

Impact of prosthodontic status on oral wellbeing: a cross-sectional cohort study

J. MONTERO*, J. F. LÓPEZ*, M. P. GALINDO*, P. VICENTE* & M. BRAVO[†] *Faculty of Medicine, University of Salamanca, Salamanca and [†]Faculty of Odontology, University of Granada, Granada, Spain

SUMMARY To assess the impact of the prosthodontic status on oral health-related quality of life and satisfaction. We performed a cohort study at the University Clinic in Salamanca in which a group requesting prosthetic treatment (P0; $n = 31$) was compared with a group treated with conventional prostheses (P1; $n = 29$) and a control group (C; $n = 18$) not requesting or treated with prostheses. A clinical examination for the presence of caries, periodontal disease and edentulism was carried out. An assessment was made on the impact on the quality of life employing the oral impacts on daily performance-Spanish version and the oral health impact profile 14-Spanish version, and wellbeing was assessed by the self-rated satisfaction on a 0–10 scale. The P0 cohort was significantly less satisfied and suffered a greater level of impact as regard their

quality of life than the other cohorts. The main benefit of conventional prosthetic treatment was perceived by most of the treated patients (P1) in dimensions related to chewing, the aesthetic function and the assessment of the general state of the mouth. However, an unexpected proportion of patients underwent a worsening of their oral wellbeing after prosthetic treatment, mainly in the chewing ability (23%) and pain discomfort (19%) dimensions. Satisfaction and quality of life were higher in the treated group (P1) and controls (C) than in those requesting prosthetic treatment (P0). **KEYWORDS:** patient satisfaction, oral health-related quality of life, treatment outcomes, sociodental indicators, cohort study

Accepted for publication 17 May 2009

Introduction

Most oral pathology is not lethal, although it is usually accompanied by certain morbidity, with physical, psychological and social consequences that must be evaluated to estimate the impact on patients' quality of life. Physical pain discomfort, functional limitations, aesthetic dissatisfaction and psychosocial impact are the main factors affecting the oral health-related quality of life (OHQoL).

Prosthodontics is one of the odontological specialities in which such impacts on oral wellbeing are most frequently found. The impact generated by the loss of teeth has been addressed by several authors (1–4). Studies aimed at assessing the therapeutic effect of the replacement of lost teeth are scarce, even though tooth loss is the ultimate consequence of the most prevalent

oral pathologies (caries and periodontal disease); being a very common situation in adults, most especially in the elderly. To isolate the therapeutic effect of the various prosthodontic alternatives in terms of wellbeing, most studies have addressed the population with no teeth at all (5–9). The test treatment is usually implant overdenture, while the control is the traditional complete denture. However, as the majority of the population is not edentate and because not all people are candidates for treatment with implants, it is necessary to evaluate partially dentate patients who have been treated with conventional therapeutic modes (removable dentures and tooth-supported fixed prostheses) in terms of wellbeing (10).

The interest in this issue can also be justified if the aim is to perfect our knowledge in decision making in prosthodontics; despite the decrease in edentate

subjects in targeted age groups (35–44 and 65–74 years), as inferred from the findings of the last Spanish oral-health survey (11), it is to be expected that owing to the rapid increase in life expectancy, the demand for prosthetic treatment will rise in industrialized countries in the forthcoming years (12).

The two most popular OHQoL indicators are the oral health impact profile-14 (OHIP-14) and the oral impacts on daily performance (OIDP) because of the sound theoretical foundation, the ease of use and their confirmed psychometric capacity (13). Both indicators have recently been validated in the Spanish adult population (14, 15).

Aim

To compare the impact on OHQoL and oral satisfaction among three prosthodontics cohorts: a pre-treatment group, a post-treatment group and a control group.

Methods

Design

We designed an observational cohort study aimed at analysing the degree of satisfaction and the OHQoL of patients who were going to receive and who had received prosthetic treatment, comparing them with a similar group from the sociodemographical point of view. All treatments received by the treated patients were carried out by dental students under the supervision of professors from the School of Odontology of the University of Salamanca. The study was approved by the Bioethics Committee of the same University and all participants gave specific (written) informed consent.

