Association between denture hygiene and oral health-related quality of life in edentulous patients

Associação entre a higiene de próteses totais e qualidade de vida relacionada à saúde bucal em pacientes desdentados

Raphael Freitas de SOUZA[a], Andrea Sayuri Silveira Dias TERADA[a], Maria Paula DELLA VECCHIA[a], Romulo Rocha REGIS[a], Ana Paula ZANINI[a], Helena de Freitas Oliveira PARANHOS[a], Claudia Helena SILVA-LOVATO[a]

[a]Department of Dental Materials and Prosthodontics, Ribeirão Preto Dental School, USP – University of São Paulo, 14040-904 Ribeirão Preto, SP, Brazil

Resumo

Objetivo: Intervenções visando à melhor higiene de próteses totais podem ter maior chance de sucesso caso levem à melhora da qualidade de vida relacionada à saúde bucal (QVSB), assim melhorando a colaboração do paciente. No entanto, não se conhece se há associação entre a higiene precária das próteses e pobre QVSB. Assim, este estudo buscou avaliar a associação entre a área coberta por biofilme sobre próteses totais e a QVSB em uma amostra de pacientes completamente desdentados. **Material e método**: Uma amostra foi composta por 80 participantes (20 homens e 60 mulheres, média etária de 65,0 ± 9,1 anos) que solicitavam novas próteses totais em uma clínica universitária. A variável usada como medida para a higiene das próteses foi a área coberta por biofilme, quantificada por meio de um método computadorizado. Em seguida, participantes responderam ao instrumento OHIP-EDENT e a questões sobre parâmetros sócio-demográficos. Testes bivariados e regressão múltipla quantificaram a associação entre o biofilme e as demais variáveis (α = 0,05). **Resultado**: A correlação da área coberta por biofilme com a QVSB, bem como com a maioria das variáveis sócio-demográficas, foi fraca e não significante. A regressão múltipla confirmou essa falta de associação entre o biofilme das próteses e a QVSB. **Conclusão**: É possível concluir que a higiene de próteses totais é independente da QVSB para o usuário de próteses totais regular.

Descritores: Prótese total; boca edentada; biofilmes; higiene bucal; qualidade de vida; questionários.

Abstract

Objective: Interventions for better denture cleansing would be more successful if they can improve oral health-related quality of life (OHQoL), thus reinforcing patient's compliance. Nevertheless, it is currently unknown whether precarious denture hygiene is associated with poor OHQoL. This study aimed to assess the association between denture biofilm coverage and OHQoL in a sample of adult edentulous patients wearing complete dentures. **Material and method**: The sample was composed by 80 participants (20 men and 60 women, mean age of 65.0 ± 9.1 years) who requested new complete dentures in a university clinic. The variable used as a measure of denture hygiene was biofilm coverage area, which was quantified by means of a computerized method. Afterwards, participants answered the OHIP-EDENT instrument and questions about socio-demographic parameters. Bivariate tests and multiple regression quantified the association between denture biofilm and other variables (α = 0.05). **Result**: Correlation between biofilm coverage area and OHQoL, as well as with most socio-demographic variables, was weak and non significant. Multiple regression confirmed the lack of association between denture biofilm and OHQoL. **Conclusion**: It can be concluded that denture hygiene is independent of OHQoL for the average complete denture wearers.

Descriptors: Denture, complete; edentulous mouth; biofilms; oral hygiene; quality of life; questionnaires.

INTRODUCTION

The number of elderly has grown worldwide, as a consequence of increased life expectancy[1]. A common problem of aging populations is still the large number of edentulous people, despite several advances in preventive dentistry[2]. Those people are usually rehabilitated by means of complete dentures which, by their turn, demand periodical maintenance and adequate hygiene to maintain oral health. The presence of removable prostheses can be a factor associated with diseases and discomfort if not maintained adequately, both by dental professionals and wearers themselves[3].

Denture maintenance and hygiene usually show certain degrees of precariousness, however. One of the most frequent problems found is poor denture hygiene[4,5], often caused by lack of instruction or age-related motor coordination problems[6]. The acquisition of better oral hygiene habits by complete denture wearers improves oral health and also increases dentures' longevity. Nevertheless, changing edentulous patients' oral hygiene habits is usually a difficult task[7,8].

