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Change in Patients' Self-Reported Quality of Life before and after Dental Implantation

SUMMARY

Background/Aim*: The loss of teeth and its consequences for health, as well as the psychological discomfort it entails, have a negative impact on both self-reported health state and quality of life (QoL). Dental implantation aims to increase patients' health and satisfaction and to improve all aspects of QoL. The purpose of this cross-sectional correlational study was to compare the patients' QoL before and after dental implantation.* ***Material and Methods****: The study comprised 62 patients aged between 24 and 77, including 28 (45.16%) women and 34 (54.84%) men, who reported to a private dental clinic in Szczecin, Poland to replace missing teeth with implants. The survey was carried out twice: prior to the treatment, when the decision to use implants had been made, and three months after implantation, during the first check-up. QoL was measured using the 36-Item* Short Form Health Survey *(SF-36), and sociodemographic data were collected using a questionnaire of the author.* ***Results****: There were statistically significant differences between the assessment of health and QoL before and after implantation treatment. Both the patients' health and comfort of life improved after therapy.* ***Conclusions****: Replacement of missing teeth with dental implants brought overall improvement in patients' QoL, social comfort, and general health. Dental implantation should be recommended in the early phase of edentulism, after tooth loss.*

Key words: Dental Implantation, Oral Health-Related Quality of Life, Health Survey

Bożena Mroczek[1], Małgorzata Anna Lichota[1], Grzegorz Trybek[2], Anna Grzywacz[3]

[1] Department of Human Sciences in Medicine of the Pomeranian Medical University in Szczecin, Poland
[2] Department of Oral Surgery, of the Pomeranian Medical University in Szczecin, Poland
[3] Independent Laboratory of Health Promotion of the Pomeranian Medical University in Szczecin, Poland

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Introduction

The loss of teeth is a serious life event that impairs two important functions, eating and speaking, and may be accompanied by problems such as pain and bleeding associated with gum disease. It thus affects various aspects of Quality of Life (QoL). Patients experience pain and psychological discomfort[1-2]. Somatic diseases may cause pathological changes within the oral cavity, potentially leading to partial or complete edentulism and, consequently, to the need to replace the missing teeth with implants[1, 3-5].

QoL and general health can serve as important indicators of the effects of a treatment, and should be taken into account during oral diagnosis, interventions, and the application of procedures[5-7]. Recent studies have revealed significant relationships between QoL, overall oral status, orthodontic treatment, and treatment with *prosthetic* implants[3, 8].

QoL is defined as an individual's perception of his or her position in life, within the cultural context and value system he or she lives in, and in relation to his or her goals, expectations, parameters, and social relations[6, 9]. QoL is regarded as a dynamic construct that changes over time, and which can be affected by health problems that occur[5]. As a vital outcome of therapy, QoL is rated among the so-called *soft effects of* treatment, since it modifies the internal and external conditions affecting the individual.

Researchers examining the effect of edentulism on the oral health-related quality of life (OHRQoL) have demonstrated that patients suffering from this problem had lower levels of QoL, higher levels of functional

limitation, more severe physical and psychological pain, and more serious sleep and digestive disorders[10-12]. The purpose of *prosthetic* treatment is to alleviate tooth loss-related functional and esthetic problems, and to improve QoL. According to Levi, one factor that motivates people to choose a particular method of tooth *replacement* is the esthetic aspect[13]. Patients who decide to undergo dental implantation feel a difference in their own *perception of themselves*[14]. *Dental implants are made of* titanium and are inserted directly into the jawbone. On account of the osseointegration and mechanical stability they offer, they serve as pillars for *prosthetic filling. Bone* grows up to the implant surface, meaning that the implant can function as a natural tooth. Providing that hygiene principles are obeyed, implants should continue to function properly. Implantation treatment aims to reconstruct missing teeth, thus restoring the normal functioning of the stomatognathic system, providing lips with support and, consequently, restoring facial profile and improving appearance. Implant-based definitive dental prostheses are widely applied as a highly efficient *prosthetic* treatment method[11, 15]. Some researchers maintain that the QoL related to edentulism, as well as its health, functional, psychological, and social consequences, the therapy employed, and oral hygiene during implantation treatment has not yet been fully described[10, 16-17]. An important contributor to QoL is the overall health and oral hygiene status. QoL assessment is widely used in dental medicine, since it provides information about changes in patients' self-perceived health and QoL level in the course of the pathological process and after dental treatment. Nevertheless, as Riordain *et al*. ave pointed out, there is still too little evidence for improvement in QoL after implantation treatment[4].

The aim of this study was to compare the QoL of patients subjected to dental implant treatment before and after the treatment. We assumed that this method of replacing missing teeth has an effect on QoL and the self-reported health state.

Material and Methods

Study Design

This was a longitudinal clinical study with selected predictor variables. We formulated the hypothesis that, the patients' QoL would be considerably improved following implantation. The survey was carried out twice during 2015 using the same questionnaire: once at the initial visit (V1), during which the doctors and patients established the protocol of dental implant treatment (including treatment date), and then on the first check-up (V2), after dental implantation (this usually took place three months after the treatment).

