ORAL HEALTH-RELATED QUALITY OF LIFE IN PARTIALLY EDENTULOUS PATIENTS BEFORE AND AFTER IMPLANT THERAPY: A 2-YEAR LONGITUDINAL STUDY

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SUMMARY

Objectives. **The aim of this study was to measure the Oral Health-Related Quality of Life (OHRQoL) before and after a prosthodontic implant therapy so to determine the physical and psychological impact of implant-supported fixed partial dentures (IFPD) rehabilitation among edentulous patients.**

Methods. 50 partially edentulous patients aged 40-70 years, treated with IFPD, completed the OHRQoL questionnaire before the implant surgery (Time 0) and 2 years after their whole implant-prosthetic rehabilitation (Time 1). The questionnaire was proposed in a short version of Oral Health Impact Profile (OHIP-14, range 0-56) and analyzed through the 'additive method'. We evaluated statistical mean, standard deviation, median, variance and mode of all OHIP-14 domains and the statistical significance about oral changes at Time 0 and Time 1 using the Chi-square test (p-values < 0.05).

Results. Patients reported significant changes in mean OHIP scores (Time 0: 2.15; Time 1: 0.65; $p < 0.01$). The most prevalently affected domain was "functional limitation", followed by "psychological discomfort" and "physical pain". There were no significant differences dependent on age, gender and antagonistic teeth ($p > 0.05$). Patients with I and IV Kennedy's class edentulism showed better improvement ($p < 0.05$).

Conclusions. Preoperative and post-treatment assessments of OHRQoL exhibited significant differences. The IFPD treatment had a positive effect on the OHRQoL, which improved better in patients with I and IV Kennedy's edentulous class.

Key words: oral health-related quality-of-life, OHIP-14, dental implants, prosthodonti, missing teeth.

Introduction

The assessment of the outcome of a dental therapy is based on four parameters: biologic and physiologic features (health of oral structures, nutrition, chewing, aesthetics), longevity and survival time (of natural teeth, restorations, implants), psychological and social parameters (personal satisfaction from dental treatment, self-confidence, quality of life, perception of body image), financial and economic factors (direct and indirect cost) (1, 2).
The first two categories have been widely investigated by clinicians, but the psychosocial parameters have obtained lots of interest only in the last decades (3).
Oral health-related quality of life (OHRQoL) is a complex patient-centred concept that focuses on the impact of oral problems and diseases to the well-being of individuals and society and evaluating the effects of professional dental interventions (4).
The OHRQoL is influenced by many variables: patients' age, existing pathologies, alcohol or tobacco habits, dental diseases, tooth loss (5), prosthesis wear (6) and also sociodemographic, financial (7), cultural, educational, psychological and dietary factors.

So there is a close relationship between the number of natural teeth and OHRQoL (8). It has been demonstrated that tooth loss and increasing age have negative effects on OHRQoL (9), while increasing age alone is associated with fewer negative effects on OHRQoL (10).
Moreover totally edentulous patients reported a worse quality of life (11, 12), because their condition is related to the inability to chew, poor speech, physical pain and aesthetic dissatisfaction. Population-based oral health studies have often defined satisfactory oral health as the presence of a minimum of 20 natural teeth or a wide number of contacting posterior teeth pairs (5, 13).
Different treatment possibilities have been proposed in order to replace the missing tooth and restore function and aesthetics in partially edentulous patients. For the latter class of patients, the two main options were removable or fixed partial dentures.
In recent years, implant therapy has achieved more importance and significance thanks to a higher successful rate, new biocompatible and bone-stimulating materials, advanced technologies and the optimal effects on OHRQoL reported by patients themselves (14).
This was been clearly underlined by the fact that patients who received conventional removable dentures reported little satisfaction and only modest improvements in the quality of life in comparison with patients rehabilitated with implant-supported partial dentures (15, 16).
Strassburger et al. (17) reviewed the impact of implant and prosthodontic treatments on OHRQoL and patient satisfaction, concluding that research in the field of patient-based outcomes has concentrated on dental implant treatment for edentulous patient, but other guiding indications for implant therapy are not well listed.
With respect to chewing, bite force, function, aesthetic, dental health and self-image, implant-supported removable dentures have provided greater improvement of oral health (14-16).
Selection of the specific psychometric instrument allows to assess OHRQoL and to evaluate whether implant-supported partial dentures restore the oral function and, at the same time, make patients satisfied.