Adequate cleansing habits render biofilm formation difficult, in analogy to what happens on the natural dentition[9,10]. Denture biofilm formation is the main etiologic factor for several oral infectious diseases, such as denture stomatitis. Despite of that, factors associated with denture hygiene are poorly understood. As found for dentate subjects[11], oral hygiene habits of denture wearers might be influenced by social variables, i.e., gender and income. The identification of such factors may lead to the recognition of groups with higher risk for denture-related problems.

Oral health is determined by a plethora of factors, such as psycho-social stress, social support, cultural aspects and hygiene habits[12]. For people in general, some factors may present direct association with oral health (i.e. oral health behaviors). As a construct, oral health-related quality of life (ORQoL) encloses several factors associated with both oral health and related behaviors[13,14], such as psychosocial stress and functional parameters. As for people in general, psychological discomfort, social disability, functional limitation and physical discomfort are components of edentulous patients' OHQoL[15].

As an oral health behavior, denture hygiene may present association with OHQoL. That association is unclear, though. One can hypothesize that better denture maintenance may lead to better OHQoL as well as to lower biofilm levels. OHQoL can be considered as an important motivator of behavioral changes to improve the oral health of elderly patients[16]. In other words, self-perceived improvements in oral health might be associated with better oral hygiene and serve to reinforce cleansing habits. Regardless of the cause-effect relationship between denture hygiene and OHQoL, the knowledge of such association may lead to a better understanding of denture wearers' oral health behavior.

In general, most studies have approached the efficacy of different methods for cleaning complete dentures in terms of biofilm removal[8,17,18] or the frequency of poor denture hygiene[4,5]. To our knowledge, there is no investigation that attempted to explain possible factors associated with the hygiene of removable dentures. Therefore, this study aimed to evaluate the association between denture hygiene and socio-demographic factors, as well as with OHQoL, in a sample of adult edentulous patients.

MATERIAL AND METHOD

This study investigated the association between denture hygiene and OHQoL, by means of a correlational design[19]. We evaluated a sample of edentulous participants enrolled among former patients of the Ribeirão Preto Dental School, who received conventional maxillary and mandibular complete dentures. Such patients had received oral hygiene instructions after denture insertion according to the brushing method described by Paranhos et al.[6]. Included participants should be wearing at least their maxillary dentures to make data collection possible. No maximum time following denture insertion was considered, but participants should have passed their functional adaptation and adjustment phase. The study enrolled participants at least 1 month after denture insertion as a minimum period to avoid that phase[20,21]. Exclusion criteria were: inability to understand spoken or written Portuguese, presence of debilitating systemic diseases and oral pathologic changes, such as neoplasms or candidiasis.

This study commenced after approval by the institutional Ethics Committee. After informed consent, the participants underwent data collection by means of photographic records of their maxillary dentures and questionnaires.

Measurements of biofilm coverage area on maxillary complete dentures served as a measure of denture hygiene, and followed the computerized method described by Paranhos et al.[22,23]. Briefly, maxillary dentures' intaglio surfaces were rinsed for 5 seconds, dried for 10 seconds and disclosed by a neutral red aqueous solution 1% (Farmácia Ensino – FCFRP-USP, Ribeirão Preto, SP, Brazil). Afterwards, dentures were rinsed again for removal of excessive disclosing dye, air dried and photographed (digital camera: Canon EOS Digital Rebel EF-S 18-55; Canon Inc., Tokyo, Japan and flash: Canon MR-14 EX; Canon Inc.) at a 45-degree angle with standard film-object distance and exposure time[22]. Total area and stained zones (biofilm area) were measured by means of an image processing software (Image Tool 3.0; University of Texas, San Antonio, TX, USA). The ratio between biofilm area and intaglio surface's total area resulted in the variable of interest, namely, biofilm coverage area (in %).

