Measuring Oral Health-Related Quality-of-Life Using OHQoL-GE in Periodontal Patients Presenting at the University of Berne, Switzerland

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Purpose: To assess the impact of oral health related quality-of-life (OHQoL) on patients presenting at the Department of Periodontology and Fixed Prosthodontics using a German version (the OHQoL-GE) of the oral health-related quality-of-life in the UK (OHQoL-UK) questionnaire.

Materials and Methods: A total of 251 patients were invited to fill out the OHQoL-GE. In addition, patients were given a checklist of dental-related items over the past year including 'tooth ache', 'dental treatment', 'bleeding gums', 'swollen gums' and 'problems with dental prosthesis'. Prior to being seen by a dental professional, the patients completed the questionnaires. During the new patient clinic visit, medical and dental history, age, gender, number of teeth present and presence or absence and type of dental prosthesis were recorded. In addition, a basic periodontal examination (BPE) was performed.

Results: Two hundred and fifteen OHQoL-GE questionnaires were completed. OHQoL-GE scores were significantly associated with patients' self-reported symptoms and problems in the past year: experiences of 'tooth ache' ($P < 0.05$), 'swollen gums' ($P < 0.001$) and 'problems with dental prosthesis' ($P < 0.05$) with the exception of 'bleeding gums' ($P = 0.102$) and 'dental treatment' ($P = 0.739$). In addition, OHQoL-GE scores were directly correlated with the BPE ($r_s = -0.295$, $P < 0.01$), the number of teeth present ($r_s = 0.190$, $P < 0.01$) and inversely correlated with age ($r_s = 0.152$, $P < 0.05$). Patients with removable partial dentures had the lowest median score of 43 (interquartile range, IQR 23), patients without dental prosthesis had a median score of 46 (IQR 18) and patients with fixed dental prosthesis (FDP) had the highest score of 54 (IQR 26). The differences were statistically significant between patients without dentures and patients with FDP ($P < 0.05$), and between removable denture wearers and patients with FDP ($P < 0.05$).

Conclusions: The issues were periodontal and prosthetic status, number of teeth present and age impact on quality-of-life. This has implications in understanding the consequences of dental health and in the use of patient-centred outcomes in dental research. The OHQoL-GE demonstrates discriminative validity in a population seeking dental advice and/or treatment.

Key words: dental care, dental health, German language, OHQoL, periodontal status, prosthetic status, quality-of-life, tooth loss

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The patient's satisfaction with care and oral health-related quality-of-life (OHQoL) is increasingly recognised as an important outcome of care. Recent studies have begun to explore wider issues of dental therapy and have investigated patient-centred outcomes in addition to traditional clinical outcome variables. This development may be observed in clinical studies regarding periodontal therapy (Åslund et al, 2008; Whitehead and Watts, 1987; Kalkwarf et al, 1992; Mathews and McCulloch, 1993; Fardal et al, 2002; Lee et al, 2002; Needleman et al, 2004; Ng and Leung, 2006) as well as in studies comparing various

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Table 1 The OHQoL-GE questionnaire

Welchen Einfluss hat Ihre Mundgesundheit auf
a) die Art und Weise, wie Sie essen und das Essen genießen? What affect does your oral health have on your eating or enjoyment of food?
b) Ihre Erscheinung? On your appearance?
c) Ihre Aussprache? On your speech?
d) Ihren Komfort (Schmerz-/Beschwerdefreiheit)? On your levels of pain or discomfort?
e) den Geruch des Atems? On your breath odour?
f) Ihre allgemeine Gesundheit? On your general health?
g) die Art und Weise, wie Sie lächeln oder lachen? On your smiling or laughing?
h) Ihr Sozialleben? On your social life?
i) Ihre romantischen Beziehungen? On your romantic relationships?
j) Ihre Arbeit oder Fähigkeit, die gewöhnlichen Tätigkeiten auszuführen? On your work or your ability to carry out your usual jobs?
k) Ihre Finanzen? On your finances?
l) Ihre Fähigkeit, sich zu entspannen und zu schlafen? On your ability to relax or sleep?
m) Ihr Selbstvertrauen (Frei von Verlegenheit)? On your confidence?
n) Ihr unbekümmertes Auftreten (Sorgenfrei)? On how much you worry?
o) Ihre Stimmung oder Fröhlichkeit? On your mood or happiness?
p) Ihre Persönlichkeit? On your personality?

