

# Assessment and Evaluation of Quality of Life (OHRQoL) of Patients with Dental Implants Using the Oral Health Impact Profile (OHIP-14) - A Clinical Study

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## ABSTRACT

**Introduction:** Peri-implant tissue health is a requisite for success of dental implant therapy. Plaque accumulation leads to initiation of gingivitis around natural teeth and peri-implantitis around dental implants. Peri-implantitis around dental implants may result in implant placement failure. For obtaining long-term success, timely assessment of dental implant site is mandatory.

**Aim:** To assess and evaluate Quality of Life (OHRQoL) of individuals with dental implants using the Oral Health Impact Profile (OHIP-14).

**Materials and Methods:** Total 92 patients were evaluated for assessment of the health of peri-implant tissues by recording, Plaque Index (PI), Probing Pocket Depth (PD), Bleeding On Probing (BOP) and Probing Attachment Level (PAL) as compared to contra-lateral natural teeth (control). In the same patients Quality of Life Assessment was done by utilizing Oral Health Impact Profile Index (OHIP-14).

**Results:** The mean plaque index around natural teeth was more compared to implants and it was statistically significant. Other three dimensions mean bleeding on probing; mean probing attachment level and mean pocket depth around both natural teeth and implant surfaces was found to be not statistically significant. OHIP-14 revealed that patients with dental implants were satisfied with their Oral Health-Related Quality of Life (OHRQoL).

**Conclusion:** Similar inflammatory conditions are present around both natural teeth and implant prostheses as suggested by results of mean plaque index, mean bleeding on probing, mean pocket depth and mean probing attachment level, hence reinforcing the periodontal health maintenance both prior to and after incorporation of dental implants. Influence of implant prostheses on patient's oral health related quality of life (as depicted by OHIP-14) and patients' perceptions and expectations may guide the clinician in providing the best implant services.

**Keywords:** Dental implant, Dentistry, Periodontal health

## INTRODUCTION

Edentulism is known to be enfeebling and an irreversible phase and may be consorted by various regressive changes of the oral mucosa, oro-facial musculature, salivary tissues and other sensory and functional disorders. In spite of the fact that the prevalence of complete edentulism has reduced in course of the most recent decade, edentulism is still considered a note worthy disorder globally, especially among aged individuals. It can cause deterioration, functional snag, physical, psychological and social impairment, and handicap. Diminished tissue recovery and declined tissue defiance in the subjects without dentition can prejudice the defensive ability of the oral mucosa [1].

It is not possible for many edentulous individuals to cope up with the impediments of dentures; hence implant technology has turned into a more incessant arrangement. However, implant therapy has not been considered as a substitute to fixed and removable prosthesis [2]. Implants may present biological, mechanical, iatrogenic or patient-related failures [3,4]. Successful implant therapy is maximally dependent upon the health status of the peri-implant mucosal health. Plaque accumulation leads to initiation of gingivitis around both natural teeth and dental implants as it can induce an inflammatory reaction in gingival and alveolar mucosa. If left untreated, resorption of the underlying bone i.e., periodontitis around natural teeth and peri-implantitis around dental implants occur [5,6]. It has been found that patients are more contented with implant supported prosthodontic rehabilitation as far as aesthetics, restoration of the function, mucosal comfort and stability when compared to conventional prostheses [7].

The purpose of the present research was to assess health of peri-implant tissues and contra-lateral natural teeth (control) of same patient with regard to clinical parameters and also to evaluate patient satisfaction and their oral health related quality of life OHRQoL, after receiving dental implant therapy by utilizing the Oral Health Impact Profile (OHIP) [8,9]. OHIP-14 is a smaller version of Oral Health Impact Profile (OHIP-49) which estimates the people's attitude of the social impact of disorders affecting the oral cavity on the well being of an individual. This was introduced by Slade in 1997 [9]. The unwavering quality and legitimacy of the basic OHIP-49 and the derived shorter OHIP-14 questionnaires were esteemed perfect to evaluate the influence of oral health on masticatory capacity and psychosocial function and have been approved as reliable methods to quantify OHRQoL. Very limited studies have been performed with focus on the patients' experiences of implant treatment on oral health quality of life. OHIP-14 has been commonly adopted as a shortened 14-item questionnaire to estimate the impact of oral health on the quality of life [8,9].