Participants answered a form containing questions about socio-demographic aspects and OHQoL. Most volunteers filled the research form under supervision of the researchers, whereas illiterate participants provided answers by means of an interview. Specific issues approached by the questions were a). gender; b) age; c) marital status; d) educational level; e) number of dependents; f) time of edentulism; g) monthly income. Participants were also asked to fill the Brazilian OHIP-EDENT inventory which is a specific instrument for the assessment of OHQoL of edentulous subjects composed by 19 questions[24]. In order to answer the inventory, participants should consider

experiences and impressions gathered during the last three months that anteceded data collection. Possible answers for each question (respective scores in parentheses) are 0) never; 1) sometimes; and 2) almost always, resulting in a summary score ranging from 0 to 38. Scores were also obtained for specific domains composed by 4 or 5 questions each, as purported by Souza et al.[15]: a) masticatory-related complaints; b) psychological discomfort and disability; c) social disability; d) oral pain and discomfort.

The association between denture biofilm coverage area and independent variables was quantified by means of two approaches. Firstly, bivariate analyses were performed. Biofilm percentage was described as a function of the different levels of qualitative variables and compared by means of parametric tests (t test or one-way ANOVA). Association with quantitative dependent variables was quantified by Pearson correlation coefficients or, in the case of OHIP-EDENT, the Spearman correlation test. The latter statistical approach employed multiple linear regression analysis, using biofilm area as the dependent variable. Socio-demographic data and the overall OHIP-EDENT score were entered in the regression model as dependent variables. In order to minimize entered variables, data for monthly income and dependents were not used; in their place, we calculated an income/dependents ratio. Gender, education and marital status were included as dummy variables. All statistical tests were performed using SPSS 15.0 (SPSS Inc., Chicago, IL, USA) with a significance level of 0.05.

RESULT

A total of 102 patients (77 women and 25 men) were examined initially. Inclusion was impossible for some because they were not wearing their maxillary complete dentures (n = 8). One had his maxillary denture broken and was not included either. Refusal to participate in the protocol was reported by 6 patients. Reasons for the exclusion of possible participants comprised oral candidiasis (n = 6) and impaired cognition (n = 1). At the end of the enrollment, eighty participants composed the sample of this study and were assessed according to the protocol. Although 79 of them were able to fully provide requested answers, a participant could not provide information about his income.

Our sample presented a remarkable predominance of women, who showed a slightly lower biofilm coverage area than male subjects. Most participants were married and presented low educational levels, although neither factors were associated with biofilm coverage. Several participants presented low numbers of dependents (1 or 2), and no difference in biofilm coverage area was found in association with this variable (Table 1).

Age and time of edentulism presented wide variation within the tested sample, but did not present significant association with denture hygiene. Quantitative income-related variables disclosed relatively low monthly earnings for participants, but no show significant association with biofilm coverage was found (Table 2).

Results for OHQoL present wide variation and a clearly asymmetrical distribution, with a trend to low scores. No visible

Table 1. Bivariate analysis of biofilm coverage area and qualitative socio-demographic variables

Variable		n	Biofilm (%, mean ± SD)	P[†]
Gender	Female	60	28.3 ± 3.5	0.013
	Male	20	30.8 ± 4.7	
Marital status	Married	45	28.5 ± 3.5	0.500[(ns)]
	Single	10	28.7 ± 3.2	
	Divorced	5	28.3 ± 5.4	
	Widowed	20	30.0 ± 5.4	
Education	Illiterate	15	28.9 ± 5.0	0.528[(ns)]
	Incomplete primary	50	29.0 ± 3.9	
	Primary graduate	5	26.4 ± 3.5	
	Incomplete high school	4	29.1 ± 2.6	
	High school graduate	2	26.6 ± 3.6	
	University graduate	4	31.5 ± 1.1	
Number of dependents (including participants)	1	42	29.3 ± 4.2	0.081[(ns)]
	2	33	28.5 ± 3.6	
	3	3	30.8 ± 1.6	
	4	2	22.6 ± 2.0	

[†]Comparisons by means of t test or ANOVA. [(ns)]Non significant difference ($p > 0.05$).

