

Oral Health–Related Quality of Life among Dental Implant Patients in Relation to Temporomandibular Joint Function

Rihab Abdul Hussein Ali, Saif Mohammed Radeef¹, Nawres Bahaa Mohammed², Ban Sahib Diab

Department of Pediatric and Preventive Dentistry, College of Dentistry/University of Baghdad, ¹Psychological Research Centre, Ministry of Higher Education and Scientific Research, University of Baghdad, ²Department of Oral and Maxillofacial Surgery, University of Al Ameer, Kerbala, Iraq

Abstract

Background: The placement of dental implants may enhance the oral health–related quality of life, which may influence temporomandibular joint function. **Aim:** The purpose of this study was to compare dental implant patients with partially and fully dentate patients in terms of oral health–related quality of life related to temporomandibular joint function. **Materials and Methods:** Ninety dental implant patients aged 50–60 years were included in the study, with 90 patients from other two groups who were matched in age and gender. For evaluation of oral health–related quality of life, Arabic version of Geriatric Oral Health Assessment Index was utilized. In order to define the occurrence and severity of temporomandibular joint disorders among patients, Helkimo Clinical Dysfunction Index was used. To analyze the data, SPSS 22 (Chicago, IL, USA) was employed. **Results:** Data revealed that the mean values of oral health–related quality of life and its three domains were higher among the fully dentate group than the other groups with a statistically significant difference. A similar picture was observed regarding the temporomandibular joint function. The mean values of oral health–related quality of life were decreasing significantly with increasing severity of temporomandibular disorders among the partially edentulous group. The same figure found concerning the three domains; however, the significant decreasing was found for physical domain only. **Conclusion:** After receiving oral implant therapy, the quality of life in relation to dental health had increased. The temporomandibular problems have an adverse effect on the dental health.

Keywords: Dental implant, oral health–related quality of life, temporomandibular joint function

INTRODUCTION

The dental community accepts and acknowledges that poor oral health can result in significant pain and suffering and that untreated mouth symptoms are a significant contributor to a worse quality of life.^[1] In actuality, both dental disease and the therapy itself can have a negative impact on oral health–related quality of life (OHRQoL).^[2] It is acknowledged by the World Health Organization as a crucial component of the Global Oral Health Program and is essential to overall health and well-being.^[3] Additionally, the quality of life has many facets and varies from person to person across time.^[4]

Numerous oral diseases have been identified in the literature as affecting OHRQoL. An illustration is edentulism, a condition that can impact dietary preferences, nutritional status, and masticatory function. According to reports, wearing dentures may make it difficult to eat satisfyingly,

speak effectively, or laugh freely.^[5,6] One of the most widely used scales for assessing OHRQoL was created by Atchison and Dolan, and it is known as the Geriatric (General) Oral Health Assessment Index (GOHAI).^[7] It was designed to assess three aspects of OHRQoL, including physical, psychological, and social functioning, as well as pain or discomfort.^[2,8]

The edentulous jaw is the primary focus of studies looking at how dental implants affect OHRQoL. OHRQoL is unfavorably impacted by the fully edentulous situation

Address for correspondence: Dr. Rihab Abdul Hussein Ali, Department of Pediatric and Preventive Dentistry, College of Dentistry, Health Directorate, University of Baghdad, Baghdad, Iraq. E-mail: alialredaalsalhi@gmail.com

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due to the incapability to masticate, slurred language, discomfort, and unhappiness with one's appearance.^[9,10] OHRQoL appears to be improved with implant therapy.^[11] The functionality of dental prostheses is considerably improved by dental implants, especially in the mandible.^[9,12] After implant therapy, Yeung^[13] discovered a general improvement in the OHRQoL ratings and patient satisfaction.

