International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html

Investigating the Effect of Dental Implant Treatment on Mental Health and Quality of Life

Raheleh Solhmirzaei,[1]Soroush Noorinasab[2], Mahnaz Gholami[2], Amirhossein Samiee Dehpagaee[4], Wael Sheet Hussein[5], Wissam Hamid[6], Omid Tavakol*[7]

1.Department of Dentistry, Qazvin university of medical sciences, Qazvin, Iran.
2. D.D.S., Private Practice, Shiraz, Iran.
3. Postgraduate Student, D.M.D., Periodontics Department, Faculty of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran. Orcid.org/0000-0002-7176-8768
4. D.D.S., School of Dentistry, Shiraz Branch, Islamic Azad University, Shiraz, Iran. Orcid.org/0000-0002-6415-0871
5. Department of Optical Techniques, Al-Noor University College, Nineveh, Iraq.
6.Department of Dentistry, Al-Zahrawi University College, Karbala, Iraq
7. Assistant Professor, M.Sc., Prosthodontics Department, School of Dentistry, Shiraz Bra.nch, Islamic Azad University, Shiraz, Iran. Orcid.org/0000-0002-8429-4274

Abstract

The present study aimed to evaluate the impact of implant-supported fixed dental prostheses on OHRQoL and HRQoL, patient satisfaction (PS), and mental and physical health status. This cross-sectional study was conducted on 30 patients who were supposed to have implant-supported fixed prostheses for treating their limited edentulism. Standard questionnaires were prepared before the prosthesis placement. The patients were asked to respond to the questionnaires three months after the prosthesis delivery. Statistical analysis was performed using the Shapiro-Wilk test and T-test. The results showed that the mean OHRQoL post-test (29.32) was significantly lower than in the pre-test (39.78). Moreover, the mean HRQoL in the pre-and post-test was obtained as 59.37 and 60.51, respectively. There was no significant difference in HRQoL scores between the pre-and post-test due to the higher significance level, but it slightly improved. The mean PS in the post-test (3.12) was significantly greater than in the pre-test (2.85). In conclusion, Treatment with implant-supported fixed prosthesis could improve OHRQoL, mental and physical health, and PS, while it did not affect HRQoL.

Keywords: Oral health-related quality of life, Health-related quality of life, Dental implant treatment.

Full length article **Corresponding Author*, e-mail: omidtavakkol@yahoo.com

1. Introduction

Today, increasing attention is paid to various aspects of health, such as social, mental, and physical, as well as the impact of PS on HRQoL [1]. The oral health impact profile (OHIP) is among the most famous and reliable methods known to identify and evaluate various aspects of OHRQoL, which has been used in recent studies on oral health [2]. Results of an extensive survey in Germany showed that having fewer than nine teeth had a more significant impact on HRQoL than diseases such as cancer, hypertension, and allergies [3]. Clinical indicators alone are not enough to describe health status. This is also true for oral diseases and their consequences for OHRQoL.

Two common oral diseases, caries, and periodontitis often do not manifest symptoms in the early stages. This could explain why clinical indicators of caries or periodontal involvement, such as the number of decayed teeth, tooth mobility, and pocket depth, are not strongly associated with OHRQoL impairment [4-5]. However, caries and periodontitis are progressive processes that lead to tooth loss if not adequately treated. Tooth loss could devastate people's lives, especially psychologically, including a lack of self-confidence, interest in establishing close relationships, hiding teeth, and avoiding laughing in public [6-7].

Despite numerous studies in this field, limited research has been conducted on patients with a dental implant-supported prosthesis [8]. Introducing dental implants is

considered among the most significant advances in clinical dentistry. Replacing missing teeth with removable or fixed partial dentures was the only treatment before the advent of implants [9]. This method is used for jaw correction in many parts of the world. In this method, an artificial root made of titanium is placed in the patient's jawbone as a tooth. These patients should be studied from different aspects to see if they have a proper indication for the implant [10]. Implants could provide a beautiful and pleasant appearance to patients. Using implants has a better prognosis than other options [11]. Although the exact number of dental implant treatments is not reported in our country, evidence has shown that the demand for implant treatment is increasing as in other countries [12]. The impact of dental implants on patients' quality of life and satisfaction with the outcome should be investigated to evaluate the effect of dental implants on patients' daily life. Therefore, the present study examined the impact of dental implant treatments on patients' mental health and quality of life.