Sample

The three prosthodontic cohorts were as follows: pre-prosthesis cohort (P0): formed by individuals who attended the University Clinic requesting prosthodontic treatment; post-prosthesis Cohort (P1): subjects treated with conventional prostheses (removable or tooth-supported fixed prostheses) at the University Clinic through the academic year 06–07 and the Control Cohort, including subjects who attended the University Clinic as companions or as patients but who had not requested or had received prosthetic treatment at the

University Clinic. P1 and P0 were recruited using a pseudo-probabilistic consecutive sampling from the database available to the Patient Admission Service, and controls were sampled from among age-matched companions of patients of P0 or P1 who had not requested or had received prosthetic treatment at the University Clinic.

The sample size was estimated to detect a large standardized difference of 0.8 (16): by considering a power of 70% and an alpha significance level = 0.05, we obtained a size per group of 20 individuals ($20 \times 3 = 60$). The aim of the oversampling was to obtain a larger effective sample size. In fact, 94 people were asked to participate, and an effective size of 78 was obtained (31 in P0, 29 in P1 and 18 in Controls).

Acquisition of clinical data

For all individuals, data were collected on sociodemographical (age, gender, socio-occupational class and residence), behavioural (tooth-brushing habits, pattern of visits to dentist), clinical (caries, periodontal disease and edentulism) and well being (satisfaction and OHQoL) variables.

The clinical exploration was carried out by a single examiner calibrated with the methodology of the World Health Organization (17) in the examination of caries and periodontal disease. As factors potentially related to prosthetic wellbeing, we assessed the degree of edentulism, examining – by inspection – the number of occlusal units and the number of aesthetic units, and recording the Eichner Index (18).

The Eichner Index classifies the arches as a function of the number of occlusal contacts present in the four areas of chewing (left and right molar zones and left and right bicuspid zones) upon leading the jaw to the maximal intercuspal position. In patients bearing removable dentures, this index was calculated after removal of the dentures to evaluate the type of occlusion that the patients had with the fixed units (both natural and prosthetic). The coding of this index uses three letters (A, B and C). Arches classified as A showed occlusal contact in all four chewing areas; those classified as B showed occlusal contact but not in all the chewing areas and those in class C did not show any occlusal contact, despite the persistence of some teeth.

This index was complemented with the recording of the number of occlusal and aesthetic units. In patients bearing removable dentures, we counted the natural or

fixed-prosthesis-replaced occlusal pairs in the premolar and molar areas while the subjects maintained the maximum intercuspal position of the jaw stable. The count of aesthetic units only accepts values between zero and six by recording the natural or fixed-prosthesis-replaced aesthetic pairs of teeth (between canines).

Collection of subjective data

Oral health-related quality of life was evaluated by means of the OIDP-sp (Spanish version) (14) and the OHIP-14sp (Spanish version) (15). The OIDP-sp comprised eight dimensions (eating, speaking, hygiene, occupation, sleeping/relaxing, smiling, social and emotional) in which the subject assessed the presence of impacts (problems or difficulties attributable to the mouth, teeth or dentures in each dimension). Each impact was evaluated by the subject in terms of both the frequency of appearance and the frequency in perceived severity, using a Likert Scale from 0 to 5. Each dimension had an impact score proportional to the frequency and severity of the impact. The global computational system of the impact on OHQoL is a percent estimation (0–100) that is proportional to the number of dimensions affected, and the frequency and severity of the dimensional impacts with which they were recorded, because the total score is the result of multiplying the frequency and severity scores of all dimensions and dividing it by 200, which is the maximum possible score ($5 \times 5 \times 8$ dimensions).

The OHIP-14 sp is a questionnaire that evaluates the frequency of the appearance of impacts in seven dimensions (pain, functional limitation, psychological discomfort, physical, psychological, and social incapacity and disability) using a Likert Scale from 0 to 4 (0 = never; 1 = rarely; 2 = occasionally; 3 = fairly often and 4 = very frequently).