The condylar process of the mandible and the temporal bone of the skull are two common bones that articulate bilaterally, dynamically, and synovially at the temporomandibular joint (TMJ).^[14] TMJ performs a useful role in the masticatory system. It functions as a single unit with the blood supply, neurological system, masticatory muscles, jaws, periodontium, and teeth.^[15]

Temporomandibular disorders (TMDs) are a subset of craniofacial pain disorders that affect the TMJ, masticatory muscles, and related musculoskeletal structures of the head and neck with pain and dysfunction. It is the most frequent nondental source of discomfort in the orofacial area.^[16] Patients with TMD frequently experience localized pain, restricted jaw movement, and TMJ sounds when moving their jaw.^[17,18] TMD, which causes body discomfort and dysfunction, is the second most common musculoskeletal condition after chronic low back pain.^[19] Numerous research has linked TMD with the quality of life. However, both in terms of the diagnosis of TMD and the quality of life, these studies' methodologies are inconsistent and their findings are inconsistent.^[20,21] According to a review of the research, TMD patients experience a lower quality of life than people without this condition.^[22] Evidence recommends that an individual's impression of their physical, mental, and social well-being with regard to oral health may be negatively correlated with TMD symptoms,^[22,23] which is identified as OHRQoL.^[24] Understanding the OHRQoL impairment brought on by TMD experience may be crucial for oral health education and treatment seeking when TMD patients are taken into consideration.^[21]

Because there has been no previous Iraqi study concerning the OHRQoL and its domains among dental implant patients, the current study was conducted to evaluate these variables in addition to the relation with temporomandibular function.

MATERIALS AND METHODS

This study was carried out in Iraq between July 2021 and December 2022 among implant patients aged 50–60 years who were matched in terms of their age and gender with patients who were partially edentulous and fully dentate (90 patients in each group). The missing teeth in the partially edentulous group were in the posterior part of the jaws (both class I and class II Kennedy classification)

and ranging from 1 to 9 in number. From a variety of private implant clinics, a sample of implant patients was selected.

Inclusion criteria

All the participants included in this study could read and write, were in good health, and did not use any systemic medicines, and both sexes were eligible. Before taking part in this study, participants signed an informed consent form. The study's protocol has been permitted by the ethical council of the University of Baghdad, College of Dentistry.

The GOHAI (Arabic version) was utilized to evaluate the perceived oral health status.^[25] It had 12 questions covering three domains: physical function, for example, mastication, talking, and swallowing (items 1, 2, and 3); psychosocial function, such as worry or concern about oral health, self-image, self-consciousness about oral health, and avoiding social contact due to oral problems (items 6, 7, 9, and 10); and pain or discomfort related to dental conditions (items 5, 8, and 12).^[6,7]

All three groups of participants received the questionnaire. A Likert scale with three points was used to administer the GOHAI (always, sometimes, and never). After inverting the responses to three items, the GOHAI scores were calculated by adding 12 items (always, often = 1, seldom, sometimes = 2, never = 3) (item 3: swallow comfortably; item 5: eat anything without feeling discomfort; item 7: happy with looks). Each patient received a simple summative score, ranging from 12 to 36, with a higher score indicating better self-reported dental health.^[7,26]

It was done to do additional validity and reliability checks. After submitting the questionnaire for review by a psychology specialist, the questionnaire's validity was established.

Validity

The researcher used parametric statistic means to statistically analyze the research data after applying the OHRQoL scale to the research sample of 270 people. Because the distribution of the sample members' degrees on the scale was moderately distributed if the values of both skewness and kurtosis were less than 1, the researcher turned to this approach because it yielded a number of statistical indicators shown in Table 1.

Table 1: Descriptive statistical characteristics of the research sample on the OHRQoL scale

No.	Statistics	Value	No.	Statistics	Value
1	Mean	30.37	5	Skewness	−0.45
2	Median	31	6	Kurtosis	−0.50
3	Mode	32	7	Minimum	23
4	Standard deviation	2.91	8	Maximum	36

Correlation of item score with the total score of scale (item validity)

It is the further technique that is used in examining the test items, which expresses the degree of the validity of the item, by discovering the correlation coefficient between the degree of each item and the total degree in the test, as the total degree states what the test truly measures: the correlation of each item of the scale with the total score on the scale.^[27]

In order to do this, the researcher used the Pearson correlation coefficient to determine the relationship between the degree of each paragraph of the quality-of-life scale and the overall sample score of 270. The correlation coefficients ranged from 0.30 to 0.64, and it was clear that there was a statistically significant relationship when the correlation values were balanced with the Pearson tabular correlation coefficient value of 0.10 at the level 0.05 and degree of freedom 268, and Table 2 shows that.