prosthodontic dental therapies (Wismeijer et al, 1992; Boerrigter et al, 1995; Burns et al, 1995; Clancy and Franks, 1997). However, most of these studies focused on patients' satisfaction regarding function and aesthetics of the prostheses. Others have pointed out (Kressin et al, 1996) that OHQoL aspects are distinct from assessment of oral discomfort and eating problems. More recently, specific OHQoL instruments such as the OHQoL-UK tool (McGrath and Bedi, 2001), Oral Health Impact Profile (OHIP) (Slade and Spencer, 1994; Allen et al, 2001; Allen and McMillan, 2003; Wolfart et al, 2005; Scott et al, 2006) or General (formerly Geriatric) Oral Health Assessment Index (GOHAI) (Atchison and Dolan, 1990; Locker et al, 2001; Veyrune et al, 2005) and others (including Slade, 1997) have been used in clinical studies.

To measure the impact of dental treatment and oral health on the patients' quality-of-life, the OHQoL-UK questionnaire was developed (McGrath and Bedi, 2001) with reported good psychometric properties, validity and reliability. It has been used as an instrument to measure outcome in studies evaluating the effect of dental treatment (Hegarty et al, 2002; McGrath et al, 2003b, c, d) and the OHQoL-UK has proved to be sensitive to clinical short-term as well as long-term changes after treatment.

In contrast to other instruments, the OHQoL-UK instrument measures both positive and negative effects of oral health (McGrath and Bedi, 2003) that are based on the World Health Organization-revised conceptual model of health, reflecting both positive and negative aspects of health status (World Health Organization, 1998). Translated versions into Arabic and Brazilian Portuguese have been validated successfully (Dini et al, 2003; McGrath et al, 2003a).

The aim of this study was to assess the impact of oral health on the quality-of-life of a group of patients seeking dental care at the Department of Periodontology and Fixed Prosthodontics at the University of Berne, Switzerland. Moreover, the associations between patient's self-reported dental status, clinical periodontal status, prosthetic status and OHQoL outcomes were to be determined validating the German version of the OHQoL-UK 16-item questionnaire, and assessing whether or not it can differentiate between patients with different self-reported dental items and clinical findings. Patients reporting to this department may include periodontal patients, prosthodontic patients and patients with a combination of these problems.

MATERIALS AND METHODS

Questionnaire

Following translation of the OHQoL-UK questionnaire (Allen and McMillan, 2003) into German by a bilingual speaker, a back translation into English was carried out by another independent bilingual speaker. Differences in the translation were resolved by discussion. The developed German version (the OHQoL-GE, Table 1) was then tested by staff and patients at the School of Dental Medicine, University of Berne, Switzerland. Following minor amendments, a final version was agreed upon.

Sample

A total of 251 German speaking adult patients attending the new patient's clinic at the Department of Periodontology and Fixed Prosthodontics at the School of Dental Medicine, University of Berne, Switzerland, over a 6-month period were invited to complete the OHQoL-GE and five questions regarding self-reported signs and symptoms over the past year associated with oral health, periodontal disease and prosthetic status. After being informed about the aims and objectives of this study and the use of data, the patients who wished to participate gave informed consent. Inclusion criteria were good command of the German language and a minimum age of 16 years. Patients were excluded if they required antibiotic pre-medication, as this would not allow a complete clinical assessment at the outpatient clinic.