Table 2. Bivariate analysis of biofilm coverage area and quantitative socio-demographic variables

Variable	Mean ± SD	r[†]	P
Age (years)	65.0 ± 9.1	0.21	0.058[(ns)]
Edentulism (years)	27.3 ± 14.1	−0.15	0.176[(ns)]
Monthly income (R$)	702.2 ± 338.5	0.06	0.609[(ns)]
Income/dependents ratio	483.2 ± 166.9	0.18	0.116[(ns)]

[†]Pearson correlation coefficient. [(ns)]Non significant correlation ($p > 0.05$).

association is present between denture hygiene and OHQoL (Figure 1) and the correlation coefficient between such measures is almost null, at least when no correction is made for potential confounders. None of the isolated domains of the OHIP-EDENT presented significant association with biofilm coverage area either (Table 3). No participant had their dentures inserted or adjusted during the three months period considered by the questionnaire.

Results from multiple regression analysis confirm that there is no association between denture hygiene and OHQoL. Although multiple regression further supports non significant associations found by means of bivariate analyses, it did not confirm the

effect of gender (Table 4). Variation explained by means of the multivariate model was fairly low, as long as the coefficient of determination (R^2) was 0.174.

DISCUSSION

Present results demonstrate that the association between denture hygiene and socio-demographic factors is discrete. In other words, tested factors cannot answer for much of the observable variation in biofilm coverage. Moreover, the OHQoL of edentulous patients is not correlated with biofilm coverage area either.

Only one factor correlated significantly with biofilm coverage area, namely, gender. The significantly higher area for male participants can be explained by means of different hygiene habits. Marchini et al.[25] found that female elderly tend to brush their teeth more frequently than men. It is possible that edentulous patients present the same gender differences, although they may be more discrete than in dentate subjects. An evidence of that is the lack of significance following multivariate analysis.

Other factors, i.e., marital status, education, number of dependents, age, time of edentulism and income, showed no significant association. This was an unexpected finding, as long as age-related changes and lack of instruction were supposedly involved with precarious denture hygiene[6]. Moreover, the association between social-demographic factors and oral diseases

caused by biofilms was previously described. In a sample of people receiving residential care, older age and lower income were significantly associated with a higher prevalence of denture stomatitis[3]. Nevertheless, previously cited studies enrolled heterogeneous samples such as institutionalized patients with diverse oral health statuses. In this study, a relatively homogeneous group of participants reflects complete denture wearers – the population to whom its results intend to be generalizable. The chance of being edentulous is closely associated with lower income and older age, as well as with lower educational levels[26]. Therefore, it is probable that socio-demographic factors present lower variation in denture wearers if compared with adult people in general.

The non significant association between OHQoL and denture hygiene is another interesting finding, as long as better OHQoL tends to motivate oral health behavior[16]. Probably, edentulous patients do not feel that denture biofilm has impact on their oral health. This explanation is reinforced by the lack of items regarding oral hygiene as part of OHIP-EDENT[27], although questions regarding halitosis and bad taste were present in the original OHIP[28]. The choice of instrument cannot be pointed out as a reason for the lack of association. The Brazilian OHIP-EDENT has adequate reliability and presented good construct validity in a sample of complete denture wearers[24]. We considered that the response to items associated with oral discomfort or even with psychological or social discomfort and disability could vary as a function of oral hygiene.