**Research Hypothesis:** There will be significant difference in the health of peri-implant tissues and natural teeth and quality of life of subjects with dental implants and natural teeth.

**Null Hypothesis:** There will be no significant difference in the health of peri-implant tissues and natural teeth and quality of life of subjects with dental implants and natural teeth.

## MATERIALS AND METHODS

This research was carried out in College of Dentistry AlJouf University, over a period of 12 months, after obtaining clearance

from the institutional ethical clearance committee. A total number of 92 patients i.e. 48 males and 44 females, with 276 implants (94 in anterior region and 182 premolar and molar region) were enrolled in this research. Mean age of the participants was 43 years (range 25 - 68 years). All patients were treated using implants of the Straumann® Dental Implant System (Straumann AG, Basel, Switzerland) following a standardized method and as per the manufacturer's instructions. Patients included were medically healthy having their implants installed at least one year ago and who gave consent to participate in this research. The patients having natural teeth in contra lateral locations to the implant site in the jaw were chosen. Exclusion criteria were patients with systemic disease, periodontal disease and pregnant patients.

**Clinical Examinations:** The clinical examination was carried out by a single examiner and included the assessment of the following parameters at all implants and contra lateral natural teeth. Plaque Index (PI), Probing Pocket Depth (PD), Bleeding On Probing (BOP), Probing Attachment Level (PAL) were registered for the patients participating in this study. These measurements were carried out for the tissues around both implants and natural teeth (control) that were present symmetrically across the arch in the other side of the jaw. All control teeth in this study were natural teeth with no crowns or faulty restorations. Plaque index was recorded for each patient after examining the facial surfaces of the crowns of natural dentition or implants. The Probing Pocket Depth (PD), Probing Attachment Level (PAL) were assessed at four aspects i.e., three facial that included mesial, distal and mid facial and one mid-lingual location of each implant and contra lateral tooth with a periodontal probe (PCB 12; Hu-Friedy, Leimen, Germany). For standardization same probe with approximately same amount of pressure was used for probing natural teeth and implant surfaces. Bleeding On Probing (BOP) was also documented at four aspects per implant/tooth and calculated in percent per site.

**Quality of Life Assessment (Oral Health Impact Profile):** The subjects were informed to fill a quality of life survey, Oral Health Impact Profile (OHIP-14) [9]. The OHIP measures individuals' attitude of the social impact of oral disorders on their well being. The questionnaire constitutes seven dimensions comprising two items, out turning altogether 14 (OHIP 1-14). The seven dimensions of the questionnaire include limitation of the function, pain, psychological discomfort, physical and psychological disability, social disability and handicap. The patients response was to be recorded as one of the five categories i.e. never (0), hardly ever (1), occasionally (2), fairly often (3) and very often (4).

## STATISTICAL ANALYSIS

Mann-Whitney U test and unpaired t test were applied to find the differences between two groups. A statistical significance was set at 5% level of significance ( $p < 0.05$ ).

## RESULTS

The distribution of subjects according to number of implants placed is represented in [Table/Fig-1]. Majority of the participants were having three implants (25 patients) followed by one and two implants. The highest number of implants present in patient of the present study was six implants. [Table/Fig-2] shows statistically significant difference between the plaque accumulation around implants and natural teeth ( $t = -3.1123$ ,  $p = 0.0022$ ) at 5% level of significance. No statistically significant results were obtained when the bleeding on probing around implants and natural teeth was compared ( $t = -1.6082$ ,  $p = 0.1095$ ) at 5% level of significance [Table/Fig-2]. A non-significant difference was observed between implants and natural teeth with respect to pocket depth ( $t = 1.8489$ ,  $p = 0.0661$ ) and attachment level ( $t = 1.0552$ ,  $p = 0.2928$ ) at 5% level of significance [Table/Fig-2].