Data collection

The questionnaires were completed by the patients in the waiting area prior to being seen by a dental professional. A short dental examination was carried out in the outpatient clinic by a clinician in the department. Data were collected regarding the number of teeth present, the absence or presence and type of dental prosthesis (none, FDP), the presence of a removable partial denture (RPD) and a complete denture and a BPE was carried out. This screening examination is the standard procedure at the department to identify treatment needs. Comprehensive dental examinations were arranged as appropriate. Data regarding age and gender were taken from the patients' notes.

Data analysis

Data collected on questionnaire forms were entered into a computer for analysis and proofread for entry errors. OHQoL-GE scores were derived from response categories to each question: very bad (score 1), bad (score 2), none (score 3), good (score 4) and very good (score 5). The summation score from each of the 16 items can, therefore, produce overall OHQoL-GE scores ranging from 16 (representing the worst impact) to 80 (best impact possible), with 48 representing a level of no impact of oral health on quality-of-life. Equal weighting was given to each question, as weighting appears not to improve the psychometric performance of the measure (McGrath and Bedi, 2002). If data were not normally distributed, medians and interquartile ranges (IQRs) were used and the hypothesis testing used a non-parametric test (Mann–Whitney U test).

Variations in median OHQoL-GE scores, self-reported dental-related items and prosthetic status were explored through non-parametric analysis using the Mann–Whitney U test for independent samples. Associations between OHQoL-GE scores and mean BPE, the number of teeth present and age were examined through correlation analysis. Data were analysed using the statistical package SPSS 14.0 (SPSS, 2005, IL, USA).

RESULTS

A total of 251 patients attending the outpatient clinic at the Department of Periodontology and Fixed Prosthodontics were invited to complete the OHQoL-GE and answer five questions regarding self-reported items over the past year associated with oral health, periodontal disease and prosthetic status. Individual questions were omitted in 21 questionnaires and 15 questionnaires were left unanswered leaving a total of 215 questionnaires, completed by 99 men and 116 women. The mean age and mean and median OHQoL-GE values are presented in Table 2. The data showed an unbalanced distribution and, subsequently, medians were used for the analysis and expressed with their IQRs. Men had a higher median OHQoL-GE score of 49 (IQR 21) compared with women, who had a score of 46 (IQR 24). However, the difference was not statistically significant. Mean OHQoL-GE scores are displayed for reference purposes only.

Patients' OHQoL was associated with some self-reported signs and symptoms over the past year (Table 3). The OHQoL-GE scores were statistically significantly lower for patients with self-reported 'tooth ache' ($P < 0.05$), 'swollen gums' ($P < 0.001$) and for patients who reported 'problems with the dental prosthesis' ($P < 0.05$) compared with those who did not report these items. There was no statistically significant association between OHQoL scores and self-reported 'bleeding gums' and 'dental treatment' over the past year.

Patients with RPDs had the lowest median score of 43 (IQR 23), patients with complete dentures had a median score of 44 (IQR 21), patients without a dental prosthesis had a median score of 46 (IQR 18) and patients with FDPs had the highest score of 54 (IQR 26). The differences were statistically

Table 2 Study group profile

	N	Mean OHQoL-GE (95% CI)	Median OHQoL-GE (IQR)	*P* value
Number of subjects	215	50.3 (48.4 to 52.3)	47.0 (23)	
Males	99	51.6 (49.1 to 54.2)	49.0 (21)	0.179*
Females	116	49.2 (46.4 to 52.1)	46.0 (24)	
Age mean (*SD*)	53.0 (12.3) (range 16 to 86)			

CI: Confidence interval; IQR: Interquartile range; OHQoL-GE: Oral health-related quality-of-life-German; *SD*: standard deviation; *Mann–Whitney test.