Reliability of oral health–related quality-of-life measure

The reliability of test results is the degree to which they are free from irregular measurement errors. Then consistency and measurement precision are examples of reliability in this context.^[28] Using Alpha Cronbach's coefficient of reliability and the data from the entire sample, the researcher confirmed the stability of the quality-of-life scale (0.82).

Temporomandibular joint function

The frequency and severity of TMD among patients were determined using the Helkimo Clinical Dysfunction (Di) (objective clinical dysfunction) Index. Clinical examination included additional oral examination, palpation, and observation of muscles discomfort, TMJ pain, and pain with the movement of the mandible in all patients as a part of the clinical dysfunction portion.^[29] A modified version of Helkimo's Dysfunction Index (Di) was computed in order to complete the clinical dysfunction examination. According to the severity of the clinical findings for the Helkimo Clinical Index, patients were categorized into four groups (Di0–DiIII).^[30]

The opening of the mandible, deviation during opening, TMJ dysfunction, pain in the preauricular region, and palpation of the masticatory muscles including the temporalis, masseter, and lateral pterygoid were all parts of the clinical examination. The clinical evaluation was completed as follows^[31]:

- a. Opening range: The patient was asked to gently open the mouth to measure the opening range, which was then recorded by a vernia. If the distance between the upper and lower central incisors was greater than 40 mm, it received a score of 0; if between 30–39 mm, it received a score of 1; and if it was less than 30 mm, it received a score of 5.
- b. TMJ dysfunction: Without using a stethoscope, the TMJ was assessed for clicking, locking, and luxation. Scores ranged from 0 for no impairment to 1 for palpable clicking to 5 for obvious clicking, locking, and luxation.
Mandibular deviation during lowering: The patient was instructed to slightly open lips; deviation between maxillary and mandibular midlines noted; score of 0 if less than 2 mm, 1 if 2–5 mm, and 5 if greater than 5 mm recorded.
- c. Muscle pain: For the muscles of mastication, a bilateral examination was done; a score of 0 indicates no discomfort, a score of 1 indicates tenderness with palpation at one to three places, and a score of 5 indicates tenderness at more than or equal to four sites.
- d. TMJ pain: TMJ was palpated bilaterally to determine whether it was painful. A score of 0 indicated no discomfort, a score of 1 indicated lateral tenderness, and a score of 5 indicated posterior tenderness.
- e. Pain with the movement of mandible: Mandibular movements such as opening, protrusion, retersion, and lateral extrusion were requested of the patient. Scores ranged from 0 (no discomfort with movement), 1 (pain with 1 movement), to 5 (pain with at least two movements).

The scores given for each of the five symptoms were summed up. The total dysfunction score for each person ranged from 0 to 25 points. The more severe/acute the disorder, the higher the score. Patients were categorized into four groups based on the results: Di0, no malfunction; DiI, mild dysfunction (1–4 points); DiII, moderate dysfunction (5–9 points); and DiIII, severe dysfunction (9–25 points).^[31]

Statistical analysis

Statistical analysis of the data was performed using SPSS 22 (Chicago, IL, USA). Means, standard error, the independent-samples T test technique, and ANOVA (one way) were used as statistical tests. A *P* value of less than or equal to 0.05 was used to define statistical significance.

Table 2: Statistical analysis of the items of the OHRQoL scale using the item-to-total-score relationship method

Item	Correlation coefficient	Significant	Item	Correlation coefficient	Significant	Item	Correlation coefficient	Significant
1	0.46	Significant	5	0.35	Significant	9	0.55	Significant
2	0.58	Significant	6	0.3	Significant	10	0.55	Significant
3	0.51	Significant	7	0.45	Significant	11	0.5	Significant
4	0.64	Significant	8	0.6	Significant	12	0.35	Significant

Ethical approval

The study was carried out in conformity with the ethical standards set forth in the Helsinki Declaration. Before a sample was taken, it was done with the patient's verbal and analytical consent. A local ethics committee evaluated and approved the study protocol as well as the consent form and subject information according to the document number 329321 on 4-4-2021 by College of Dentistry/ University of Baghdad to get this approval.