During the last three decades, various questionnaires have been designed as valid and reliable subjective measurement scale of oral impacts.
The Oral Health Impact Profile (OHIP-14) was chosen for its simple comprehension, ease to use and higher validity and sensitivity in detecting patients' dissatisfaction after prosthetic treatments. Additionally, OHIP-14 is a shortened version of the OHIP-49 containing just 14 items (Tab. 1) in order to make it more practical to administer in the clinical setting (18). It's based on Locker's conceptual model (19) and analyzes the influences that the oral health *status* may have with the masticatory, phonatory and aesthetic function, daily living and social interactions, dividing these aspects in 7 domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap (20).
This validated questionnaire is one of the most comprehensive measures of oral health, which has verified satisfactory psychometric properties (reliability and validity) in different cultural contexts and has been used in several descriptive studies.
Despite a large number of OHRQoL studies, only few of them described patients with implant-supported fixed partial dentures (IFPD) and the effects on patients' OHRQoL improvement.
The purpose of this prospective clinical study was to determine whether rehabilitation with IFPD affected the OHRQoL of partially edentulous patients. The study period and OHRQoL meas-

Table 1 - Items composing the shortened version of the Oral Health Impact Profile questionnaire.

OHIP-14 items	
1)	Phonatory function: trouble pronouncing words
2)	Taste function: sense of taste worsened
3)	Physical pain: painful aching in mouth
4)	Uncomfortable and difficult eating
5)	Felt self-conscious
6)	Felt tense or irritated
7)	Diet unsatisfactory
8)	Interrupt meals
9)	Difficulty relaxing
10)	Been embarrassed
11)	Irritable with other people
12)	Difficulty conducting usual jobs
13)	Daily life less satisfying
14)	Total impediment

urement included a preoperative stage and a post-treatment phase following completion of the whole prosthodontic treatment.

Materials and methods

During the period from March 2010 to December 2012, all patients referred for implant therapy to the Oral Surgery Department of "S. Giovanni Calibita" Hospital - Fatebenefratelli, Isola Tiberina (University of Rome Tor Vergata) were selected using the following inclusion criteria:

- Age between 40 and 70 years;
- Good general health, no medical risks, including osteoporosis, current bisphosphonate therapy, previous or current chemotherapy or radiotherapy;
- Ability to understand and respond to the questionnaire used in the study;
- Absence of soft or hard tissue inflammation in the oral cavity;
- Partial edentulism;
- Adequate oral hygiene;
- Sufficient bone volume to insert implants with a length of 10 mm and a diameter of 4.25 mm, without the aid of regenerative surgery;
- Presents of dental elements in the opposing jaw;
- Willingness to accept and give informed consent;
- Agreeable to participate in the whole duration of this sperimental study.

Exclusion criteria for the study subjects were maintained in order to avoid bias for sampling and included:

- Systemic or neurological disease that contraindicate implant surgery;
- Other health conditions: alcoholism, smoking (more than 15 cigarettes/d), obesity, severe immunosuppression;
- Psychological or psychiatric conditions that could influence a patient's compliance to treatment;
- Insufficient bone volume;
- Chronic and unresolved periodontal disease;
- Chronic symptoms of temporomandibular disorders;
- Previous history of removable denture wearing.