Table 3 Self-reported signs and symptoms over the past year associated with periodontal disease and quality-of-life: discriminative validity

	OHQoL-GE scores	
	Median (IQR)	*P* value*
Tooth ache		
Yes (N = 102)	44 (21)	0.003
No (N = 109)	50 (20)	
Bleeding gums		
Yes (N = 95)	45 (22)	0.102
No (N = 117)	45 (22)	
Swollen gums		
Yes (N = 90)	43 (17)	< 0.001
No (N = 119)	52 (21)	
Problems with dental prosthesis		
Yes (N = 63)	44 (20)	0.004
No (N = 78)	51.5 (21)	
Not applicable (N = 63)	46 (20)	
Dental treatment		
Yes (N = 117)	46 (22)	0.739
No (N = 94)	47.5 (23)	

IQR: Interquartile range; *Mann–Whitney test.

Table 4 OHQoL-GE scores in relation to prosthetic status

	OHQoL-GE scores	
	Median (IQR)	*P* value*
Prosthetic status		
No prosthesis (N = 116)	46 (18)	0.016
FDPs (N = 69)	54 (26)	0.019
RPDs (N = 23)	43 (23)	
Complete dentures (N = 7)	44 (21)	

IQR: Interquartile range; OHQoL-GE: Oral health-related quality-of-life-German; *Mann–Whitney test.

significant between patients without denture and patients with FDPs ($P < 0.05$) and between RPD wearers and patients with FDPs ($P < 0.05$) (Table 4).

The OHQoL-GE scores for patients who were missing anterior teeth are presented in Table 5. Patients were included in the category of 'missing anterior teeth' if they had one or more canine or incisor teeth missing. A majority of patients who had one or more anterior teeth missing had also one or more posterior teeth missing. The differences between patients with missing anterior teeth and those with no missing anterior teeth were not statistically significant, for all patients or for the various prosthetic groups.

Furthermore, correlation analysis revealed that OHQoL was moderately and significantly correlated with the mean BPE ($r_s = -0.295$, $P < 0.01$), the number of teeth present ($r_s = 0.190$, $P < 0.01$) and age ($r_s = 0.152$, $P < 0.05$). Patients with high BPE scores (worse periodontal condition) and patients with fewer remaining teeth tended to have lower OHQoL-GE scores. Of all patients, 73.7% had periodontal disease evidenced by increased periodontal probing

Table 5 OHQoL-GE scores in relation to missing anterior teeth		
	OHQoL-GE scores	
	Median (IQR)	*P* value*
Missing anterior teeth (N = 60)	44 (26)	0.160
No anterior teeth missing (N = 154)	48 (21)	
No prosthesis		
Missing anterior teeth (N = 10)	51 (25)	0.766
No anterior teeth missing (N = 106)	46 (18)	
FDPs		
Missing anterior teeth (N = 29)	46 (24)	0.173
No anterior teeth missing (N = 40)	61.5 (27)	
RPDs		
Missing anterior teeth (N = 14)	38 (20)	0.670
No anterior teeth missing (N = 9)	46 (21)	

FDP: Fixed dental prosthesis; Oral health-related quality-of-life-German; RPD: Removable dental prosthesis; *Mann–Whitney test.

depths (BPE scores of 3 and 4 in one or more sextants). The remaining 24.7% had no or minor forms of gingival inflammation (BPE scores of no more than 0, 1 or 2 in all sextants) (Table 6). The mean number of teeth present was 24.5 (*SD* = 5.3). OHQoL-GE scores tended to increase with age.

Table 6 Frequency of patients with periodontal disease		
BPE score	**Frequency**	**Per cent**
0, 1 and 2*	62	24.7
3, 4 and furcation**	185	73.7
Missing	4	1.6
Total	251	100

BPE: Basic periodontal examination.
*BPE scores of no more than 0, 1 or 2 and no furcation involvement in all sextants; **BPE scores of 3 or 4 or furcation involvement in one or more sextants.

