations, different from previous investigations, our study performed a detailed denture evaluation in terms of stability, retention, occlusion, vertical dimension, and defects. Thus, we could identify specific dental prosthesis conditions negatively impacting the OHRQoL of LTCF residents. This finding is particularly important for clinical decision-making of denture replacement aiming to achieve a better OHRQoL, especially

considering the barriers faced by LTCF residents to accessing prosthetic treatment.

CONCLUSION

The OHRQoL of older adults living in LTCFs is negatively impacted by edentulism with denture use only on one jaw and use of dental prostheses with poor stability. Therefore, clinical decision-making for improving the OHRQoL of LTCF residents should be based on the need for dentures and dental prosthesis stability. To address this issue, we encourage LTCFs to provide oral health training to caregivers, include dental professionals in the staff, and work together with oral health teams in the Brazilian primary care system.

Conflict of interest

The authors declare no conflicts of interest.

Funding

This study was supported by the São Paulo Research Foundation (FAPESP, Process numbers 2018/06185-6 and 2021/02463-4) and Coordenação e Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Code 001).

Authors' contributions

MMDM: conceptualization, formal analysis, funding acquisition, investigation, writing – original draft, writing – review & editing. MAP: investigation, writing – review & editing. OMC: investigation, writing – review & editing. LFSO: investigation, writing – review & editing. RLW: investigation, writing – review & editing. YWC: conceptualization, formal analysis, supervision, writing – review & editing. RCMRG: conceptualization, funding acquisition, project administration, supervision, writing – review & editing.

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