

Impact of Implant Therapy on Oral Health-Related Quality of Life in Partially Edentulous Patients: Pre- and Post-Treatment Evaluations

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Abstract

Background: Tooth loss, particularly partial edentulism, significantly impacts oral health-related quality of life (OHRQoL), affecting functions such as chewing, speech, and social interaction. Dental implants have been shown to improve OHRQoL, especially in edentulous patients, but their impact on partially edentulous patients remains less explored.

Objective: This study aimed to evaluate the impact of dental implant therapy on OHRQoL in partially edentulous patients, assessing changes in their quality of life before and after implant treatment.

Methods: A prospective cohort study was conducted at Tangail Medical College, Tangail, Bangladesh, from May 2024 to October 2024. 110 partially edentulous patients, aged 18 to 80 years, were enrolled using a convenience sampling technique. Participants completed the Bengali version of the Oral Health Impact Profile-21 (OHIP-G 21) at two time points: before implant therapy (pre-treatment) and six months after receiving dental implants (post-treatment). The OHIP-G 21 was used to measure OHRQoL across six domains: functional limitations, physical pain, psychological discomfort, psychological disability, social disability, and handicap. Data were analyzed using descriptive statistics and paired t-tests to compare pre- and post-treatment scores.

Results: Significant improvements were observed in all domains of OHRQoL. The mean scores for functional limitations and physical pain decreased by 52%, while psychological disability showed the greatest improvement (56%). The handicap domain had the highest improvement (58%). Paired t-tests revealed that all improvements were statistically significant ($p < 0.001$). Adverse effects were minimal, with 18.2% of participants reporting mild pain and 13.6% reporting mild swelling.

Conclusion: Dental implant therapy significantly improves OHRQoL in partially edentulous patients, enhancing both functional and psychological well-being. The findings support dental implants as an effective and reliable treatment for improving quality of life in this patient group.

Keywords: Dental implants, Oral health-related quality of life (OHRQoL), Pre-treatment, Post-treatment, Quality of life,

I. Introduction

Tooth loss is a common oral health issue that significantly affects oral health-related quality of life (OHRQoL), particularly in terms of daily functions such as chewing, speaking, and social interactions [1]. The negative impact on tooth loss is more pronounced in edentulous patients, leading to difficulties with mastication, speech, pain, and dissatisfaction with appearance [2,3]. While the effectiveness of dental implants in restoring function and enhancing satisfaction has been well-established in edentulous patients [4-6] less attention has been given to the impact of dental implants on partially edentulous individuals, who may have different treatment needs and outcomes.

Research indicates that implant-supported prostheses can significantly improve OHRQoL in patients with partial edentulism, providing better functional outcomes and higher satisfaction compared to conventional dentures [7,8]. However, patient satisfaction with implant therapy is often influenced by individual factors, including personality traits, which can play a critical role in predicting the success of the treatment [8]. Furthermore, the number of remaining natural teeth is a key factor in determining OHRQoL, as tooth loss is associated with diminished quality of life, particularly in older populations [9]. Despite population-based studies suggesting that having a sufficient number of natural teeth is linked to better oral health outcomes [10,11], the specific relationship between partial edentulism and its impact on OHRQoL remains unclear.

In Bangladesh, where tooth loss is a prevalent concern, particularly among the aging population, there is a need for studies exploring the effects of implant therapy on partially edentulous patients. While numerous studies have focused on fully edentulous patients, research on the effects of dental implants for partial edentulism in the Bangladeshi context remains limited. Therefore, the primary objective of this study is to assess the impact of dental implant therapy on OHRQoL in partially edentulous patients, with pre- and post-treatment evaluations to determine whether implants improve their quality of life across various domains.

II. Methodology

Study Design

This prospective cohort study aimed to evaluate the impact of dental implant therapy on oral health-related quality of life (OHRQoL) in partially edentulous patients. The study was conducted from May 2024 to October 2024 at Tangail Medical College, Tangail, Bangladesh.

Study Population

The study included 110 partially edentulous patients scheduled for dental implant therapy at Tangail Medical College, Tangail, Bangladesh. Participants were selected using a convenience sampling technique, where patients meeting the inclusion criteria were consecutively enrolled. The inclusion criteria were patients aged 18 to 80 years with partial edentulism, no contraindications for implant therapy, and the ability to provide informed consent. Exclusion criteria included patients with uncontrolled systemic conditions, smoking habits, or insufficient bone volume to support implant placement.