That does not mean, however, that denture hygiene is not associated with OHQoL at all. Other studies found that correlation as a significant one for adult dental patients, with poor hygiene meaning worse OHQoL[29]. In those cases, dental plaque may be also associated with an increasing prevalence of lesions such as caries and periodontal disease. By its turn, the present study enrolled participants without oral infectious disease, in order to avoid this possible confounder. We do not discard a possible indirect effect of precarious oral hygiene, leading to oral disease and then to worse OHQoL. Nevertheless, this independence between denture hygiene and OHQoL in asymptomatic patients should be taken into consideration by dental professionals. Such finding is in agreement with a study in patients with periodontal disease[30]. Although dental hygiene therapy reduced plaque index and other periodontal variables, OHQoL remained unchanged. As a consequence of present findings, patients may perceive no
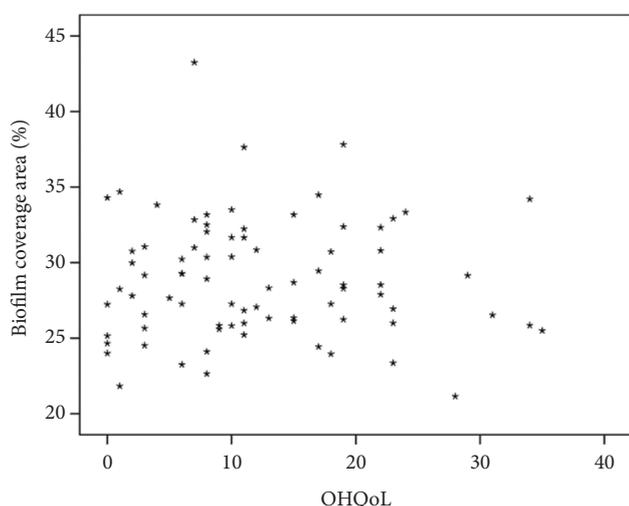

Figure 1. Scatterplot of biofilm coverage area versus OHQoL.

Table 3. Bivariate analysis between biofilm coverage area and OHQoL

	Minimum	1st Quartile	Median	3rd Quartile	Maximum	r†	P
Masticatory-related complaints	0	1	3	5.75	8	0.01	0.954(ns)
Psychological discomfort and disability	0	0	2	5	10	0.12	0.290(ns)
Social disability	0	0	0	1	8	0.06	0.575(ns)
Oral pain and discomfort	0	2	5	7	10	−0.09	0.435(ns)
Total	0	6	10.5	18.75	35	0.02	0.880(ns)

†Spearman correlation coefficient. (ns)Non significant correlation (p > 0.05).

Table 4. Multiple regression analysis between biofilm coverage area and other variables

Variable	b	CI 95%	β
Gender	2.01	–0.03 to 4.06[ns]	0.22
Age (years)	0.09	–0.02 to 0.20[ns]	0.21
Edentulism (years)	–0.05	–0.12 to 0.01[ns]	–0.19
Education	0.13	–0.58 to 0.83[ns]	0.04
Marital status	0.58	–0.14 to 1.30[ns]	0.19
Income/dependents ratio	0.00	0.00 to 0.01[ns]	0.06
OHIP-EDENT	0.01	–0.09 to 0.12[ns]	0.03
Constant	19.78	12.30 to 27.27	

[ns]Non significant association ($p > 0.05$).

benefit from improved denture hygiene unless it plays a role in the therapy of oral infectious diseases. However, such hypothesis needs to be clarified by different studies, e.g. by using a sample of participants presenting oral candidosis in a longitudinal study.

The choice of biofilm coverage area as an indicative of denture hygiene could be pointed as a limitation, as long as other significant oral health behaviors could be measured, i.e., overnight denture wearing[3]. However, such measurement would include other variables outside denture hygiene itself. The specific choice of a computerized method for the assessment of denture biofilm also deserves some comments. Using a computerized method instead of visual indices is advantageous, as long as it generates a single quantitative variable instead of ordinal measures. That method reduces investigator subjectivity and increases statistical power, and results have good correlation with plaque weight, microbial counts and visual assessment[23]. Although measurements were not carried out on other surfaces, such as maxillary dentures' buccal flanges, the sole use of the intaglio surface of a maxillary denture serves as an accurate indicative of denture hygiene status. Photographs were taken in a 45° angle in order to better capture vestibular and buccal flanges' inclines. Such areas cannot be observed by means of a 90° angle and therefore biofilm coverage could be underestimated by such method[22].

In summary, present results show a lack of association between denture hygiene and studied socio-demographic factors, except for gender. We expect similar results in common edentulous patients who received conventional prosthodontic treatment, suggesting that other factors may be more importantly involved with their oral hygiene habits. The relative relevance of other factors, however, remains as a subject for future research. OHQoL was not associated with denture hygiene either, disclosing that edentulous patients do not feel higher biofilm levels as a problem. A possible clinical consequence of the latter finding is that patient instructions should focus on the prevention of oral diseases instead of a reduction in oral discomfort.

