International Journal of Dental Hygiene

Official Journal of the International Federation of Dental Hygienists

ORIGINAL ARTICLE

K Öhrn
B Jönsson

A comparison of two questionnaires measuring oral health-related quality of life before and after dental hygiene treatment in patients with periodontal disease

Abstract: *Aim:* The aim of this study was to compare the usefulness of two different questionnaires assessing oral health-related quality of life (OHRQoL) at the basic examination and after initial dental hygiene treatment (DHtx). *Methods:* A total of 42 patients referred for periodontal treatment completed the Oral Health Impact Profile (OHIP-14) and the General Oral Health Assessment Index (GOHAI) at the basic periodontal examination. They underwent DHtx and completed the questionnaires once again after the treatment. *Results:* No statistically significant differences could be found between the two assessments, neither for the total scores nor for any of the separate items of the OHIP-14 or the GOHAI. However, the GOHAI questionnaire seems to result in a greater variety in the responses indicating that the floor effect is not as pronounced as for the OHIP-14. Those who had rated their oral health as good reported significantly better OHRQoL on both questionnaires. The same pattern was found for patients who reported that they were satisfied with their teeth. After DHtx and necessary extractions, there was a statistically significant correlation between the number of teeth and the total scores on both questionnaires. No other statistically significant correlations with periodontal variables could be found. *Conclusion:* No statistically significant difference could be found after DHtx compared to before in regard to OHRQoL assessed with OHIP-14 and GOHAI. However, there was a greater variety in the responses with the GOHAI questionnaire; it may hereby be more useful for patients with periodontal disease.

Key words: dental hygiene; General Oral Health Assessment Index; Oral Health Impact Profile-14; oral health-related quality of life; periodontitis

Authors' affiliations:
K Öhrn, *B Jönsson*, Dalarna University, School of Health and Social Sciences, Falun, Sweden

Correspondence to:
K. Öhrn
Dalarna University
Health and Social Sciences
Högskolegatan 10
Falun
SE-79188
Sweden
Tel.: +4623778166
Fax: +4623778090
E-mail: koh@du.se

Dates:
Accepted 31 March 2011

To cite this article:
Int J Dent Hygiene **10**, 2012; 9–14
DOI: 10.1111/j.1601-5037.2011.00511.x
Öhrn 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.

Introduction

Chronic diseases, like periodontal disease, may have great impact on daily life, even though symptoms may be weak or not obvious for patients. Still there is a scarcity of studies investigating patients' experiences of periodontal disease and treatment, even though patients' involvement in the treatment is of crucial importance for a successful result. There is a weak relationship between oral status assessed by professionals and oral health assessed by patients indicating that patients perspective is not captured

in clinical examinations (1, 2). To achieve a comprehensive understanding of the periodontal conditions, it is consequently necessary to supplement the assessment performed by dental professionals with patients' experiences of disease and oral health. Assessment of oral health-related quality of life (OHRQoL) may hereby be of interest.

Oral health-related quality of life has obtained a growing interest within dentistry in general (3–8) but also in periodontology (2, 9–13). Several of the studies reported that patients with more severe periodontitis rated their OHRQoL as poorer than those who had less severe periodontitis. In addition, periodontal treatment seems to improve OHRQoL (2, 9, 13, 14). However, Åström *et al.* (2008) who reported a relationship between periodontal disease and OHRQoL emphasized the importance of using patient-related outcomes because there is a lack of linear association between patients' reports and periodontal pockets.

Oral health-related quality of life has been assessed with different questionnaires among which the short version of the Oral Health Impact Profile (OHIP-14) is the most widely used (6, 10, 15–18). Another questionnaire often used is the General Oral Health Assessment Index (GOHAI) (19–22). Both questionnaires have been translated and validated in different cultures including Sweden (17, 18, 21) but have also been questioned in regard to their psychometric properties (23, 24). Locker *et al.* compared the OHIP-14 and the GOHAI in a geriatric population (25). They concluded that although the GOHAI identified more oral functional and psychosocial impacts than the OHIP-14, neither was markedly superior to the other when used as discriminatory measures. But the high prevalence of subjects with zero scores in OHIP-14 may compromise the ability to detect within-subject change (25). Each of the questionnaires has advantages and disadvantages, and it is difficult to decide which questionnaire best reflects experiences reported by patients with periodontal diseases. It is thus of interest to compare different instruments in regard to periodontal disease.