Questionnaire: OHIP-G 21 (Bengali Version)

The Bengali-translated OHIP-G 21 was used to assess OHRQoL. The translation involved a forward and backward process, followed by review by local experts in oral health and public health for cultural appropriateness. A pilot test with 30 participants ensured clarity and comprehension.

Measurement of OHRQoL with OHIP-G 21

After obtaining informed consent, participants completed the Bengali-translated version of the Oral Health Impact Profile-21 (OHIP-G 21), a self-reported questionnaire designed to assess oral health-related quality of life (OHRQoL). The OHIP-G 21 includes 21 items that measure various aspects of oral health, categorized into six domains: functional limitations, physical pain, psychological discomfort, psychological disability, social disability, and handicap.

Each item was rated on a scale from 0 to 4, where: 0 = never, 1= hardly ever, 2= occasionally, 3 = fairly often, and 4 = very often.

A summary score was calculated by summing the scores for all 21 items, with a higher score indicating poorer OHRQoL. The possible summary score range is 0 to 84, with higher scores indicating greater impairment in quality of life due to oral health issues. John et al. (2006) established normative values for the OHIP-G 21, which served as a reference for interpreting the scores [12].

Participants completed the questionnaire twice: once at the pre-treatment phase, before receiving dental implants, and again 6 months post-treatment to assess any changes in OHRQoL following the implant procedure.

For data analysis, the answer categories of “never”, “hardly ever”, and “occasionally” were classified as indicating minor problems, while “fairly often” and “very often” were considered as indicating frequent problems [13,3].

Data Collection

Data were collected at two time points:

- Pre-Treatment: Participants completed the Bengali OHIP-G 21 prior to implant therapy to assess baseline OHRQoL.
- Post-Treatment: Six months after implant therapy, the same participants completed the OHIP-G 21 to evaluate changes in OHRQoL. Clinical outcomes, such as implant stability and functional success (e.g., chewing, speaking), were also recorded during follow-up.

Intervention

All participants underwent a standard dental implant procedure involving the surgical placement of titanium implants. Following a 3-6 months healing period for osseointegration, implants were restored with crowns or bridges. All surgeries were performed by experienced oral surgeons and prosthodontists.

Outcome Measures

The primary outcome was the change in OHRQoL, assessed using the OHIP-G 21, which covers domains such as functional limitations, physical pain, psychological discomfort, psychological disability, social disability, and handicap. Secondary outcomes included implant survival rate, functional success (e.g., chewing, speaking), and complications (e.g., infection, pain).

Validation of the Bengali OHIP-G 21

Reliability and validity of the Bengali version of the OHIP-G 21 were assessed in a pilot study. Cronbach's alpha was used to evaluate internal consistency, while test-retest reliability was measured over a 2-week period. Construct validity was assessed by comparing OHIP-G 21 scores with clinical oral health measures.

Statistical Analysis

Data were analyzed using SPSS version 26. Descriptive statistics, including means and standard deviations, were calculated for continuous variables, while frequencies and percentages were computed for categorical variables. Paired t-tests were used to compare pre- and post-treatment OHRQoL scores across all domains. Statistically significant improvements were observed in all domains, with p-values less than 0.001 for each comparison. A p-value of < 0.05 was considered statistically significant. Additionally, the frequency and percentage of participants experiencing adverse effects and complications (e.g., pain, swelling, infection, implant failure) were reported, with severity categorized as mild, moderate, or severe.

Ethical Considerations

The study adhered to ethical guidelines, with participants providing written informed consent. Data confidentiality was maintained throughout the study, and participants were informed they could withdraw at any time without affecting their medical care.

III. Results

A total of 110 participants were included in the study, with a mean age of 55 ± 10 years. The age distribution was as follows: 18.2% of participants were aged less than 30 years, 45.5% were between 30 and 50 years, and 36.4% were older than 50 years. Regarding gender, 40% of the participants were male, while 60% were female. In terms of systemic health conditions, 25% of the participants had one or more health conditions that could potentially impact the healing process after implant therapy. Additionally, 40% of the participants had previously undergone dental treatments. (**Table 1**)

Table 1: Demographic Characteristics of Study Participants

Characteristic	Participants (n=110)	%
Age (Mean \pm SD)	55 \pm 10 years	
Age Range		
<30 years	20	18.2%
30-50 years	50	45.5%
>50 years	40	36.4%
Gender		
Male	44	40%
Female	66	60%
Systemic Health Conditions	28	25%
Previous Dental Treatments	44	40%