2. Materials and Methods

In this cross-sectional study, 30 dental implant candidates referred to a private clinic in Shiraz were randomly selected. These patients were asked to complete the informed consent form and respond to OHIP, health survey, and patient satisfaction questionnaire before and three months after the prosthesis placement. The patient's demographic data, including gender, age, smoking status, educational level, and number and location of placed implants, were recorded. Then, the patients were asked to respond to the OHIP-49 questionnaire.

2.1. Oral health impact profile (OHIP)-49

This 49-item questionnaire examined OHRQoL in 7 different domains, including functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap [13]. Since the Persian version of this questionnaire was unavailable, it was translated from English into Farsi, and then a translator was requested to translate it back into English. The translated version in English was matched with the original version of the questionnaire in terms of content and confirmed by an oral pathologist and periodontist. The items were scored based on a 5-point scale: The scores of all the items were added up. The minimum and maximum scores were 0 and 196, respectively. Finally, the relationship between the mean scores of the OHIP questionnaire before and three months after the prosthesis placement was examined through statistical tests.

2.2. Health survey

The 36-item short-form health survey (SF-36) examined HRQoL in 8 domains, including physical functioning, limitations in role-playing due to physical health problems, limitation in role-playing due to emotional issues, vitality, emotional health, social functioning, bodily pain, and general health. The patients completed this questionnaire before and three months after the prosthesis placement. The standardized Persian version of SF-36, whose reliability and validity were confirmed in Iran, was used, and each item was scored between 0 (worst state of health) and 100 (best state of health). Statistical tests examined the results of the SF-36 questionnaire.

2.3. Patient satisfaction questionnaire (PSQ-18)

PSQ-18 consisted of 18 items in 7 areas: general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with the doctor, and accessibility and convenience. Each item was scored based on a 5-point scale. The mean score of all the items was calculated [14]. The relationship between the obtained scores for each patient before and after the prosthesis placement was obtained using statistical tests. The data were analyzed using SPSS 17.0. The data distribution was examined by the Shapiro-Wilk test. Moreover, a paired-sample T-test was employed to respond to the research hypotheses.

3. Results

In the present study, according to the inclusion criteria, a total of 30 participants were included. 53.3% of the participants were male, and 46.7% were female. The age range was 40-50 years old. None of the participants smoked cigarettes. Also, 63.3% of the participants had a university degree. Most participants (56.7%) belonged to high socioeconomic status, while only 13.3% were from a low class. Most participants (63.3%) reported no habit of using tobacco or gutka (Table 1). In the present study, there was no significant difference between the various domains of OHIP and the patient's sociodemographic variables. Table 2 presents the results of the number of implants placed for the patients. The results showed that the group with 1 unit (46.7%) had the highest number of implants. "Posterior and anterior," "anterior," and "posterior" regions included 20%, 26.7%, and 53.3% of the samples. Table 3 presents OHRQoL in the present study. There was a significant difference in the mean functional limitation ($P<0.001$), physical pain ($P<0.001$), psychological distress ($P<0.001$), physical disability ($P<0.001$), and OHRQoL ($P=0.037$), so that their mean values in the post-test was lower than the pre-test. No significant difference was observed in the mean psychological disability and social disability between the pre- and post-test groups ($P>0.05$). The results showed a significant difference in the mean of vitality ($P=0.037$) and social functionality ($P=0.041$) between the post- and pre-test. No significant difference was observed in the mean values of other variables between the pre-test and post-test ($P>0.05$) (Table 4). Also, the results revealed a statistically significant difference in the mean values of all the studied variables ($P<0.05$) except financial aspects ($P>0.05$) between the pre- and post-test, and the mean values of these variables in the post-test were significantly higher than the pre-test.