The total scores of both indicators were estimated in two ways: the simple count (SC) method in which the items valued with scores ≥ 2 (occasionally or more frequently) were counted for the OHIP and ≥ 3 for severity for the OIDP (moderate or more severe effect). In the additive (AD) method, the scores obtained on each item were added up for the OHIP, and for the OIDP the global percent estimation score was used. Logically, the OHIP-SC varied in the 0–4 range and the OIDP-SC in the 0–8 range, while the OHIP-AD varied from 0 to 48 and the OIDP-AD varied from 0 to 100.

The P1 group was also questioned with a retrospective design OHIP (OHIP-post) in which the subjects answered whether the prosthetic treatment received had generated a poorer, equal or better effect on the 14 items of the OHIP-Post (See Annexes). This allowed a glimpse of which dimensions worsened, remained the same or improved after prosthetic treatment.

As oral satisfaction is also a perception that can be assumed to vary in a continuous range from negative to positive zones, this was evaluated by means of an analogical scale from 0 to 10 in which the subjects could declare themselves to be dissatisfied, neutral or satisfied, offering values lower, equal to or higher than 5, respectively. Oral satisfaction was considered to be a subjective entity formed by three independent dimensions that were evaluated using the same range from 0 to 10: satisfaction with oral status and satisfaction with aesthetics and satisfaction with the chewing function. Additionally, the subjects had to offer an overall value of their satisfaction with their mouths.

We also recorded whether the most valued aspect of the mouth was chewing or aesthetics. Information was also recorded about the complaints with the mouth and which primordial impact factors (pain, functional limitation or aesthetic dissatisfaction) were responsible for the deterioration of wellbeing. Another perception explored by a dichotomic variable was the perceived need for dental treatment.

The comparison between cohorts regarding the clinical variables, age, oral satisfaction and the OHQoL total scores (SC) was accomplished using a ANOVA or chi-squared tests. The Kruskal–Wallis test (H) was used to compare social class and the AD scores of the OHQoL impacts (AD). The effect of each variable on the subjective variables was estimated using Pearson correlation coefficients. All these analyses were performed with the Statistical Package for the Social Sciences v. 15.* The average numbers of the different variables were expressed as mean values \pm s.d. or as a 95% confidence interval.

Results

Sociodemographical and behavioural description

A total of 94 subjects were invited to participate in the study, of which only 78 (83%) consented, these being

*SPSS Inc., Chicago, IL, USA.

clinically and sociodemographically similar to those who did not join the study. The mean age of the participants was 64.7 ± 10.7 years, 55% being men; mostly of middle class extraction, and all residing in the city of Salamanca or its metropolitan area. Sixty three per cent of subjects brushed their teeth two to three times a day and 81% went to their dentist for some kind of problem.

Within the participants, 40% belonged to the pre-prosthesis cohort (P0); 37% to the post-prosthesis cohort (P1) and 23% to the Control cohort (C). Table 1 shows the sociodemographical and behavioural descriptions within groups. No significant difference was found between groups in these variables, although there were a higher proportion of females in the control group.

Clinical description

Table 1 also shows the clinical description of these cohorts. From the prosthodontic point of view, the majority of participants belonged to the Eichner class B. The distribution of Eichner categories was statistically discrepant among groups, the Eichner type A group was significantly more prevalent in the P1 and C groups. Moreover, on average the control group had significantly fewer missing and replaced teeth, and more aesthetic and functional units in comparison with that of the P0 and P1 groups.

Regarding caries, the participants in the control group showed a better dental status, with a mean DMFT Index (sum of decayed, missed and filled teeth) lower than that in the P0 and P1 cohorts. In periodontal terms, using the Community Periodontal Index all participants were comparable.

Description of perceived wellbeing

Table 2 shows the descriptions of wellbeing among cohorts. In the whole sample, 82% of the subjects considered chewing as the most important aspect of their mouth as compared with aesthetics; 63% of subjects referred to some complaint about the mouth and 69% perceived some requirement for dental treatment. In the P0 group, the primordial impact factors and the perceived need for dental treatment were statistically more prevalent than that in P1 or C group.

Mean overall satisfaction was 5.1 ± 2.1 ; in aesthetics, 5.6 ± 2.6 ; in chewing, 5.5 ± 2.5 and in oral health

status, 5.4 ± 2.4 . Table 2 shows that the subjects from the P0 cohort were less satisfied overall with their mouth, and they self-rated their oral health, together with their dental aesthetics and chewing, more negatively than the other cohorts studied, between which no significant difference was observed.