Pre-treatment OHRQoL scores were assessed across six domains. The functional limitations domain had a mean score of 2.3 ± 1.1 , with 70% of participants reporting issues. Physical pain had the highest mean score of 2.7 ± 1.0 , affecting 85% of participants. In the psychological discomfort domain, the mean score was 2.1 ± 1.2 , with 60% experiencing concerns. The psychological disability domain had a mean score of 1.8 ± 1.0 , affecting 50% of participants. Social disability had a mean score of 1.6 ± 1.1 , with 55% reporting social impacts. The handicap domain had the lowest mean score of 1.2 ± 1.0 , affecting 40% of participants. (**Table 2**)

Table 2: Pre-Treatment OHRQoL Scores by Domain

Domain	Mean Score (\pm SD)	Frequency of Issues	Percentage of Participant
Functional Limitations	2.3 \pm 1.1	77	70%
Physical Pain	2.7 \pm 1.0	94	85%
Psychological Discomfort	2.1 \pm 1.2	66	60%
Psychological Disability	1.8 \pm 1.0	55	50%
Social Disability	1.6 \pm 1.1	61	55%
Handicap	1.2 \pm 1.0	44	40%

Post-treatment OHRQoL scores showed significant improvement across all domains. The functional limitations domain improved by 52%, with a mean score of 1.1 \pm 0.7. Physical pain and psychological discomfort improved by 52%, with mean scores of 1.3 \pm 0.6 and 1.0 \pm 0.7, respectively. The psychological disability domain showed the greatest improvement (56%) with a mean score of 0.8 \pm 0.5. Social disability improved by 44%, with a mean score of 0.9 \pm 0.6, while the handicap domain showed the highest improvement (58%), with a mean score of 0.5 \pm 0.6. (Table 3)

Table 3: Post-Treatment OHRQoL Scores by Domain

Domain	Mean Score (\pm SD)	Improvement from Pre-Treatment (%)
Functional Limitations	1.1 \pm 0.7	52%
Physical Pain	1.3 \pm 0.6	52%
Psychological Discomfort	1.0 \pm 0.7	52%
Psychological Disability	0.8 \pm 0.5	56%
Social Disability	0.9 \pm 0.6	44%
Handicap	0.5 \pm 0.6	58%

Significant improvements were observed in all domains of OHRQoL from pre-treatment to post-treatment. The mean scores for functional limitations decreased by 1.2 (from 2.3 \pm 1.1 to 1.1 \pm 0.7), with a t-value of 8.50 and $p < 0.001$. Similarly, physical pain showed a mean improvement of 1.4 (from 2.7 \pm 1.0 to 1.3 \pm 0.6, t-value = 9.85, $p < 0.001$), and psychological discomfort improved by 1.1 (from 2.1 \pm 1.2 to 1.0 \pm 0.7, t-value = 7.60, $p < 0.001$). Psychological disability had the greatest improvement of 1.0 (from 1.8 \pm 1.0 to 0.8 \pm 0.5, t-value = 9.00, $p < 0.001$), while social disability improved by 0.7 (from 1.6 \pm 1.1 to 0.9 \pm 0.6, t-value = 6.30, $p < 0.001$), and handicap improved by 0.7 (from 1.2 \pm 1.0 to 0.5 \pm 0.6, t-value = 8.15, $p < 0.001$). All comparisons were statistically significant ($p < 0.001$). (Table 4)

Table 4: Statistical Comparison of Pre- and Post-Treatment OHRQoL Scores

Domain	Pre-Treatment Mean (\pm SD)	Post-Treatment Mean (\pm SD)	Mean Difference	t-value	p-value
Functional Limitations	2.3 \pm 1.1	1.1 \pm 0.7	1.2	8.50	<0.001
Physical Pain	2.7 \pm 1.0	1.3 \pm 0.6	1.4	9.85	<0.001
Psychological Discomfort	2.1 \pm 1.2	1.0 \pm 0.7	1.1	7.60	<0.001
Psychological Disability	1.8 \pm 1.0	0.8 \pm 0.5	1.0	9.00	<0.001
Social Disability	1.6 \pm 1.1	0.9 \pm 0.6	0.7	6.30	<0.001
Handicap	1.2 \pm 1.0	0.5 \pm 0.6	0.7	8.15	<0.001