Based on these criteria, a total of 50 partial edentulous patients (mean age 51.2 ± 12.6 years, 56% women) had an indication for implant therapy and were screened for this study. All patients provided informed consent, which included a complete discussion about the potential benefits, risks and possible complications of the proposed implant treatment and an examination of alternative options.
After providing informed consent, patients performed the OHIP-14it (Italian version of the OHIP-14 questionnaire) (21) in order to investigate the OHRQoL of the participants before the implant-prosthetic rehabilitation (Time 0). Aided by a trained interviewer, the subjects completed the OHIP-14it, answering in terms of frequency the appearance of 14 situations (Tab. 1) of impact. Frequency was codified using a Likert scale with 5 options (18): "never" (score 0: no impact), "hardly ever" (score 1), "occasionally" (score 2), "fairly often" (score 3) and "very often" (score 4). The OHIP-14 was analyzed through the 'additive method' (OHIP-ADD) by summing the item codes for the 14 questions (range 0-56) (22). High OHIP scores indicated poor OHRQoL, while low OHIP scores showed satisfactory and adequate OHRQoL.
Subsequently patients were subjected to the implant treatment performed by the same operator, with the aid of surgical guide when needed. None of the implants had been lost during the follow-ups and none of the prosthodontic device and/or soft tissue failures were registered during the observation period.
After 2 years, with the definitive implant-prosthetic rehabilitation (Time 1), patients completed again the same OHIP-14it questionnaire, which was analyzed with the identical 'additive method'. In this way authors assessed the influence of implant therapy on OHRQoL by putting in comparison pre- and post-treatment OHIP-14 scores. Additionally, it was evaluated the impact of implant therapy on each OHIP-14 domain.

The OHIP scores and subscales were calculated using statistical software (SPSS Statistics 17 for Windows, Chicago, IL, USA). Descriptive statistics, frequencies, means, medians, standard deviations, mode and variances of all OHIP-14 domains were employed. Furthermore, the OHRQoL change from Time 0 to Time 1 was statistically analyzed through the Chi-square test, maintaining the level of significance at 5% (p-values < 0.05).

Results

During the thirty-three-month recruitment period, 50 patients (female: n=28; male: n=22) were selected and included in this study.
The average patient age was 51.2 ± 12.6 years (range: 40.2-69.5).
Fourteen patients received implants in the lower jaw, twenty-four were treated in the upper jaw and twelve received implants in both jaws.
A single-tooth gap in the front area and a dental gap in the posterior tooth area were the most frequent indication for implant therapy (48%, n=24). A free-end gap was present in 16% (n=8) and a dental gap requiring more than one implant was present in 30% (n=15) of the patients. Three patients (6%) had a combination of single-tooth and free-end gaps.
The OHIP scores for all patients are showed in Table 2, together with statistical significance of the difference between Time 0 and Time 1 measurements.
At the pre-implant phase the mean total OHIP-14it score was 2.15 (SD ± 1.42) points with a variance of 2.03 pt and a summing score of 754 pt.
The most prevalently affected domain was "functional limitation" (sum: 148 pt.; average value: 2.96 ± 1.31 pt.), followed by "psychological discomfort" (sum: 138 pt.; average value: 2.76 ± 1.45 pt.) and "physical pain" (sum: 128 pt.; average value: 2.56 ± 1.29 pt.). The most frequently problems reported by patients were: difficulty chewing, eating and speaking due to dental problems (82%); psychological disappointment including unsatisfactory dental aesthetics, worrying and being irritated about oral problems (62%); painful and enduring aching in the mouth (46%).
There was a significant difference (p<0.05) be-

Table 2 - OHIP-14 values and statistical significance of pre- and post-treatment scores.