The total scores of the OIDP-sp and OHIP-sp obtained with both the AD and the SC methods were significantly higher in P0 than in P1 or C, which meant that the subjects from the P0 cohort suffered a significantly greater impact on their OHQoL than those of the P1 cohort and the controls.

Modulating factors

Likewise, after the observation that the cohorts did not differ as regard age, gender or social class, which could have acted as factors affecting oral wellbeing, Pearson coefficients were used to evaluate the correlation with clinical factors, aggregating the whole sample in a single group (Table 3).

Self-assessment of the prosthetic effect

Regarding the prosthetic effect, Table 4 shows the distribution of the 'better', 'same' and 'worse' replies within the 14 items of the OHIP-post. The prosthetic treatment managed to improve or maintain equal the 14 items of the OHIP-post. The prosthetic effect had mainly a positive effect in items 5, 7 and 11, corresponding to the dimensions of chewing capacity, aesthetics upon smiling and satisfaction with the general state of the mouth. However, in item 3 (pain discomfort), a higher proportion of negative effect (19%) than positive effect (10%) was found after prosthetic treatment. In general, 76% of the P1 improved, 18% worsened and 6% remained the same after prosthetic treatment.

Discussion

This study could be considered an exploratory approach to assess the presumable effect of the prosthodontic status in terms of wellbeing using indicators of satisfaction and impact on the OHQoL, previously validated in the Spanish population. In view of the type of pseudo-probabilistic sampling and the high acceptance values obtained, the subjects participating in the study can be considered representative of patients requesting

Table 1. Sociodemographical, behavioural and clinical description of cohorts

	Pre-prosthesis (<i>n</i> = 31) <i>n</i> (%)	Post-prosthesis (<i>n</i> = 29) <i>n</i> (%)	Control (<i>n</i> = 18) <i>n</i> (%)
Sociodemographical variables			
Gender			
Male	18 (58)	18 (62)	7 (39)
Female	13 (42)	11 (38)	11 (61)
Social class [†]			
High	7 (23)	1 (3)	6 (33)
Medium	14 (45)	20 (69)	7 (39)
Low	10 (32)	8 (28)	5 (28)
Residence			
Urban	27 (87)	27 (93)	16 (89)
Rural	4 (13)	2 (7)	2 (11)
Age (95% CI)	59·1–68·3	60·7–68·8	62·6–68·6
Behavioural variables			
Brushing habits			
2–3 times per day	16 (52)	21 (73)	12 (67)
Once per day	12 (40)	7 (24)	5 (28)
Less than once per day	3 (10)	1 (3)	1 (5)
Dental visits pattern			
Check-up visits	4 (14·8)	5 (18)	0 (0)
Problem-based visits	23 (85·2)	22 (82)	17 (100)
Clinical description			
Eichner classification*			
A	1 (3)	9 (31)	7 (39)
B	23 (74)	14 (48)	11 (61)
C	7 (23)	6 (21)	0 (0)
Total	31 (100)	29 (100)	18 (100)
Prosthetic variables (95% CI)			
Missing teeth*	13·3–18·6	12·8–19·7	7·7–12·9
Replaced teeth*	2·6–8·6	7·3–15·3	0·7–5·9
Occlusal units	1·4–2·9	1·8–4·2	2·7–5·3
Aesthetic Units*	2·3–4·1	2·7–4·7	5·3–5·9
Standing teeth	9·4–13·5	7·9–13·7	10·7–15·8
Functional teeth [‡] *	12·0–17·0	11·5–18·5	18·2–23·4
Number of replaceable teeth*	3·9–7·9	0·4–3·4	1·9–4·7
Caries variables (95% CI)			
Decayed teeth	0·9–2·6	1·1–2·7	0·5–2·0
Healthy restored teeth	1·7–4·2	2·8–5·9	3·7–7·1
DMFT*	18·2–23·1	20·0–24·9	13·8–20
Healthy non-restored teeth*	8·9–13·8	7·1–12·0	12·0–18·2
Teeth with deep caries*	0·7–2·5	0·0–1·2	0·0–0·6
Periodontal variables [§] (95% CI)			
Sextants with PI = 0	1·5–3·0	1·4–3·0	0·9–2·5
Sextants with PI = 1	1·5–2·8	1·2–2·4	1·9–3·4
Sextants with PI = 2	0·9–1·8	0·6–1·4	0·8–1·8
Sextants with PI = 3	0·0–0·3	0·3–0·9	–0·1–0·4
Sextants with PI = 4	0·0–0·3	0·1–0·8	–0·1–0·6

DMFT, decayed, missed and filled teeth.