Table 1: Distribution of sociodemographic variables, habits, and medical conditions of participants

Variables		Number (%)
Age	40-45	13 (43.4)
	45-50	17 (56.6)
Gender	Male	16 (53.3)
	Female	14 (46.7)
Education Level	Illiterate	3 (10)
	School	8 (26.7)
	University	19 (63.3)
Socioeconomic Status	Low level	4 (13.3)
	Middle level	9 (30)
	High level	17 (56.7)
Smoking	Smoker	-
	Past smoker	7 (23.3)
	Non-smoker	23 (76.7)
Medical conditions	Diabetes	3 (10)
	Hepatitis, HIV & muscular disorder	1 (3.3)
	Arthritis, GIT & Dryness of mouth	3 (10)
	Cardiovascular	1 (3.3)
Habits	Tobacco related	3 (10)
	Pan, Ghutka and others	8 (26.7)
	None	19 (63.3)

Table 2. Descriptive results of the number of implants placed

Groups (Unit)	Frequency	Percentage
1	14	46.7
2	9	30
3	4	13.3
4	2	6.7
5	1	3.3

Table 3. Comparing OHRQoL and its components in the present study

Variables	Groups	Mean	SD	P value
Functional limitation	pre-test	9.55	1.71	<0.001*
	post-test	7.88	2.17	
Physical pain	pre-test	10.82	1.71	<0.001*
	post-test	7.53	1.22	
Psychological distress	pre-test	6.95	0.79	<0.001*
	post-test	5.28	0.70	
Physical disability	pre-test	7.02	0.82	<0.001*
	post-test	3.24	0.65	
Psychological disability	pre-test	2.32	0.65	0.066
	post-test	2.29	0.63	
Social disability	pre-test	1.26	0.30	0.068
	post-test	1.25	0.29	
Defect	pre-test	1.86	0.78	0.08
	post-test	1.85	0.78	
OHRQoL	pre-test	39.78	3.27	<0.001*
	post-test	29.32	4.08	

*: p value< 0.05

Table 4. Impact of dental implant treatments on patients' HRQoL

Variables	Groups	Mean	SD	P value
Physical functionality	pre-test	66.75	1.24	0.092
	post-test	66.24	1.63	
Limitations due to physical health status	pre-test	52.37	0.74	0.466
	post-test	52.48	0.86	
Limitations due to emotional problems	pre-test	45.66	0.44	0.056
	post-test	45.86	0.46	
Vitality	pre-test	78.24	0.45	0.037*
	post-test	79.57	0.41	
Emotional health	pre-test	57.70	1.28	0.111
	post-test	58.33	1.35	
Social functionality	pre-test	43.18	0.40	0.041*
	post-test	45.93	0.55	
The pain	pre-test	44.63	0.47	0.078
	post-test	45.17	0.40	
General Health	pre-test	45.76	1.04	0.066
	post-test	47.15	0.94	
Health-related quality of life	pre-test	60.17	2.47	0.068
	post-test	61.81	2.32	

*: p value< 0.05

4. Discussion

This study investigated the effect of implant-supported fixed dental prostheses on OHRQoL, general health status, and patient satisfaction regarding patients' tooth appearance and ability to chew and speak. The results showed that implant treatment had a significant and beneficial effect on OHRQoL and patient satisfaction regarding tooth appearance and chewing and speaking abilities. At the same time, it did not significantly improve general health status. The study of Kranjcic et al. showed that age, education, profession, size of residence, type of prosthesis, and time of using artificial teeth significantly affect OHRQoL [15]. Also, the study of Al Deeb et al. showed a significant difference between different areas of OHIP and gender, education status, the general health status of patients, and smoking status. At the same time, no significant difference was observed in terms of socio-economic status, patients' habits, and their type of prosthesis [16]. In the present study, there was no significant difference between the various domains of OHIP and the patient's sociodemographic variables. Filius et al. (2018), found that the mean patient satisfaction significantly improved after dental implants (P<0.001) [17]. Also, the health survey slightly increased, but this change was not statistically significant.

The slight increase in the mean score of SF-36 in the present study could be justified by components such as social functioning and limitations in role-playing due to emotional problems that emphasize the psychological dimension of health perception. The average decrease in the components of "functional limitation, physical pain, and psychological distress" was significant in the research, consistent with the current research results in these three components. Also, the average decrease in the "physical disability" variable was insignificant in the Filius study. Still, the present study showed a significant decline, and a discrepancy is observed.