The criteria for inclusion in the study were age at least 18 years, committed to dental implantation, agreement to take part in both surveys, successfully completed implantation treatment, and attending the check-up. Each patient was examined by a dentist using a mirror and a probe under artificial lighting. The dentist assessed the patients' needs for treatment and the oral health status.

Procedure

Our study was approved by the Bioethics Committee of the Pomeranian Medical University in Szczecin, Poland (approval no. KB–0012/41/05/15). The patients participated in the study voluntarily and gave their informed consent. The study was conducted in accordance with the guidelines of the Helsinki Declaration and the principles of Good Clinical Practice, as well as with respect for the rights and dignity of the person.

Evaluation of oral health-related quality of life (OHRQoL)

The research instruments used in this survey-based study were the 36-Item *Short Form Health Survey* (SF-36) and a questionnaire of the author's devising (AQ). We obtained permission from Quality Metric, Inc. to use the authorized Polish Version of the SF-36. The SF-36 questionnaire consists of 36 questions divided into eight subscales: role physical (RP), mental health (MH),bodily pain (BP), general health (GH), physical functioning (PF),vitality (V), social functioning (SF), role emotional (RE), and one additional question concerning health change[18, 19]. Score on the Likert scale for each of these areas ranges from 0 to 100, with 0 denoting the worst and 100 the best possible health state. SF-36 is not time-consuming to use, and its usefulness, repeatability, and ability to reveal changes in QoL have been demonstrated[20]. The author's questionnaire contained 20 simple structured questions aimed at (1) demographic data collection (age, sex, place of residence, education, marital status, financial income), (2) selected clinical data concerning implantation treatment.

Statistical Analysis

The normality of variables distribution was verified using the Shapiro-Wilk test. The variables were characterized by arithmetic means (X), standard deviations (SD), medians (M), and extremes (min–max). Statistical analysis was performed using the chi-square test, Student's *t*-test, analysis of variance (ANOVA), the correlation coefficient, and Cronbach's alpha, in order to assess the reliability of the results in particular SF-36 domains. All tests were performed at a statistical significance level of $\alpha = 0.05$.

Results

Participants

The study comprised 62 participants, including 28 (45.2%) women and 34 (54.8%) men, aged between 24 and 77. The mean age of the participants was M_{AGE} = 55.77 years, and the standard deviation (SD) was 12.01 for the entire group; M_{Female} = 52.61 ± 12.88 (range: 24–77), M_{Male} = 58.38 ± 10.73 (range: 28–73). Sociodemographic data are shown in table 1. The majority of the participants had tertiary (43 - 69.35%) or secondary (18 - 29.03%) education; one person, a man (1.62%), had no higher than vocational education.

Table 1. Sociodemographic data of the participants (n=62)

Variables			n	%
Age	X ± SD	55.77±12.01		
mini-max		24-77		
Gender				
Women	X±SD	52.61±12.88		
mini-max		24 - 77		
Men	X±SD	58.38±10.73		
	mini-max	28 - 73		
Place of residence (population):		urban area	53	85.48
		rural area	9	14.52
Economic status:		very good	28	45.16
		good	30	48.38
		average	4	6.45
Employment		employed	46	74.19
		unemployed	16	25.81
Education		master's degree	43	69.35
		secondary	18	29.03
		vocational	1	1.61

Tooth loss among the study subjects was mostly caused by dental caries (tooth decay) (24 - 38.71%), *neglect* of oral *hygiene* (19 - 30.65%), and *periodontal disease* (20 - 32.26%). The prevailing causes among the women were dental caries (11 - 39.29%) and *periodontal disease* (10 - 35.71%), and among the men, dental caries (13 - 38.24%) and oral *hygiene neglect* (13 - 38.24%). The main factor motivating the patients as a whole (50 - 80.65%) to choose implantation treatment was the esthetic aspect; the main factor motivating the women (23 - 82.14%) was psychological comfort, and the main factor motivating the men (30 - 88.24%) was the esthetic aspect.

Health assessment before and three months after implantation treatment (on the check-up):

1. The participants described their health as excellent (3 - 4.84%) or very good (25 - 40.32%), The mean score was 8.77 ± 4.29. The women more often described their health state as excellent or very good (16 - 57.14%), and the men as good or average (22 - 64.7%),
2. There was a statistically significant relationship between health assessment three months before treatment (X= 6.78 ± 1.85) and three months after treatment (X= 8.64 ± 1.50) (Table 2),

Table 2. Self-assessment of patients' health status before and after treatment

	Health self-assessment		t-Student test
	X	SD	p
Before treatment	6.78	1.85	F= -7.502
After treatment	8.64	1.50	p<0.001

3. Health assessment statistically significantly depended on economic status (p= 0.04); the higher patient's economic status, the better health assessment,
4. Patients observed positive changes in their comfort of life, which were reflected in higher health assessment (p= 0.05).