The aim of this study was to compare the usefulness of two different questionnaires assessing OHRQoL at the basic examination and after initial dental hygiene treatment (DHtx).

Materials and methods

Design

The study was a comparative study with assessment before and after DHtx with two different questionnaires.

Subjects

All patients referred to a department of periodontology in a Swedish county were included consecutively from February to June 2005. Forty-two patients completed the OHIP-14 and GOHAI at the basic periodontal examination, underwent initial periodontal treatment and completed the questionnaires after the DHtx. There were 23 women with a mean age of 56.4 (SD 7.0) and 19 men with a mean age of 52.6 (SD 8.1). No statistically significant differences in age with regard to gender could be found.

Outcome measures

Oral health-related quality of life was assessed with the OHIP-14 and the GOHAI. In the present study, the reference period for both questionnaires was 3 month. OHIP-14 is a 14-item questionnaire with the response rate of a five-point Likert scale from 'never' = 0 to 'very often' = 4. GOHAI is a 12-item questionnaire with the response rate of a five-point Likert scale from 'never' = 0 to 'always' = 4. The exception is the responses to item 3, 5 and 7, which are reversed. A summary of the responses produces an overall score, ranging from 0 (best possible) to 56 (OHIP-14) and 48 (GOHAI) (poorest possible) OHRQoL. In addition, a questionnaire was created covering self-rated general health and oral health, satisfaction with general health and teeth, oral hygiene habits and demographic factors.

Periodontal variables included number of teeth, plaque index according to Silness and Löe (26) bleeding on probing and periodontal pockets divided into shallow pockets 4–5 mm and deep pockets ≥6 mm.

Procedure

An invitation letter and the questionnaires were sent to patients in connection with the ordinary invitation to the initial examination. The participants gave their verbal consent at the first visit to the clinic. The questionnaires had been completed before the oral examination, which was performed by the same specialist in periodontology before and after DHtx. Patients who were in the need of DHtx were referred to a dental hygienist (DH) according to the routines at the clinic. The DHtx included 4–5 visits. In addition to the DHtx (i.e. oral health education, instruction in oral hygiene, scaling and polishing), necessary tooth extractions were performed by the periodontist. At the last visit with the DH, the second questionnaires (OHIP-14 (II) and GOHAI (II)) were handed out and patients were asked to complete them within 2 weeks. Three month after the DHtx, the patients were re-examined to evaluate the treatment according to the routine at the clinic.

Analyses

In the GOHAI questionnaires, the responses to item 3, 5 and 7 were reversed in the analyses. Internal reliability was assessed with Cronbach alpha. Self-rated general and oral health was dichotomized into good/poor and satisfaction with general health, and teeth were dichotomized into satisfied/dissatisfied. Differences in OHRQoL between the two assessments were analysed with Wilcoxon signed ranks test. Differences between the dichotomized variables were analysed with Mann–Whitney *U*-test. Correlations between OHIP-14/

GOHAI scores and periodontal variables were analysed with Spearman's rank-order correlation, and correlations between dichotomized variables were analysed with χ^2 test. A *P*-value <0.05 was regarded as statistically significant. The statistical package SPSS 15.0 (SPSS Inc., Chicago, IL, USA) was used in the analyses.

Results

General and oral health

A total of 37 (88%) patients rated their general health as good. They were all satisfied with their general health and so were also two of the patients who had rated their general health as poor. There was a significant correlation between patients rating of their oral health and the satisfaction with their teeth (χ^2 = 15.8; d.f. = 1; $P < 0.001$). A total of 14 (33%) patients rated their oral health as good and 18 (43%) were satisfied with their teeth. No statistically significant difference between periodontal variables and satisfaction with the teeth or self-rated oral health could be found.

Oral hygiene habits

At the initial examination, 38 patients (91%) brushed their teeth twice daily and the remaining patients once a day. There were 28 patients (67%) who cleaned their teeth inter-proximally at least once a day. After DHtx, there were 38 patients (91%) who clean their teeth inter-proximally on a daily basis. Inter-proximal brushes were the most common aid followed by triangular wooden toothpicks.