The study by Berretin-Felix et al. (2008), showed that the treatment using implant-based fixed dentures increases the quality of life in older people, which is consistent with the results of the present study [18]. Mo et al. (2005), reported that implants improve the quality of life, which can be seen in communication, isolation, and relationships with friends and family. The results of the present study also show a significant improvement in the OHIP index, which is consistent with the results of Mo's study [19]. The present

study shows a significant increase in patient satisfaction after prosthesis placement, which is consistent with the results of Mo and Filius's studies.

Sanz et al. study (2022), showed that the satisfaction of patients concerning pain after the treatment, duration of treatment, and cost did not differ between dental implant (DI) therapy and root canal treatment (RCT); however, patients recalled that pain during treatment was significantly worse for RCT than DI. Likewise, patients rated the physical pain dimension more negatively for RCT than for DI [20]. Jehn et al. (2020), reported that OHIP items related to functional impairment and physical pain showed the highest scores (occurring occasionally), and financial loss related to treatment was frequently stated. Moreover, higher scores were detected in almost all OHIP dimensions for participants with patient-specific implant-supported removable dentures [21]. One of the limitations of our study was the small number of samples; due to the conditions related to the Covid19 pandemic, it was not possible to examine a more significant number of samples, and it is suggested to use a more significant number of samples in the future studies for a more detailed analysis.

5. Conclusions

Implant treatment in patients with one or more missing teeth leads to improved quality of life-related to oral health and patient satisfaction. Although, results showed that dental implant treatment did not affect HRQoL.

Acknowledgments
The authors extend their gratitude to the Shiraz University of Medical Sciences.

Availability of data and materials
All data generated or analyzed during this study are included in this published article.

Authors' contributions
S. N, O. T, and M.GH contributed to the study concept and design; S. N, A.SD, S.R, and O.T collected the data; S.N and O.T carried out analysis and interpretation of data; O.T performed drafting of the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable

Competing interests
The authors declare that they have no competing interests.

Funding
No funding.

References

[1] J. Beekman, A. Keisler, O. Pedraza, M. Haramura, A. Gianella-Borradori, E. Katz, ... & M. R. Yeaman. (2019). Neuromyelitis optica spectrum disorder: patient experience and quality of life. *Neurology® Neuroimmunology & Neuroinflammation*. 6 (4). https://doi.org/10.1212/NXI.0000000000000580.

[2] V. Papagiannopoulou, C. J. Oulis, W. Papaioannou, G. Antonogeorgos, & J. Yfantopoulos. (2012). Validation of a Greek version of the oral health impact profile (OHIP-14) for use among adults. *Health and quality of life outcomes*. 10 (1): 1-10.

[3] F. Mack, C. Schwahn, J. S. Feine, T. Mundt, O. Bernhardt, U. John, ... & R. Biffar. (2005). The impact of tooth loss on general health related to quality of life among elderly Pomeranians: results from the study of health in Pomerania (SHIP-O). *International Journal of Prosthodontics*.18 (5).

[4] R. Mariño, M. Schofield, C. Wright, H. Calache, & V. Minichiello. (2008). Self-reported and clinically determined oral health status predictors for quality of life in dentate older migrant adults. *Community dentistry and oral epidemiology*. 36 (1): 85-94. https://doi.org/10.1111/j.1600-0528.2007.00378.x

[5] R. R. Ray. (2023). Periodontitis: An oral disease with severe consequences. *Applied Biochemistry and Biotechnology*. *195* (1): 17-32.

[6] G. Tsakos, J. G. Steele, W. Marcenes, A. W. Walls, & A. Sheiham. (2006). Clinical correlates of oral health-related quality of life: evidence from a national sample of British older people. *European journal of oral sciences*. 114 (5): 391-395. https://doi.org/10.1111/j.1600-0722.2006.00398.x

[7] A. E. Gerritsen, P. F. Allen, D. J. Witter, E. M. Bronkhorst, & N. H. Creugers. (2010). Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. *Health and quality of life outcomes*. 8 (1): 1-11.