[†]Based on the referred last occupation: High, skilled non-manual workers; Medium, qualified manual worker; Low, non-qualified manual workers.

[‡]Healthy fixed teeth, natural or artificial.

[§]PI: Community Periodontal Index (See reference no. [16]).

*Differences within groups are statistically significant at $P < 0·05$ using ANOVA or chi-squared tests.

Table 2. Well-being description of cohorts

	Pre-prothesis (<i>n</i> = 31)	Post-prothesis (<i>n</i> = 29)	Control (<i>n</i> = 18)			
Perceived health variables <i>n</i> (%)						
Most valued aspects of mouth						
Chewing	24 (77)	24 (83)	16 (89)			
Aesthetics	7 (23)	5 (17)	2 (11)			
Complaints about the mouth						
No	9 (29)	12 (41)	8 (44)			
Yes	22 (71)	17 (59)	10 (56)			
Primordial factors of impacts*						
None	8 (26)	14 (49)	9 (50)			
Aesthetics	8 (26)	1 (3)	3 (18)			
Functional limitation	12 (38)	9 (31)	1 (6)			
Pain discomfort	3 (10)	5 (17)	1 (6)			
Perceived treatment need*						
No	4 (13)	12 (41)	8 (44)			
Yes	27 (87)	17 (59)	10 (56)			
Total	31 (100)	29 (100)	18 (100)			
Oral satisfaction, Mean (s.d.)						
Overall satisfaction*	5.0 (2.2)	6.3 (2.0)	6.4 (1.7)			
Satisfaction with oral status*	4.7 (2.6)	5.5 (2.4)	6.4 (1.3)			
Satisfaction with chewing**	4.4 (2.4)	6.1 (2.5)	6.4 (2.1)			
Satisfactions with aesthetics**	4.4 (2.8)	6.6 (2.2)	6.2 (1.7)			
Impact on quality of life, Median and 95% CI						
OIDP-ADD**	11.1	10.6–21.5	1.8	2.5–11.0	2.0	1.7–8.7
OIDP-SC***	1.0	1.3–2.5	0.0	0.1–1.0	0.0	0.1–0.9
OHIP-ADD*	9.0	9.0–17.0	4.0	4.5–11.6	4.0	2.8–8.7
OHIP-SC*	3.0	2.8–5.0	1.0	1.4–3.5	1.0	0.9–2.6

OIDP, oral impacts on daily performance; OHIP, oral health impact profile; SC, simple count; ADD, additive scoring method.

*Differences within groups are statistically significant at *P* < 0.05.

**Differences within groups are statistically significant at *P* < 0.01.

***Differences within groups are statistically significant at *P* < 0.001.

treatment at the Odontology Clinic of the University of Salamanca in both sociodemographical and clinical terms. The sample size (*n* = 78) was small but similar to that of other studies, with the same aims and methods (19).

Mean overall satisfaction and the average impact, as measured with the OIDP-sp and OHIP-sp, were significantly worse than the values published for the general population (20) and the prosthesis-fitted population not requesting treatment (21).

The results of this study showed that both the OIDP-sp and the OHIP-sp served to discriminate between prosthodontic groups (P0 and P1), even though they were not specific indicators of prosthetic wellbeing. Nevertheless, other authors have proposed a specific modification of the OHIP (OHIP-EDEN; edentulous) to improve its usefulness (psychometric capacity) in

edentate adults (22). Others have proposed specific indicators for individuals bearing removable dentures (23, 24). However, we consider that a generic indicator of the OHQoL is an ideal tool for comparing wellbeing with the control cohort (some of them with no type of prosthesis), with the general population and with other patient populations.