CONCLUSION

The denture hygiene of adult patients is not associated with socio-demographic factors such as age, marital status, number of dependents, time of edentulism and monthly income. Denture biofilm does not seem to influence – or to be influenced by – the OHQoL of complete denture wearers.

ACKNOWLEDGEMENTS

REFERENCES

1. United Nations Population Division. World population prospects: the 2002 revision. New York: United Nations; 2003.

2. Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. Bull World Health Organ. 2005; 83: 661-9. PMid:16211157. PMCid:2626328.

3. Evren BA, Uludamar A, Işeri U, Ozkan YK. The association between socioeconomic status, oral hygiene practice, denture stomatitis and oral status in elderly people living different residential homes. Arch Gerontol Geriatr. 2011; 53: 252-7. PMid:21269712. http://dx.doi.org/10.1016/j.archger.2010.12.016

4. Jeganathan S, Thean HP, Thong KT, Chan YC, Singh M. A clinically viable index for quantifying denture plaque. Quintessence Int. 1996; 27: 569-73. PMid:9161261.

5. Takamiya AS, Monteiro DR, Barão VA, Pero AC, Compagnoni MA, Barbosa DB. Complete denture hygiene and nocturnal wearing habits among patients attending the Prosthodontic Department in a Dental University in Brazil. Gerodontology. 2011; 28: 91-6. PMid:20604810. http://dx.doi.org/10.1111/j.1741-2358.2010.00369.x

6. Paranhos HF, Silva-Lovato CH, Souza RF, Cruz PC, Freitas KM, Peracini A. Effects of mechanical and chemical methods on denture biofilm accumulation. J Oral Rehabil. 2007; 8: 606-12. PMid:17650171. http://dx.doi.org/10.1111/j.1365-2842.2007.01753.x

7. Paranhos H de F, da Silva CH, Venezian GC, Macedo LD, de Souza RF. Distribution of biofilm on internal and external surfaces of upper complete dentures: the effect of hygiene instruction. Gerodontology. 2007; 24: 162-8. PMid:17696893. http://dx.doi.org/10.1111/j.1741-2358.2007.00177.x

8. Souza RF, Regis RR, Nascimento C, Paranhos HF, Silva CH. Domestic use of a disclosing solution for denture hygiene: a randomised trial. Gerodontology. 2010; 27: 193-8. PMid:19545320. http://dx.doi.org/10.1111/j.1741-2358.2009.00309.x

9. Abelson DC. Denture plaque and denture cleansers: review of the literature. Gerodontics. 1985; 1: 202-6. PMid:3005102.

10. Nicholson RJ, Stark MM, Scott HE. Calculus and stain removal from acrylic resin dentures. J Prosthet Dent. 1968; 20: 326-9. http://dx.doi.org/10.1016/0022-3913(68)90227-8

11. Källestål C, Dahlgren L, Stenlund H. Oral health behavior and self-esteem in Swedish adolescents over four years. J Adolesc Health. 2006; 38: 583-90. PMid:16635771. http://dx.doi.org/10.1016/j.jadohealth.2005.05.021

12. Newton JT, Bower EJ. The social determinants of oral health: new approaches to conceptualizing and researching complex causal networks. Community Dent Oral Epidemiol. 2005; 33: 25-34. PMid:15642044. http://dx.doi.org/10.1111/j.1600-0528.2004.00190.x

13. Gift HC, Atchison KA, Dayton CM. Conceptualizing oral health and oral health-related quality of life. Soc Sci Med. 1997; 44: 601-8. http://dx.doi.org/10.1016/S0277-9536(96)00211-0

14. John MT, Hujoel P, Miglioretti DL, LeResche L, Koepsell TD, Micheelis W. Dimensions of oral-health-related quality of life. J Dent Res. 2004; 83: 956-60. PMid:15557405. http://dx.doi.org/10.1177/154405910408301213

15. Souza RF, Leles CR, Guyatt GH, Pontes CB, Della Vecchia MP, Neves FD. Exploratory factor analysis of the Brazilian OHIP for edentulous subjects. J Oral Rehabil. 2010; 37: 202-8. PMid:20050983. http://dx.doi.org/10.1111/j.1365-2842.2009.02043.x

16. MacEntee MI. Quality of life as an indicator of oral health in older people. J Am Dent Assoc. 2007; 138: 47S-52S. PMid:17761846.