Post-treatment adverse effects and complications were reported as follows: 18.2% of participants experienced pain, with the majority reporting mild pain (15 cases) and 5 cases of moderate pain. 13.6% of participants had swelling, with mild swelling reported in 10 participants and 5 with moderate swelling. 6.4% of participants experienced infection, mostly mild (6 cases) with 1 case of moderate infection. Implant failure occurred in 3.6% of participants, with all failures classified as severe (4 cases). Additionally, 9.1% of participants reported other complications, with 8 cases of mild and 2 cases of moderate severity. (Table 5)

Table 5: Adverse Effects and Complications Post-Treatment

Adverse Effect/Complication	Frequency (n)	Percentage of Participants	Mild	Moderate	Severe
Pain	20	18.2%	15	5	0
Swelling	15	13.6%	10	5	0
Infection	7	6.4%	6	1	0
Implant Failure	4	3.6%	0	0	4
Other Complications	10	9.1%	8	2	0

IV. Discussion

The findings of this study demonstrate significant improvements in oral health-related quality of life (OHRQoL) following dental implant therapy for partially edentulous patients. The pre- and post-treatment OHRQoL scores, assessed using the OHIP-G 21, revealed considerable enhancement across all domains, including functional limitations, physical pain, psychological discomfort, psychological disability, social disability, and handicap.

Consistent with previous studies, patients in this study reported significant improvements in functional limitations, with 52% reduction in the mean score [14,15]. This suggests that implant therapy effectively restored the ability to chew, speak, and perform other essential oral functions, which aligns with findings from studies on prosthodontic treatments [16]. Similarly, the significant reduction in physical pain (52% improvement) is in agreement with findings by Emami et al. (2009), who noted the positive impact of implants on relieving pain and discomfort associated with partial edentulism [17].

The improvements in psychological discomfort and psychological disability (52% and 56% improvements, respectively) are particularly noteworthy, as they suggest that dental implants not only address physical issues but also contribute to improved mental well-being and self-esteem. These results are consistent with Johannsen et al. (2012), who observed a positive psychological impact of implant therapy, highlighting how the restoration of missing teeth can alleviate feelings of embarrassment and worry related to oral health [18]. The reduction in social disability (44% improvement) further supports this, indicating that participants felt more comfortable in social situations after their implant treatments, which is consistent with findings by Heydecke et al. (2003) [6].

The handicap domain saw the largest improvement (58%), indicating that dental implants had a significant impact on the participants' ability to perform daily activities and function at full capacity. This aligns with the work of Gerritsen et al. (2010), who found that tooth restoration, especially through implants, leads to better overall quality of life by reducing limitations in daily activities [19].

The results of the paired t-tests showed that the changes in OHRQoL scores were statistically significant across all domains, with p-values less than 0.001, reinforcing the effectiveness of implant therapy in improving both functional and psychological aspects of life. These findings are similar to those of Yoshida et al. (2016), who found that dental implants led to significant improvements in OHRQoL, particularly in patients with partial edentulism [20].

Adverse effects and complications post-treatment were relatively minimal, with pain and swelling being the most common issues, reported by 18.2% and 13.6% of participants, respectively. These findings are consistent with previous research, which has shown that while complications such as infection and implant failure can occur, they remain infrequent in well-executed implant therapies [21]. The low incidence of implant failure (3.6%) in this study is similar to the outcomes reported by Pjetursson et al. (2005), further supporting the effectiveness and reliability of dental implants [22].

The results of this study demonstrate that dental implants significantly improve OHRQoL in partially edentulous patients, particularly in terms of functional abilities, physical pain relief, psychological well-being, and social participation. These findings contribute to the growing body of literature supporting the benefits of dental implants in restoring both physical function and quality of life for patients with partial edentulism.

V. Conclusion

This study showed that dental implant therapy significantly improves oral health-related quality of life (OHRQoL) in partially edentulous patients, with notable improvements in functional limitations, pain, psychological discomfort, disability, social participation, and handicap. Dental implants not only alleviate physical pain but also enhance psychological well-being and social interactions, contributing to a better overall quality of life. The findings highlight dental implants as an effective treatment for both functional and psychological improvements in patients with partial edentulism. With minimal adverse effects and a low

incidence of complications, dental implants are a safe and reliable solution for restoring function, comfort, and confidence in patients with missing teeth, significantly improving their quality of life.

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