DISCUSSION

There has been an increase in the use of patient-centred oral health status assessments, predominantly seeking to measure the impact of oral health on quality-of-life in recent years (Buck and Newton, 2001). From the patient's perspective, the consequences of oral ill health are an important outcome and various tools assessing the impact of oral health and dental treatment on quality-of-life have been used particularly in the fields of cariology, oral rehabilitation, to some extent, in oral surgery and oral medicine, and in periodontology (Low et al, 1999; Awad et al, 2000; Goodey et al, 2000; Allen et al, 2001; Fardal et al, 2002; Heydecke et al, 2003, 2004; Needleman et al, 2004; Akifusa et al, 2005; Veyrune et al, 2005; Wolfart et al, 2005; Åstrøm et al, 2006; Allen and McMillan, 2003; Allen et al, 2006; Ng and Leung, 2006; Scott et al, 2006; Åslund et al, 2008).

Using the German language version of the OHQoL-UK questionnaire, a significant impact of self-reported and clinical findings on quality-of-life in this patient group was identified. Variations in OHQoL in relation to self-reported dental-related items and clinically assessed periodontal and prosthetic status were apparent. This is in agreement with Needleman et al (2004) who reported the OHQoL-UK questionnaire to demonstrate the discriminative validity and sensitivity to periodontal disease (both self-reported and clinically observed).

The difference in OHQoL scores in relation to self-reported 'tooth ache', 'swollen gums' and 'problems with dental prosthesis' was huge. Patients who reported to have had these problems over the past year had median scores below the level of 48, indicating a negative impact of OHQoL. Patients who did not report to have had these problems had median scores above the level 48, indicating a positive impact. The finding that self-reported periodontal aspects are associated with QoL is in agreement with other studies (Needleman et al, 2004; Ng and Leung, 2006).

The impact of the type of dental prosthesis on OHQoL was considerable, too. Only the group of patients with FDPs showed a median score above

48, indicating a positive impact of OHQoL. Patients with no dentures or with RPDs (or complete partial dentures) had a significantly lower median score that was below 48, indicating a negative overall impact of oral health on quality-of-life. The finding that dental patients perceived their OHQoL similarly as negative as denture wearers is in contrast to findings by Allen and McMillan (2003) who applied a different evaluation system when compared with that of the present study. However, one possible explanation for this is the fact that patients presenting at the Department of Periodontology and Fixed Prosthodontics at the Dental School in Berne are often dissatisfied with their dental status and feel the need for dental care.

The finding that with decreasing number of teeth the perceived OHQoL tended to decrease has been observed in previous studies (Steele et al, 2004; Akifusa et al, 2005; Åstrøm et al, 2006). Unexpectedly, OHQoL tended to increase with age in the present study. This is in contrast to findings by McGrath and Bedi (2002) on a UK population. One might expect that with increasing age, the number of remaining teeth may decrease and result in a lower OHQoL. However, this inverse relationship between age and OHQoL was also observed by Steele et al (2004). This may indicate distinct differences in the way oral health is perceived upon quality-of-life at different ages or stages in life.

As most patients attending the clinic sought dental advice, the population in this study has to be considered as a highly selective one. This is likely to be the reason why patients without a dental prosthesis had rather low OHQoL-GE scores. Similarly, patients with RPDs who attend the department may represent a subset of patients who are particularly unhappy with their dental prosthesis and, hence, often requested a fixed prosthetic replacement. It also has to be considered that a majority (73.7%) of this patient group had periodontal disease evidenced by increased periodontal probing depths (BPE scores of 3 and 4). Therefore, the results of this study apply mainly to periodontal patients.

In conclusion, the issues are periodontal and prosthetic status, number of teeth present and age impact on the quality-of-life. The German language version of the OHQoL-UK 16-item questionnaire demonstrated discriminative validity in identifying those with self-reported symptoms associated with periodontal diseases and those with clinical evidence of periodontal disease. In addition, the instrument was sensitive to the prosthetic status. These findings have implications in understanding the consequences of dental health and in the use of patient-centred outcomes in dental research.