Self-assessments of satisfaction and oral function are variables of great relevance in population studies and are relatively simple to obtain (25). We consider that simple estimation of overall satisfaction is a very valuable indicator that responds to the main issue of the wellbeing perceived by individuals.

As reported by some authors, in this study we observed that conventional prosthetic treatment seems to be able to improve the quality of life (26, 27), as oral wellbeing was significantly worse in the subjects who were going to

Table 3. Pearson correlations of well-being indicators with clinical variables in the whole sample ($n = 78$)

	Satisfaction	Oral status	Aesthetics	Chewing	OIDP	OHIP
Missing teeth	-0.22	-0.20	0.00	-0.40**	0.23*	0.32**
Replaced teeth	-0.04	0.01	0.25*	-0.19	0.07	0.20
DMFT Index	-0.24*	-0.20	0.00	-0.37**	0.26*	0.35**
Non-restored healthy teeth	0.24*	0.20	0.00	0.37**	-0.26*	-0.35**
Functional teeth [†]	0.25*	0.21	0.05	0.40**	-0.24*	-0.32**
Teeth for extraction or endodontic treatment	-0.17	-0.04	-0.38**	-0.15	0.14	0.10
Teeth to be replaced	-0.20	-0.32**	-0.33**	-0.25*	0.15	0.07
Teeth with PI = 0	-0.03	0.06	0.24*	-0.17	0.20	0.29**
Teeth with PI = 1	0.15	0.08	-0.03	0.33**	-0.20	-0.27*
Teeth with PI = 2	0.02	-0.11	-0.16	-0.02	-0.17	-0.23*
Teeth with PI = 3	-0.23*	-0.15	-0.33**	-0.02	0.00	0.02
Eichner types	-0.24*	-0.17	0.05	-0.42**	0.24*	0.24*
Occlusal units	0.23*	0.15	0.00	0.39**	-0.17	-0.18
Aesthetic units	0.20	0.30**	0.18	0.36**	-0.20	-0.29**

OIDP, oral impacts on daily performance; OHIP, oral health impact profile; DMFT, decayed, missed and filled teeth; PI, Periodontal Index.

[†]Healthy fixed teeth, natural or artificial.

** $P < 0.01$; * $P < 0.05$.

Table 4. Percentage distribution of subjects in P1 ($n = 29$) using the OHIP-post*

	Better	Same	Worse
OHIP-1 Speak clearly	34	52	14
OHIP-2 Taste and odour of mouth	19	71	10
OHIP-3 Pain or discomfort	10	71	19
OHIP-4 Ease of oral hygiene	29	57	14
OHIP-5 Chewing ability	52	24	24
OHIP-6 Satisfactory eating	43	48	9
OHIP-7 Aesthetics on smiling	50	45	5
OHIP-8 Social relations	24	71	5
OHIP-9 Partner relations	19	76	5
OHIP-10 Worry about your mouth	21	63	16
OHIP-11 Satisfaction with the state of your mouth	60	25	15
OHIP-12 Performing daily tasks or roles	5	90	5
OHIP-13 Life satisfaction	10	85	5
OHIP-14 Use of drugs to alleviate oral health problems	0	100	0

OHIP, oral health impact profile.

*Subjects were asked to answer with a cross which of the items in the left column have improved, worsened or remained the same after the prosthetic treatment.

receive a prosthesis (P0) than in the those who had received one (P1) or did not require one (Control), as seen in Table 2. In our study, we observed considerable impact on the population requesting prosthetic treatment (P0) and certain wellbeing in the P1 and control individuals. In fact, most bearers of removable dentures

were satisfied with their mouth (21, 28, 29). The main dimensions benefiting from prosthetic treatment (Table 4) are chewing, the aesthetic function and the assessment of the overall state of the mouth. Accordingly, we believe that conventional prosthetic treatment is able to restore oral functions satisfactorily, even when it is performed by dental students, as has been reported by other authors (30–32). However, it should also be noted that a worrying proportion of patients underwent a worsening after prosthetic treatment, mainly in the chewing (24%) and pain-discomfort (19%) dimensions. The majority of these patients were new removable denture wearers who had not become familiar with their technically well made prosthesis after a year of use. These patients should have been treated with fixed tooth- or implant-supported prostheses, although the predictable factors of prosthetic acceptance are unknown (33). Some authors have reported similar results in denture wearers (19, 34).