OHIP-14 and GOHAI scores

The internal reliability was 0.95 for the OHIP-14 (I), 0.92 for the OHIP-14 (II), 0.83 for the GOHAI (I) and 0.82 for the GOHAI (II). The correlation between OHIP-14 (I) and GOHAI (I) scores was 0.70 ($P < 0.001$) and for OHIP-14 (II) and GOHAI (II) scores 0.84 ($P < 0.001$). Descriptive statistics of OHIP-14 (I + II) and GOHAI (I + II) are presented in Table 1. The frequency distribution of individuals according to OHIP-14 I and GOHAI I is presented in Figs 1 and 2. No statistically significant differences could be found between the two assessments (before compared to after DHtx), neither for the total scores nor for any of the separate items of the OHIP-14 or the GOHAI (Table 1). In the GOHAI, the proportion of patients reporting *sometimes or more often* ranged from 9.8% to 73.2% at initial examination and from 7.1% to 71.4% after DHtx (Table 2). The corresponding figures for the OHIP-14 were 2.4–35.7% at initial examination and 2.4–33.3% after DHtx.

Table 1. **General Oral Health Assessment Index (GOHAI) and Oral Health Impact Profile (OHIP)-14 total scores before (I) and after (II) dental hygiene treatment**

	GOHAI (I)	GOHAI (II)	OHIP-14 (I)	OHIP-14 (II)
Mean (SD)	12.2 (9.0)	10.8 (7.6)	8.0 (10.5)	7.0 (8.0)
Median	10.0	9.0	3.5	4.0
Range	0–34	0–31	0–41	0–28
% Score of 0	4.9	2.4	28.6	16.7
Skewness	0.8	0.8	1.6	1.2

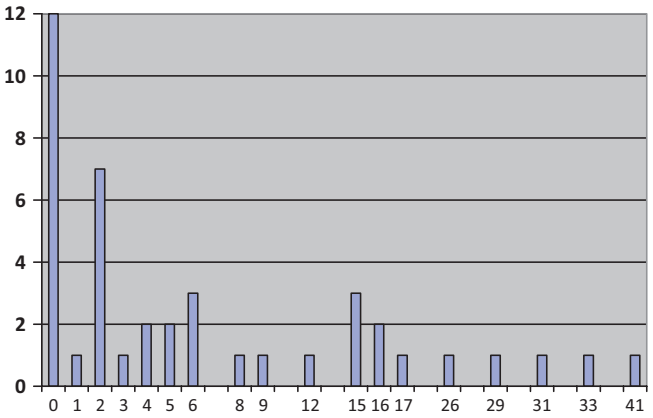

Fig. 1. Frequency distribution of individuals according to Oral Health Impact Profile-14 scores.

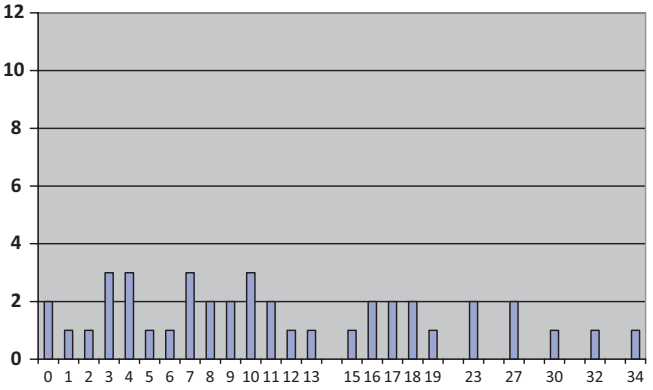

Fig. 2. Frequency distribution of individuals according to General Oral Health Assessment Index scores.

Patients who had rated their oral health as good had significantly lower scores on both the GOHAI and the OHIP-14 questionnaires compared to those who had rated their oral health as poor. The same pattern was found for patients who reported that they were satisfied with their teeth compared to those who were not (Table 3).

In the GOHAI instrument, the item 'How often did you feel nervous or self-conscious because of problems with your teeth, gums or dentures?' was rated at the most troublesome item both before and after DHtx.