Quality of life

1. The highest score was obtained for the physical functioning (PF) (X= 89.68 ± 14.43), and the lowest for the general health (GH) (63.87 ± 18.34) and vitality (V) (73.63 ± 16.17) domains. Cronbach's alpha was calculated for each of the SF-36 scales. For the physical functioning (PF), mental health (MH), vitality (V), bodily pain (BP), and general health (GH) domains, alpha was > 0.7, which suggested high reliability of the scales; for the role physical (RP) and role emotional (RE) domains, alpha was < 0.7,
2. The women scored higher for physical functioning (PF) than the men (p= 0.03), and the younger patients (aged up to 60 years) scored higher than those over 60 (p= 0.01),
3. The correlation coefficient for the physical functioning (PF) and role physical (RP) domains was 0.718 (p< 0.001), while for the mental health (MH) and vitality (V) domains, this was 0.756 (p< 0.001),
4. The lowest scores for general health (GH) were obtained by the patients aged between 56 and 60 years, while the highest was obtained by those younger than 55 (p= 0.005). The lowest scores were obtained by patients with vocational and secondary education only, and the highest by those with third-level education (p< 0.001),
5. The largest changes in health status were reported by patients over 60, and the smallest by patients aged up to 55 years (p= 0.05),
6. Higher economic status was associated with an increase in the average score for the vitality (V) QoL domain (p= 0.03),

7. City dwellers assessed their social functioning (SF) higher than their counterparts from rural areas (p= 0.03).

Changes in comfort of life

1. The majority of both the women (18 - 64.29%) and the men (25 - 73.53%) felt that their eating comfort had considerably improved,
2. After treatment, 89.29% of the women (n= 25) and 94.12% of the men (n= 32) observed that their health status and their comfort of life significantly improved - a total of 91.94% (n= 57),
3. Both the women and the men were very satisfied with the effects of implantation treatment. The mean score achieved by the women was 9.14, and by the men 9.24 (total 9.19),
4. The results concerning comfort of life before and after implantation were compared. Health status after dental implantation was assessed as lower by those patients whose comfort of life did not change and assessed highest by those who did see a significant change (p= 0.04).

Discussion

The loss of teeth poses both health and esthetic problems. Patients can obtain satisfaction through advanced implant treatment methods. Apart from the obvious esthetic advantages, dental implantation improves speaking and increases the comfort of biting and gustatory sensation, which translates into psychological and physical well-being and a better health state[1]. Irrespective of age, reconstruction of missing teeth helps patients regain their self-confidence[16, 21-23]. Polish-language medical literature does not contain publications on the self-reported health state of implantology patients, as assessed by the SF-36. Such studies can, however, be found in the English-language literature[5, 16, 21-23].

The mean age of the participants in our study was 56 ± 11.8 years. Hence, we can conclude that dental implant treatment is appropriate for patients of all ages, and is worth recommending, considering the ease of maintaining good oral hygiene and the psychological comfort associated with the alleviation of digestive problems[24]. *Patients' major hesitation in deciding on* dental implantation is related to its cost. Nevertheless, patients *value their comfort and health, and so they often choose this treatment method, despite the cost.*

Our results demonstrate that the health state of our participants improved after implantation. They scored higher in the social functioning (SF) and vitality (V) domains, and suffered less from emotional problems and limitations on their activity[16, 21]. Other studies have compared changes in the QoL of patients with dentures and those with dental implants. Following dental implementation, patients found their QoL to be noticeably higher, whereas the QoL of patients with dentures was definitely lower[16]. Similar results, confirming the alleviation of physical pain and psychological discomfort, have been reported by Yoshida *et al.*[17]. We observed a statistically significant relationship between the patients' health assessment before the treatment and three months after it. We found that the assessment of patients' health changed significantly, after implantation it was significantly higher by 2 units on average.

In his study, Yoshida measured chronological change in the QoL level during implantation treatment in a group of 20 patients with a small number of missing teeth (less than 4 teeth), who underwent implantation treatment[17]. The patients completed the shortened Japanese version of the *Oral Health* Impact Profile (OHIP-J14) *before surgery* (*T0*), *one week after surgery* (*T1*), *one week after interim prosthesis placement* (*T2*), and 1 week after definitive prosthesis placement (T3). Although a temporary functional limitation was observed after implant placement, overall OHRQoL improved after placement of the definitive prosthesis. What is more, implantation treatment was more effective in the unilateral free-end edentulous space. Similarly, in the study of Pavel *et al.*, the most significant associations on the functional scale (FS) were observed with the number of front teeth replaced with implants, followed by the presence of chewing problems and marital status[25].

Conclusions

This study has demonstrated the significant effect of implantation, as a method of treating missing teeth, on the self-reported health state. Implantation treatment improved patients' health, QoL, and comfort of life. QoL as measured by the SF-36 was higher after the implantation treatment than before it. Dental implantation should be recommended in the early phase of edentulism, after tooth loss.

Abbreviations

SF-36 - 36-Item *Short Form Health Survey*
AQ - Author's Questionnaire
QoL - Quality of Life

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Correspondence:

Anna Grzywacz
Independent Laboratory of Health Promotion of the Pomeranian Medical University in Szczecin
Szczecin, Poland
e-mail: anna.grzywacz@pum.edu.pl