17. de Souza RF, de Freitas Oliveira Paranhos H, Lovato da Silva CH, Abu-Naba'a L, Fedorowicz Z, Gurgan CA. Interventions for cleaning dentures in adults. Cochrane Database Syst Rev. 2009; 4: CD007395. PMid:19821412.

18. Felton DA. The ACP's Evidence-based guidelines for the care and maintenance of complete dentures. J Prosthodont. 2010; 19: 591. PMid:21129079. http://dx.doi.org/10.1111/j.1532-849X.2010.00662.x

19. Portney LG, Watkins MP. Foundations of clinical research: applications to practice. 2nd ed. London: Prentice Hall; 2000.

20. Basker RM, Davenport JC, Tomlin HR. Prosthetic treatment for the edentulous patient. 3rd ed. London: McMillan; 1992.

21. Leles CR, Compagnoni MA, Souza RF, Barbosa DB. Kinesiographic study of mandibular movements during functional adaptation to complete dentures. J Appl Oral Sci. 2003; 11: 311-8. PMid:21394406. http://dx.doi.org/10.1590/S1678-77572003000400007

22. Paranhos HF, da Silva CH. Comparative study of methods for the quantification of biofilm on complete dentures. Braz Oral Res. 2004; 18: 215-23. http://dx.doi.org/10.1590/S1806-83242004000300007

23. Paranhos HFO, Silva-Lovato CH, de Souza RF, Pontes KM. Evaluation of three indices for biofilm accumulation on complete dentures. Gerodontology. 2010; 27: 33-40. PMid:19545322. http://dx.doi.org/10.1111/j.1741-2358.2009.00285.x

24. Souza RF, Patrocínio L, Pero AC, Marra J, Compagnoni MA. Reliability and validation of a Brazilian version of the Oral Health Impact Profile for assessing edentulous subjects. J Oral Rehabil. 2007; 34: 821-6. PMid:17919248. http://dx.doi.org/10.1111/j.1365-2842.2007.01749.x

25. Marchini L, Vieira PC, Bossan TP, Montenegro FL, Cunha VP. Self-reported oral hygiene habits among institutionalised elderly and their relationship to the condition of oral tissues in Taubaté, Brazil. Gerodontology. 2006; 23: 33-7. PMid:16433639. http://dx.doi.org/10.1111/j.1741-2358.2006.00092.x

26. Giordani JM, De Slavutzky SM, Koltermann AP, Pattussi MP. Inequalities in prosthetic rehabilitation among elderly people: the importance of context. Community Dent Oral Epidemiol. 2011; 39: 230-8. PMid:21070321. http://dx.doi.org/10.1111/j.1600-0528.2010.00587.x

27. Allen F, Locker D. A modified short version of the oral health impact profile for assessing health-related quality of life in edentulous adults. Int J Prosthodont. 2002; 15: 446-50. PMid:12375458.

28. Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. Community Dent Health. 1994; 11: 3-11. PMid:8193981.

29. Navabi N, Nakhaee N, Mirzadeh A. Validation of a Persian version of the Oral Health Impact Profile (OHIP-14). Iranian J Publ Health. 2010; 39: 135-9.

30. Ohrn K, Jönsson B. A comparison of two questionnaires measuring oral health-related quality of life before and after dental hygiene treatment in patients with periodontal disease. Int J Dent Hyg. 2012; 10: 9-14. PMid:21564538. http://dx.doi.org/10.1111/j.1601-5037.2011.00511.x

CONFLICTS OF INTERESTS

The authors declare no conflicts of interests.

CORRESPONDING AUTHOR

Claudia Helena Lovato da Silva
Faculdade de Odontologia de Ribeirão Preto, USP – Universidade de São Paulo,
Av. do Café, s/n, 14040-904 Ribeirão Preto, SP, Brazil
e-mail: chl@forp.usp.br