Periodontal variables

Plaque index, bleeding on probing and periodontal pockets decreased significantly after DHtx compared to the initial periodontal examination (Table 4). On average, 2.4 teeth had

Table 2. **Percentage of patients responding sometimes/occasionally or more often to each of the General Oral Health Assessment Index (GOHAI) and the Oral Health Impact Profile (OHIP)-14 scores categorized into subgroups according to Locker *et al.* (25)**

GOHAI	I (%)	II (%)	OHIP-14	I (%)	II (%)
Functional limitations					
4. Prevented from speaking	9.8	21.4	1. Trouble pronouncing words	7.2	19.1
2. Trouble biting/chewing food	34.2	28.6	2. Sense of taste worse	11.9	14.3
3. Uncomfortable to swallow	31.6	21.5			
Pain and discomfort					
5. Discomfort when eating	17.1	28.6	4. Uncomfortable to eat foods	31.0	33.3
8. Use medication to relieve pain	17.1	11.9	3. Painful aching in mouth	26.2	29.3
12. Teeth, gums sensitive to hot/cold	39.1	40.6			
Psychological impact					
7. Unhappy with appearance	36.5	50.0	10. Been embarrassed	23.8	23.8
9. Nervous or self-conscious	73.2	71.4	5. Been self-conscious	16.7	19.0
10. Worried or concerned	41.4	38.1	9. Difficult to relax	26.2	23.8
11. Uncomfortable eating in front of people	17.1	16.7	13. Felt life less satisfying	28.6	21.4
			6. Felt tense	35.7	21.4
Behavioural impacts					
1. Limit kinds or amount of food	19.6	26.1	8. Had to interrupt meals	9.5	9.5
6. Limit contact with others	12.2	7.1	7. Diet been unsatisfactory	14.3	14.3
			11. Been irritable with others	7.2	2.4
			12. Difficulty doing usual jobs	7.1	4.8
			14. Totally unable to function	2.4	4.8

Table 3. **Self-rated oral health and self-rated satisfaction with teeth across oral health-related quality of life questionnaires**

	n	General Oral Health Assessment Index	Oral Health Impact Profile-14
Self-rated oral health			
Good	14	9.2 (7.3)	3.7 (4.7)
Poor	28	18.5 (9.2)	16.8 (13.4)
P-value		0.003	0.002
Satisfied with teeth			
Yes	18	8.0 (7.1)	2.4 (3.2)
No	24	18.0 (8.4)	15.5 (12.2)
P-value		<0.001	<0.001

Table 4. **Periodontal variables at initial examination and after dental hygiene treatment**

Periodontal variables	Initial examination (SD)	After DHtx (SD)	*P*-value
Plaque index	0.72 (0.34)	0.29 (0.18)	<0.001
Bleeding on probing %	59 (22)	19 (14)	<0.001
Periodontal pockets 4–5 mm	47.8 (22.6)	14.8 (12.5)	<0.001
Periodontal pockets ≥6 mm	19.5 (19.7)	2.5 (4.5)	<0.001
Number of teeth	25.2 (2.9)	22.8 (4.0)	<0.001

been extracted between the initial and the second examination (Table 4).

After DHtx and necessary extractions, there was a statistically significant correlation between number of teeth and the total OHIP-14 scores ($\rho = -0.46$; $P = 0.003$) and the total GOHAI scores ($\rho = -0.61$; $P < 0.001$). No other statistically significant correlation with periodontal variables could be found.

Discussion

The GOHAI questionnaire seems to result in a greater variety in the responses indicating that the floor effect is not as pronounced as for the OHIP-14 for this group of patients. Using the OHIP-14 questionnaire, as many as 28.6% reported an excellent OHRQoL (score 0) before treatment compared to 4.9% in the GOHAI questionnaire. The high proportion of 0 scores complicates the possibility of an improvement after treatment. However, the proportion of 0 scores decreased after treatment, even though the total mean score has decreased. The same pattern, with a great majority grading a zero on OHIP-14, has been shown also in other studies (5, 18). The least reported impacts in regard to subgroups was behavioural impact and functional limitations, where very few reported any effect *sometimes or more often* both before and after in the OHIP-14 questionnaire. Within the GOHAI questionnaire, the distribution of responses *sometimes or more often* is more equally spread among the subgroups. Painful aching in mouth was reported by 26.2% before and increased to 29.3% in the OHIP-14, while the question in regard to pain was different in the GOHAI, where the question was whether they had used medication to relieve the pain. A total of 17.1% reported that they used medication to relieve pain before treatment and the number decreased to 11.9% after. But in addition, around 40% reported that their teeth and gums were sensitive to hot/cold both before and after treatment. Another interesting difference is in the question: *have you been self-conscious because of your teeth and gums* where 17–19% answered *sometimes or more often* in the OHIP-14, and as many as 71–73% gave the same answer to the question: *have you been nervous or self-conscious because of your teeth or gums* in the GOHAI. The wording is obviously of great importance for any questionnaire. Locker and Allen (27) questioned whether the available instruments really measures OHRQoL. They argued