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REFERENCES

1. Akifusa S, Soh I, Ansai T, Hamasaki T, Takata Y, Yohida A et al. Relationship of number of remaining teeth to health-related quality of life in community-dwelling elderly. Gerodontology 2005;22:91–97.
2. Allen PF, McMillan AS, Walshaw D. A patient-based assessment of implant-stabilized and conventional complete dentures. J Prosthet Dent 2001;85:141–147.
3. Allen PF, McMillan AS. A longitudinal study of quality of life outcomes in older adults requesting implant prostheses and complete removable dentures. Clin Oral Implants Res 2003;14:173–179.
4. Allen PF, Thomason JM, Jepson NJA, Nohl F, Smith DG, Ellis J. A randomized controlled trial of implant-retained mandibular overdentures. J Dent Res 2006;85:547–551.
5. Åslund M, Suvan J, Moles DR, D'Aiuto F, Tonetti MS. Effects of two different methods of non-surgical periodontal therapy on patient perception of pain and quality of life: a randomized controlled clinical trial. J periodontol 2008; 79(6):1031–1040.
6. Åstrøm AN, Haugejorden O, Skaret E, Trovik TA, Klock KS. Oral impacts on daily performance in Norwegian adults: the influence of age, number of missing teeth, and socio-demographic factors. Eur J Oral Sci 2006; 114: 115–121.
7. Atchison KA, Dolan TA. Development of the geriatric oral health assessment index. J Dent Educ 1990;54:680–687.
8. Awad MA, Locker D, Korner-Bitensky N, Feine JS. Measuring the effect of intra-oral implant rehabilitation on health-related quality of life in a randomized controlled clinical trial. J Dent Res 2000;79:1659–1663.
9. Boerrigter EM, Geertman ME, Van Oort RP, Bouma J, Raghoebar GM, van Waas MA et al. Patient satisfaction with implant-retained mandibular overdentures. A comparison with new complete dentures not retained by implants – a multicentre randomized clinical trial. Br J Oral Maxillofac Surg 1995;33:282–288.
10. Buck D, Newton JT. Non-clinical outcome measures in dentistry: publishing trends 1988–1998. Community Dent Oral Epidemiol 2001;29:2–8.
11. Burns DR, Unger JW, Elswick RK Jr, Beck DA. Prospective clinical evaluation of mandibular implant overdentures: Part I – retention, stability, and tissue response. J Prosthet Dent 1995;73:354–363.
12. Clancy CM, Franks P. Utilization of specialty and primary care: the impact of HMO insurance and patient-related factors. J Fam Pract 1997;45:500–508.
13. Dini EL, McGrath C, Bedi R. An evaluation of the oral health quality of life (OHQoL) instrument in a Brazilian population. Community Dent Health 2003;20:40–44.
14. Fardal Ø, Johannessen AC, Linden GJ. Patient perceptions of periodontal therapy completed in a periodontal practice. J Periodontol 2002;73:1060–1066.
15. Goodey RD, Brickley MR, Armstrong RA, Shepherd JP. The minor oral surgery outcome scale: a multi-attribute patient-derived outcome measure. J Oral Maxillofac Surg 2000;58:1096–1101.