Within the analysis of the modulating factors of oral wellbeing (Table 3), it should be noted that the prosthodontic factors (number of functional, missing aesthetic and occlusal teeth) are significantly correlated with wellbeing. The Eichner Index was observed to be the most powerful modulating factor in wellbeing; therefore, it should be used in studies aiming at assessing wellbeing with respect to occlusal closure, because this latter must be a key factor in wellbeing. Because it is an indicator of the history of caries, the

DMFT Index has also been strongly linked to indicators of the impact on the OHQoL as in the population studied this index was mainly based on the number of missing teeth, which in this study proved in itself to be a relevant factor in wellbeing.

The cross-sectional design of this study limits the evidence level of the findings reported by this study, but is at least an initial approach. Longitudinal design permits the determination of the satisfaction and wellbeing curves obtained during the rehabilitation treatment. Thus, the results reported in this study will be reassessed after the follow-up of the patients who are to receive treatment during the current academic year.

Conclusions

Subjects requesting prosthetic treatment are less satisfied and suffer a greater level of impact on the quality of life than patients treated with conventional prostheses and controls. The main benefit of conventional prosthetic treatment is seen in dimensions related to chewing, the aesthetic function and self-assessed oral status. Oral wellbeing is moderately correlated with prosthodontic factors, the Eichner Index being the most powerful modulating factor.

Acknowledgment

This study was funded by a research project (Expte: SAN/196/2007) supervised by the corresponding author from the Health Regional Ministry of Castilla y León, Spain.

References

- Locker D, Slade GD. Association between clinical and subjective indicators of oral health status in an older adult population. *Gerodontology*. 1994;11:108–114.
- John MT, Koepsell TD, Hujoel P, Miglioretti DL, LeResche L, Micheelis W. Demographic factors, denture status and oral health-related quality of life. *Community Dent Oral Epidemiol*. 2004;32:125–132.
- Steele JG, Sanders AE, 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;32:107–114.
- Åstrom AN, Haugejorden O, Skaret E, Trovic TA, Klock KS. Oral impacts on daily performance in Norwegian adults: the influence of age, number of missing teeth, and sociodemographic factors. *Eur J Oral Sci*. 2006;114:115–121.
- Bouma J, Boerrigter LM, Van Oort RP, van Sonderen E, Boering G. Psychosocial effects of implant-retained overdentures. *Int J Oral Maxillofac Implants*. 1997;12:515–522.
- Melas F, Marcenes W, Wright PS. Oral health impact on daily performance in patients with implant-stabilized overdentures and patients with conventional complete dentures. *Int J Oral Maxillofac Implants*. 2001;16:700–712.
- 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.
- Awad MA, Lund JP, Dufresne E, Feine JS. Comparing the efficacy of mandibular implant-retained overdentures and conventional dentures among middle-aged edentulous patients: satisfaction and functional assessment. *Int J Prosthodont*. 2003;16:117–122.
- Heydecke G, Klemetti E, Awad MA, Lund JP, Feine JS. Relationship between prosthodontic evaluation and patient ratings of mandibular implant overdentures and conventional dentures. *Int J Prosthodont*. 2003;16:307–312.
- Thomason JM, Heydecke G, Feine JS, Ellis JS. How do patients perceive the benefit of reconstructive dentistry with regard to oral health-related quality of life and patient satisfaction? A systematic review *Clin Oral Impl Res*. 2007;18(Suppl. 3):168–188.
- Bravo M, Casals E, Cortés FJ, Llodra JC. Encuesta de salud oral en España 2005. *RCOE*. 2006;11:409–456.
- Douglass CW, Watson AJ. Future needs for fixed and removable partial dentures in the United States. *J Prosthet Dent*. 2003;87:9–14.
- Skaret E, Åstrom AN, Haugejorden O. Oral health-related quality of life (OHRQoL). Review of existing instruments and suggestions for use in oral health outcome research in Europe. In: Bourgeois DM, Llodra JC, eds. *European global oral health indicators development project 2003 report proceedings*. Paris: Quintessence International; 2004: 99–110.
- Montero J, Bravo M, Albaladejo A. Validation of two complementary oral-health related quality of life indicators (OIDP and OSS 0-10) in two qualitatively distinct samples of the Spanish population. *Health Qual Life Outcomes*. 2008;18:6.
- Montero J, Bravo M, Albaladejo A, Hernández LA, Rosel E. Validation the oral health impact profile (OHIP-14sp) for adults in Spain. *Med Oral Patol Oral Cir Oral*. 2009;14:E44–E50.
- Cohen J. *Statistical power analysis for the behavioural sciences*. Hillside, NJ: Lawrence Erlbaum Associates; 1988.
- World Health Organization. *Oral health surveys: basic methods*. 4th ed. Geneva: WHO; 1997.
- Eichner K. Renewed examination of the group classification of partially edentulous arches by Eichner and application advices on morbidity statistics. *Stomatol DDR*. 1990;40:321–325.
- John MT, Slade GD, Szentpétery A, Setz JM. Oral health-related quality of life in patients treated with fixed, removable, and complete dentures 1 month and 6 to 12 months after treatment. *Int J Prosthodont*. 2004;17:503–511.