that the instruments assessed the frequency of the functional and psychosocial impacts of oral disorder but not the meaning and significance of those impacts. The OHIP-14 questionnaire has also been questioned by Kieffer *et al.* (23) who argued that there is a difference in the categories of the items and that the items measuring oral symptoms may not be an indicator of the underlying concept. It is consequently necessary to further develop the measurement of OHRQoL, because it is still important to capture patients' experiences and not only the measurement performed by dental staff.

There were no statistically significant difference between the initial examination and the examination after the DHtx even though there was a decrease in the numbers, indicating that the DHtx does not have a major impact on patients OHRQoL or that such impact could not be found with these two questionnaires. Saito *et al.* (13) found an improvement in OHRQoL after DHtx, when OHRQoL was assessed with another questionnaire. The fact that the great majority reported that they never experienced any problem before treatment could also be a reason why no statistically significant difference could be found as well as the relatively small sample size. The relatively short time after DHtx could also influence on patients' experiences of oral problems. It would be of interest to have a longer follow-up time. However, those who rated their oral health as poor and those who were unsatisfied with their teeth reported significantly lower OHRQoL, indicating that both questionnaires are able to capture patients' experiences. The only correlation to clinical variables was in regard to number of teeth, which has been found in several studies (9, 10). This is in line with previous studies, where a weak correlation was found between self reported questions and clinical variables (1, 2). Psychological impacts were frequently reported specifically in the GOHAI questionnaire, but also in OHIP-14, which also has been reported by Abrahamsson *et al.* (28) in a qualitative interview study. Questions in regard to patients' worries are very seldom included in a medical history, but obviously need attention at least for patients with periodontal disease.

Methodological considerations

The GOHAI instrument includes three questions that are reversed in the analyses. This may have confused the patients, because it could make the question more difficult to understand. However, there is no reason to believe that the responses are incorrect, because all responses seem relevant even if the responses on item 3 (uncomfortable to swallow) may have been slightly overestimated depending on the understanding of the question. Even though DHtx has major impact on periodontal status measured by dental staff, it seems like the OHIP-14 and GOHAI are not sensitive enough to demonstrate such a difference.

The conclusion is that no statistically significant difference could be found after DHtx compared to before in regard to OHRQoL assessed with OHIP-14 and GOHAI. However, there was a greater variety in the responses with the GOHAI questionnaire; it may hereby be more useful for patients with periodontal disease.

References

1 Buhlin K, Gustafsson A, Andersson K, Håkansson J, Klinge B. Validity and limitations of self-reported periodontal health. *Community Dent Oral Epidemiol* 2002; **30:** 431–437.

2 Åslund M, Pjetursson BE, Lang NP. Measuring oral health-related quality-of-life using OHQoL-GE in periodontal patients presenting at the university of Berne. *Oral Health Prev Dent* 2008; **6:** 191–197.

3 Locker D. Measuring oral health: a conceptual framework. *Community Dent Health* 1988; **5:** 3–18.

4 Slade G, Spencer J. Development and evaluation of the Oral Health Impact Profile. *Community Dent Health* 1992; **11:** 3–11.

5 Nuttall NM, Steele JG, Pine CM, White D, Pitts NB. The impact of oral health on people in the UK in 1998. *Br Dent J* 2001; **190:** 121–126.

6 Steele JG, Sanders AE, Slade GD *et al.* How do age and tooth loss affect oral health impacts and quality of life? A study comparing two national samples *Community Dent Oral Epidemiol* 2004; **32:** 107–114.