The distribution of responses to the OHIP-14 items is represented in [Table/Fig-3]. The distribution of the patient's response was almost uniform to all the OHIP-14 items. Less percentage of patients reported having problems very frequently in past one year. Mean scores ranged between 0.42 for unable to function to 1.23 for having been self conscious. Majority of the patients whose answer was 'never' was related to inability to function (72.82%), followed by unsatisfactory diet (69.56%) and generally less satisfied in life (66.30). More complaints were reported by the patients for becoming self conscious (45.65%) followed by trouble in pronouncing words (48.91%). According to the observation from the questionnaire response, majority of the participants were contented with their oral health and implant placement.

Number of patients	Number of implants for each patient
25	3
20	1
16	2
13	4
11	5
7	6

[Table/Fig-1]: Distribution according to number of implants placed per patient.

Variables	Comparison		t-value	p value
	Implants	Natural Teeth		
Plaque index	1.24±0.71	1.57±0.58	-3.1123	0.0022*
Bleeding on probing	25.24±0.46	25.42±0.97	-1.6082	0.1095
Probing depth (mm)	2.96±0.16	2.78±0.92	1.8489	0.0661
PAL	2.82±0.32	2.75±0.55	1.0552	0.2928

[Table/Fig-2]: Comparison of the mean plaque index, bleeding on probing, probing depth and PAL around implants and natural teeth.

\* Statistically significant

## DISCUSSION

Factors that predict the outcome of implant therapy are systemic health of the subject, oral hygiene habits, anatomic acceptability, periodontal disease, occlusal discrepancies, skill of the operator, amount of trauma during process, microbial contagion, number of implants supporting a prosthesis design and characteristics of the surface of implant. This cross-sectional study with 92 patients showed the results of peri-implant soft tissues in 276 implants restored with screw retained and cement retained crowns in function for a minimum of 1 year.

In the present study, plaque accumulation was significantly lower around the implants when compared to their natural control teeth. This observation was in accordance to the results by Vered Y et al., where the implants showed a significantly lower plaque accumulation than the natural teeth [10]. Sailer et al., also observed a statistical significantly higher plaque score at the natural teeth in comparison to titanium implant-supported reconstructions with all-ceramic and metal-ceramic crowns [11]. In contrast to this Ericsson et al., [12] Abreu et al., [13] Anand and Mehta., [14] and Bragger, et al., [15] found no statistically significant difference in plaque scores of dental implants and natural teeth.

Bleeding on probing was seen almost similar at the implants and the natural teeth. This finding was in accordance to Cutrim et al., [16] and Abreu, et al., [13] who observed no significant difference for BOP. Contrarily high frequency of bleeding on probing were observed by, Papaioannou, et al., [17] Blaschke and Volz [18] Bragger, et al., [15] and Guncu, et al., [19] in their studies. The escalated bleeding frequency at the implants is attributed to the biology of the peri-implant soft tissue structures. Absence of connective tissue fibre insertion to the implant surface as seen in the natural teeth and presence of less amount of blood vessels, cells