			TIME 0				
OHIP-14 domains	**Sum**	**Mean**	**St. Dev.**	**Median**	**Mode**	**Variance**	
OHIP-14 total score	754	2.15	1.42	2	3	2.03	
Functional limitation	148	2.96	1.31	3	4	1.71	
Physical pain	128	2.56	1.29	3	3	1.67	
Psychological discomfort	138	2.76	1.45	3	4	2.11	
Physical disability	100	2	1.35	2	1	1.83	
Psychological disability	96	1.92	1.15	2	2	1.33	
Social disability	100	2	1.44	2	3	2.08	
Handicap	44	0.88	0.97	1	0	0.94	
			TIME 1				P value
OHIP-14 total score	228	0.65	0.78	0	0	0.61	<0.001*
Functional limitation	60	1.2	0.76	1	1	0.58	<0.001*
Physical pain	32	0.64	0.95	0	0	0.91	<0.001*
Psychological discomfort	46	0.92	0.70	1	1	0.49	<0.001*
Physical disability	26	0.52	0.65	0	0	0.43	<0.001*
Psychological disability	16	0.32	0.56	0	0	0.31	<0.001*
Social disability	38	0.76	0.88	1	0	0.77	<0.001*
Handicap	10	0.2	0.41	0	0	0.17	<0.05*

- Statistically significant (p<0.05).

tween OHIP-14it scores in the pre- and postoperative phase (Tab. 2). Implant-prosthetic treatment was strictly associated with better OHRQoL values in all seven domains (Tab. 2). After prosthetic rehabilitation the mean total registered OHIP-it score was 0.65 (SD ± 0.78) points with a lower variance (0.61 pt) and a summing score of 228 pt (Tab.2).
The sense of satisfaction, psychological and physical comfort related to the oral health *status* increased in all patients at Time 1.
There were no significant differences between the OHIP-14it scores dependent on age, gender and antagonistic teeth in the opposing jaw (natural teeth *vs* IFPF) ($p > 0.05$) both at Time 0 and at Time 1. Patients with I and IV Kennedy's class edentulism showed better improvement ($p < 0.05$) after the complete prosthetic rehabilitation, probably thanks to the reactivation of the masticatory, phonatory and aesthetic function, which had been almost entirely lost.

Discussion

The present study evaluated preoperative (Time 0) and post-treatment (Time 1) OHIP-14it self-assessment scores of patients treated with IFPD. Patients' OHRQoL was also analysed by the treating physicians before and after 2 years with the completion of implant-prosthodontic treatment.
The use of the reduced form of the Oral Health Impact Profile (OHIP-14) allowed having clear and coherent results and patients' complete cooperation, even by older ones. Effectively no dropouts were registered during this investigation. Furthermore, the large number of patients and the wide variety of age, oral problems and type of edentulism provided good statistical power for the insights gained in the pre- and postoperative assessments of OHRQoL.
It was observed a significant decrease ($p<0.001$) in the sum, mean, standard deviation, median, mode and variance OHIP scores of all patients at Time 1 (Tab. 2).
The impossibility of a good chewing in addition to continuous pain and difficulty of speaking related to the lack of teeth causes lower OHRQoL values at Time 0.
An unsatisfactory aesthetics linked to anterior edentulous condition (IV Kennedy's class) had a significant impact on patients' social life and psychological serenity. In addition, patients with IV Kennedy's class edentulism presented the highest expectations from the implant-prosthetic treatment.
A treatment with implant-supported fixed partial dentures influenced many aspects of patients' daily life, not only from a functional viewpoint but also aesthetic, psychological, social and employment aspects.

Conclusions

Preoperative and post-treatment assessments of OHRQoL exhibited significant differences in all patients. This study showed that the IFPD treatment had a positive effect on the OHRQoL and a strong impact on social, psychological and emotional daily life of each patient.
The most significant improvements of OHIP-14it scores have been reported by patients with bilateral posterior edentulous and intercalated anterior edentulous (I and IV Kennedy's class).
Furthermore, the functional limitation and the psychological dissatisfaction scales represented important factors for partially edentulous patients, and these aspects were considerably influenced by implant therapy and fixed prosthetic rehabilitation.

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