[8] E. Somay, B. Yilmaz, & E. Topkan. (2023). The Best Time to Dental Implant Placement in Patients with Head and Neck Cancers: An Ever-going Debate. *Asian Journal of Research in Medical and Pharmaceutical Sciences*. 12 (1): 1-12.

[9] D. Duraccio, F. Mussano, & M. G. Faga. (2015). Biomaterials for dental implants: current and future trends. *Journal of Materials Science*. *50*: 4779-4812.

[10] S. M. Burk, K. Charipova, S. Orra, P. W. Harbour, M. D. Mishu, & S. B. Baker. (2022). A surgeon's perspective on the uncorrected skeletal deformity. part II: The role of esthetic surgery for orthognathic camouflage. *American Journal of Orthodontics and Dentofacial Orthopedics*. 161 (6): 878-885. https://doi.org/10.1016/j.ajodo.2022.01.009

[11] U. Lekholm, K. Gröndahl, & T. Jemt. (2006). Outcome of oral implant treatment in partially edentulous jaws followed 20 years in clinical function. *Clinical implant dentistry and related research*. 8 (4): 178-186. doi.org/10.1111/j.1708-8208.2006. 00019.x

[12] R. Pourabbas, A. Shirmohammadi, A. Amini, & K. Khodadoust. (2011). Comparative evaluation of the curricula for dental implants in post-graduate courses in dental faculties in Iran. *Journal of Advanced Periodontology & Implant Dentistry*. 3 (1): 21-25.

[13] M. C. Wong, E. C. Lo, & A. S. McMillan. (2002). Validation of a Chinese version of the oral health

impact profile (OHIP). *Community dentistry and oral epidemiology*. 30 (6): 423-430.

[14] G. N. Marshall, & R. D. Hays. (1994). *The patient satisfaction questionnaire short-form (PSQ-18)* (Vol. 7865). Santa Monica, CA: Rand.

[15] J. Kranjčić, A. Mikuš, S. Peršić, & D. Vojvodić. (2014). Factors affecting oral health–related quality of life among elderly Croatian patients. *Acta stomatologica Croatica: International journal of oral sciences and dental medicine*. 48 (3): 174-182.

[16] M. Al Deeb, T. Abduljabbar, F. Vohra, M. S. Zafar, & M. Hussain. (2020). Assessment of factors influencing oral health-related quality of life (OHRQoL) of patients with removable dental prosthesis. *Pakistan journal of medical sciences*. 36 (2): 213.

[17] M. A. Filius, A. Vissink, M. S. Cune, G. M. Raghoebar, & A. Visser. (2018). Effect of implant therapy on oral health-related quality of life (OHIP-49), health status (SF-36), and satisfaction of patients with several agenetic teeth: Prospective cohort study. *Clinical Implant Dentistry and Related Research*. 20 (4): 592-597. https://doi.org/10.1111/cid.12625

[18] G. Berretin-Felix, H. Nary Filho, C. R. Padovani, & W. M. Machado. (2008). A longitudinal study of quality of life of elderly with mandibular implant-supported fixed prostheses. *Clinical oral implants research*. 19 (7): 704-708. https://doi.org/10.1111/j.1600-0501.2007.01451.x

[19] B. Mo, M. Lindbæk, & S. Harris. (2005). Cochlear implants and quality of life: a prospective study. *Ear and hearing*. 26 (2): 186-194.

[20] E. Sanz, M. Azabal, & A. Arias. (2022). Quality of life and satisfaction of patients two years after endodontic and dental implant treatments performed by experienced practitioners. *Journal of Dentistry*. 125: 104280. https://doi.org/10.1016/j.jdent.2022.104280

[21] P. Jehn, S. Spalthoff, P. Korn, M. Stoetzer, M. Gercken, N. C. Gellrich, & B. Rahlf. (2020). Oral health-related quality of life in tumour patients treated with patient-specific dental implants. *International journal of oral and maxillofacial surgery*. 49 (8): 1067-1072. https://doi.org/10.1016/j.ijom.2020.01.011