Dimension	Variables	0	1	2	3	4	Mean
Functional limitation	Have you had trouble pronouncing any words because of problems with your teeth, mouth, or dentures?	48.91	17.39	19.56	11.95	2.17	1.01
	Have you felt that your sense of taste has worsened because of problems with your teeth, mouth, or dentures?	55.43	15.21	13.04	10.86	5.43	0.96
Physical pain	Have you had painful aching in your mouth?	57.60	22.82	9.78	6.52	3.26	0.75
	Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth, or dentures?	51.08	16.30	14.13	9.78	8.69	1.09
Psychological discomfort	Have you been self-conscious because of your teeth, mouth, or dentures?	45.65	18.47	15.21	8.69	11.95	1.23
	Have you felt tense because of problems with your teeth, mouth, or dentures?	51.8	16.30	14.13	7.60	10.86	1.10
Physical disability	Has your diet been unsatisfactory because of problems with your teeth, mouth, or dentures?	69.56	22.82	1.08	3.26	3.26	0.48
	Have you had to interrupt meals because of problems with your teeth, mouth, or dentures?	64.13	20.65	7.60	5.43	2.17	0.61
Psychological disability	Have you found it difficult to relax because of problems with your teeth, mouth, or dentures?	56.52	20.65	9.78	8.69	4.34	0.84
	Have you been a bit embarrassed because of problems with your teeth, mouth, or dentures?	52.17	18.47	17.39	7.60	4.34	0.93
Social disability	Have you been a bit irritable with other people because of problems with your teeth, mouth, or dentures?	59.78	14.13	10.86	8.69	6.52	0.88
	Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?	54.43	20.65	11.95	5.43	7.60	0.91
Handicap	Have you felt that life in general was less satisfying because of problems with your teeth, mouth, or dentures?	66.30	24.99	5.43	2.17	1.08	0.47
	Have you been totally unable to function because of problems with your teeth, mouth, or dentures?	72.82	18.47	3.26	4.34	1.08	0.42

**[Table/Fig-3]:** Oral Health Impact Profile (OHIP-14) –questionnaire. Never (= 0), Hardly ever (= 1), Occasionally (= 2), Fairly often (= 3) and Very often (= 4)

and increased collagen fibres may lead to a greater susceptibility to plaque-induced inflammation and bleeding [20,21].

A non significant difference was documented in relation to the probing pocket depths and periodontal attachment level at implants and teeth. Studies by Abreu, et al., [13] Bragger, et al., [15] and Sailer, et al, [11] reported significantly increased probing depth and attachment level at dental implants compared to the natural dentition. Cutrim, et al., [16] observed a probing depth of 3mm in implants which was deeper in comparison with respective teeth. This difference was attributed to the density of peri-implant tissues, which may influence probing depth. The peri-implant tissue offers less resistance to clinical probing, and consequently, deeper penetration can be achieved by the probe around implants [16].

Original variety of OHIP comprises 49 questions categorized in seven dimensions according to Locker's model of oral health [22]. The OHIP-14 was developed as a shorter version of the OHIP-49. This is one of the most commonly used oral health related quality of life (OHRQoL) indicators globally. From the observation of this research, it can be perceived that individuals treated with implant were satisfied with the outcome of the treatment when assessed utilizing OHIP-14 questionnaire [23]. In accordance to this Rashika V [24], noted that subjects with implant therapy were satisfied with the outcome of the treatment when evaluated using the OHIP-14 questionnaire. Gatten, et al., [25] conducted a research to depict and correlate the quality of life of patients with restored, single endodontically treated teeth in contrast with patients having single implant-supported fixed prostheses. The authors adopted the smaller version of the Oral Health Impact Profile (OHIP-14) to survey the quality of the life of the patients and found identical overall OHIP scores and an increased level of satisfaction with both treatment modalities. Kuoppala et al., [26] observed that the subjects with implant-supported mandibular overdentures were satisfied with the results of the treatment when evaluated using OHIP-14 questionnaire. Similar to the present study data obtained from the subjects regarding their oral health-related quality of life with the aid of OHIP-14 questionnaire was not available before implant treatment. Ponsi J, et al., [27] evaluated the subjective oral health in subjects who received single dental implants in various anatomic positions using OHIP-14 questionnaire. The authors observed that replacement of missing teeth with single dental

implants in anterior and premolar areas may significantly improve subjective oral health.

## LIMITATION

Health of periodontal tissues around the different implant types, and different stages of implants is not considered in this study.

## CONCLUSION

Similar inflammatory conditions were existing around both natural teeth and implant prostheses as suggested by results of mean plaque index, mean bleeding on probing, mean pocket depth and mean probing attachment level, hence reinforcing the periodontal health maintenance both prior to and after implant therapy. The influence of implant prostheses on patient's oral health related quality of life (as depicted by OHIP-14) and patients' perceptions and expectations may guide the clinician in providing the best implant services. Follow up studies to evaluate the development of pockets around dental implants at different stages of the service life of the implants needs to be carried out.

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