16. Hegarty AM, McGrath C, Hodgson TA, Porter SR. Patient-centred outcome measures in oral medicine: are they valid and reliable? Int J Oral Maxillofac Surg 2002;31: 670–674.
17. Heydecke G, Locker D, Awad MA, Lund JP, Feine JS. Oral and general health-related quality of life with conventional and implant dentures. Community Dent Oral Epidemiol 2003; 31:161–168.
18. Heydecke G, Tedesco LA, Kowalski C, Inglehart MR. Complete dentures and oral health-related quality of life – do coping styles matter? Community Dent Oral Epidemiol 2004; 32:297–306.
19. Kalkwarf KL, Kaldahl WB, Patil KD. Patient preference regarding 4 types of periodontal therapy following 3 years of maintenance follow-up. J Clin Periodontol 1992;19: 788–793.
20. Kressin N, Spiro A, Bossé R, Garcia P, Kazis L. Assessing oral health-related quality of life. Findings from a normative aging study. Med Care 1996;34:416–427.
21. Lee J-M, Song KB, Sohn HY, Jeong SH, Kwon HK. Comparison between patient expectation before and satisfaction after periodontal surgical treatment. J Periodontol 2002; 73:1037–1042.
22. 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.
23. Low W, Tan S, Shwartz S. The effect of severe caries on the quality of life in young children. Pediatr Dent 1999; 21:325–326.
24. Mathews DC, McCulloch CAG. Evaluating patient perceptions as short-term outcomes of periodontal treatment. A comparison of surgical and non-surgical therapy. J Periodontol 1993;64:990–997.
25. McGrath C, Bedi R. An evaluation of a new measure of oral health related quality of life OHQoL-UK(W). Community Dent Health 2001;18:138–143.
26. McGrath C, Bedi R. Population based norming of the UK oral health related quality of life measure (OHQoL-UK). Br Dent J 2002;193:521–524.
27. McGrath C, Bedi R. Measuring the impact of oral health on quality of life in Britain using OHQoL-UK(W). J Public Health Dent 2003;63:73–77.
28. McGrath C, Alkhalib MN, Al-Munif M, Bedi R, Zaki AS. Translation and validation of an Arabic version of the UK oral health related quality of life measure (OHQoL-UK©) in Syria, Egypt and Saudi Arabia. Community Dent Health 2003a;20:241–245.
29. McGrath C, Comfort MB, Lo EC, Luo Y. Can third molar surgery improve quality of life? A 6-month cohort study. Int J Oral Maxillofac Surg 2003b;61:759–763.
30. McGrath C, Comfort MB, Lo EC, Luo Y. Patient-centred outcome measures in oral surgery: validity and sensitivity. Int J Oral Maxillofac Surg 2003c;41:43–47.
31. McGrath C, Hegarty AM, Hodgson TA, Porter SR. Patient-centred outcome measures for oral mucosal disease are sensitive to treatment. Int J Oral Maxillofac Surg 2003d; 32:334–336.
32. Needleman I, McGrath C, Floyd P, Biddle A. Impact of oral health on the life quality of periodontal patients. J Clin Periodontol 2004;31:454–457.
33. Ng SKS, Leung WK. Oral health-related quality of life and periodontal status. Community Dent Oral Epidemiol 2006; 34:114–122.
34. Scott BJJ, Forgie AH, Davis DM. A study to compare the oral health impact profile and satisfaction before and after having replacement complete dentures constructed by either the copy or the conventional technique. Gerodontology 2006;23:79–86.
35. Slade GD (ed). Measuring Oral Health and Quality of Life. Chapel Hill: University of North Carolina, Dental Ecology, 1997.
36. Slade GD, Spencer AJ. Development and evaluation of the oral health impact profile. Community Dent Health 1994; 11:3–11.
37. Steele JG, Sanders AG, Slade GD, Allen PF, Lahti S, Nuttall N 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;32:104–114.
38. Veyrune JL, Tubert-Jeannin S, Dutheil C, Riordan PJ. Impact of new prostheses on the oral health related quality of life of edentulous patients. Gerodontology 2005;22:3–9.
39. Whitehead SP, Watts TL. Shortterm effect of Keyes' approach to periodontal therapy compared with modified Widman flap surgery. J Clin Periodontol 1987;14:599–604.
40. Wismeijer D, Vermeeren JI, van Waas MA. Patient satisfaction with overdentures supported by one-stage TPS implants. Int J Oral Maxillofac Implants 1992;7: 51–55.
41. Wolfart S, Heydecke G, Luthardt RG, Marré B, Freesmeyer WB, Stark H et al. Effects of prosthetic treatment for shortened dental arches on oral health-related quality of life, self-reports of pain and jaw disability: results from the pilot-phase of a randomized multicentre trial. J Oral Rehabil 2005;32:815–822.
42. World Health Organization. International Classification of Impairments, Disabilities and Handicaps: ICIDH-2. Geneva: WHO, 1998.