7 Naito M, Yuasa H, Nomura Y, Nakayama T, Hamajima N, Hanada N. Oral health status and health-related quality of life: a systematic review. *J Oral Sci* 2006; **48:** 1–7. Review.

8 Svoboda J, Kiyak HA, Persson RE *et al.* Predictors of oral health quality of life in older adults. *Spec Care Dentist* 2006; **26:** 137–144.

9 Needleman I, McGrath C, Floyd P, Biddle A. Impact of oral health on the life quality of periodontal patients. *J Clin Periodontal* 2004; **31:** 454–457.

10 Ng SKS, Leung WK. Oral health-related quality of life and periodontal status. *Community Dent Oral Epidemiol* 2006; **34:** 114–122.

11 Jowett AK, Orr MTS, Rawlinson A, Robinson PG. Psychosocial impact of periodontal disease and its treatment with 24-h root surface debridement. *J Clin Periodontal* 2009; **36:** 413–418.

12 Araújo AC, Gusmão ES, Batista JE, Cimões R. Impact of periodontal disease on quality of life. *Quintessence Int* 2010; **41:** e111–e118.

13 Saito A, Hosaka Y, Kikuchi M *et al.* Effect of initial periodontal therapy on oral health–related quality of life in patients with periodontitis in Japan. *J Periodontol* 2010; **81:** 1001–1009.

14 Ozcelik O, Haytac MC, Seydaoglu G. Immediate post-operative effects of different periodontal treatment modalities on oral health-related quality of life: a randomized clinical trial. *J Clin Periodontal* 2007; **34:** 788–796.

15 Slade G. Derivation and validation of a short-form oral health impact profile. *Community Dent Oral Epidemiol* 1997; **25:** 284–290.

16 Saletu A, Pirker-Frűhauf H, Saletu F, Linzmayer L, Anderer P, Matejka M. Controlled clinical and psychometric studies on the relation between periodontitis and depressive mood. *J Periodontol* 2005; **32:** 1219–1225.

17 Hägglin C, Berggren U, Hakeberg M, Edvardsson A, Eriksson M. Evaluation of a Swedish version of the OHIP-14 among patients in general and specialist dental care. *Swed Dent J* 2007; **31:** 91–101.

18 Einarson S, Wärnberg Gerdin E, Hugoson A. Oral health impact on quality of life in an Swedish population. *Acta Odontol Scand* 2009; **67:** 85–93.

19 Atchison KA, Dolan TA. Development of the Geriatric Oral Health Assessment Index. *J Dent Educ* 1990; **54:** 680–687.

20 Tubert-Jeannin S, Riordan PJ, Morel-Papaernot A, Roland M. Dental status and oral health quality of life in economically disadvantaged French adults. *Spec Care Dentist* 2004; **24:** 264–269.

21 Hägglin C, Berggren U, Lundgren J. A Swedish version of the GOHAI index. Psychometric properties and validation. *Swed Dent J* 2005; **29:** 113–124.
22 Guzeldemir E, Toygar HU, Tasdelen B, Torun D. Oral health-related quality of life and periodontal health status in patient undergoing hemodialysis. *J Am Dent Assoc* 2009; **140:** 1283–1293.
23 Kieffer JM, Verrips E, Hoogstraten J. Model specification in oral health-related quality of life research. *Eur J Oral Sci* 2009; **117:** 481–484.
24 Franchignoni M, Giordano A, Levrini L, Ferriero G, Franchignoni F. Rasch analysis of the Geriatric Oral Health Assessment Index. *Eur J Oral Sci* 2010; **118:** 278–283.
25 Locker D, Matear D, Stephens M, Lawrence H, Payne B. Comparison of the GOHAI and OHIP-14 as measures of the oral health-related quality of life of the elderly. *Community Dent Oral Epidemiol* 2001; **29:** 373–381.
26 Silness J, Löe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. *Acta Odontologica Scandinavia* 1964; **22:** 121–135.
27 Locker D, Allen F. What do measures of 'oral health-related quality of life' measure? *Community Dent Oral Epidemiol* 2007; **35:** 401–411.
28 Abrahamsson KH, Wennström J, Hallberg U. Patients' views on periodontal disease; attitudes to oral health and expectancy of periodontal treatment: a qualitative interview study. *Oral Health Prev Dent* 2008; **5:** 209–216.