20. Montero J. Calidad de vida oral en población general. Doctoral Thesis, University of Granada; 2006. Available from: <http://hera.ugr.es/tesisugr/16093823.pdf>
21. Montero J, Albaladejo A, Hernández LA, Clemot Y, Montero M. Son satisfactorias las prótesis removibles en la población granadina? *Rev Odontol Granadina*. 2009;10:15–22.
22. Allen PF, 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;15:446–450.
23. Montero J, Bravo M, Hernández LA, Albaladejo A. Creación de un indicador específico del bienestar con prótesis removibles. *Rev Int Prót Estomatol*. 2009;22:35–42.
24. Pace-Balzan A, Butterworth CJ, Dawson LJ, Lowe D, Rogers SN. The further development and validation of the Liverpool Oral Rehabilitation Questionnaire (LORQ) version 3: a cross-sectional survey of patients referred to a dental hospital for removable prostheses replacement. *J Prosthet Dent*. 2008;99:233–242.
25. Locker D, Mscn EW, Jokovic A. What do older adults' global self-ratings of oral health measure? *J Public Health Dent*. 2005;65:146–152.
26. Inukai M, Baba K, John MT, Igarashi Y. Does removable partial denture quality affect individuals' oral health? *J Dent Res*. 2008;87:736–739.
27. Hassel AJ, Rolko C, Grossmann AC, Ohlmann B, Rammelsberg P. Correlations between self-ratings of denture function and oral health-related quality of life in different age groups. *Int J Prosthodont*. 2007;20:242–244.
28. Celebic A, Knezovic-Zlataric D. A comparison of patient's satisfaction between complete and partial removable denture wearers. *J Dent*. 2003;31:445–451.
29. Bae KH, Kim C, Paik DI, Kim JB. A comparison of oral health related quality of life between complete and partial removable denture-wearing older adults in Korea. *J Oral Rehabil*. 2006;33:317–322.
30. Peltola MK, Raustia AM, Salonen MAM. Effect of complete denture renewal on oral health survey of 42 patients. *J Oral Rehabil*. 1997;24:419–425.
31. Davis EL, Albino JE, Tedesco LA, Portenoy BS, Ortman LF. Expectations and satisfaction of denture patients in a university clinic. *J Prosthet Dent*. 1986;55:59–63.
32. 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.
33. Berg E. Acceptance of full dentures. *Int Dent J* 1993; 43(3 Supp. 1): 299–306.
34. Ellis JS, Pelekis ND, Thomason JM. Conventional rehabilitation of edentulous patients: the impact on oral health-related quality of life and patient satisfaction. *J Prosthodont*. 2007;16:37–42.

Correspondence: Dr Javier Montero, Clínica Odontológica de la Facultad de Medicina de la Universidad de Salamanca, C/ Alfonso X, el sabio S/N, Campus de Unamuno, Salamanca 37007, Spain.
E-mail: javimont@usal.es