RESULTS

The total sample included 90 patients in each group (implant, partially edentulous, and fully dentate). Table 3 illustrates the mean value of OHRQoL for the three groups as it was higher among the fully dentate group followed by the implant and finally the partially edentulous groups with a statistically significant difference ($P \leq 0.05$) among the three groups. The same result found concerning (physical, psychosocial, and pain or discomfort) domains as shown in Table 4.

Table 5 illustrates the mean values of OHRQoL with its domains (physical, psychosocial, and pain or discomfort) for the implant group by Helkimo Clinical Dysfunction (Di) (Di, DiI, DiII, and DiIII) Index compared with the partially edentulous and fully dentate groups. Results showed that the mean values of OHRQoL with its domains were higher among the fully dentate group followed by the implant and finally the partially edentulous groups for all levels of severity: Di0 (no dysfunction), DiI (mild dysfunction), DiII (moderate dysfunction), and DiIII (sever dysfunction), with a statistically significant difference ($P \leq 0.05$) among the three groups.

Inside each group, data revealed that the mean values of OHRQoL were decreasing significantly with increasing

severity of TMD among the partially edentulous group. The same figure found concerning OHRQoL domains; however, the significant decreasing was found for physical domain only.

DISCUSSION

One of the prevalent developments in dentistry is the introduction of osseointegrated implants.^[32] The present study found that the mean values of OHRQoL, and physical, psychosocial, and pain or discomfort domains were higher among the fully dentate group followed by the implant and finally the partially edentulous groups with a statistically significant difference among the three groups. This was in line with the findings of numerous earlier research.^[33-35] This might be explained by the possibility that losing a tooth negatively impacts people's life, especially in terms of its psychological implications. These include lacking self-assurance and self-worth, refraining from laughing in public or even avoiding social interaction altogether.^[13] The retention and stability have been improved with dental implants. Along with enhancing stability and functionality, attachment to implants also improves patient happiness. Additionally, implant connection enhances neuromuscular activity, enhancing edentulous patients' masticatory function.^[35,36] Additionally, it has been shown that people with implants can masticate with two times as much force as people wearing traditional dentures. It was conceivable to determine that the perception of OHRQoL in the domains connected to functional limitation, physical pain, psychological discomfort, physical disability, psychological impairment, social handicap, and social disadvantage improved after treatment with dental implants. Most patients had improved OHRQoL and self-perception, which may have a favorable impact on people's life in general and on psychological and social elements.^[34]

Table 3: Mean values of OHRQoL for the implant group compared with the partially edentulous and fully dentate groups

Variables	Groups						F test	P value
	Implant		Partially edentulous		Fully dentate			
	Mean	±SE	Mean	±SE	Mean	±SE		
OHRQoL	31.07	0.15	25.90	0.14	33.20	0.13	681.82	0.00

Table 4: Mean values of OHRQoL domains (physical, psychosocial, and pain or discomfort) for the implant group compared with the partially edentulous and fully dentate groups

Domains	Groups						F test	P value
	Implant		Partially edentulous		Fully dentate			
	Mean	±SE	Mean	±SE	Mean	±SE		
Physical	11.11	0.07	8.73	0.08	11.78	0.04	493.12	0.00
Psychosocial	13.07	0.08	10.74	0.06	14.04	0.08	462.93	0.00
Pain or discomfort	6.88	0.07	6.42	0.07	7.36	0.07	40.67	0.00

Table 5: Mean values of OHRQoL with its domains (physical, psychosocial, and pain or discomfort) for the implant group by Helkimo Clinical Dysfunction (Di) compared with the partially edentulous and fully dentate groups

Variables	Helkimo (Di)	Groups						F	P value
		Implant		Partially edentulous		Fully dentate			
		Mean	±SE	Mean	±SE	Mean	±SE		
Pain or discomfort	Di0	7.37	0.13	6.64	0.17	7.71	0.11	5.12	0.00
	DiI	6.91	0.09	6.50	0.11	7.66	0.09	16.88	0.00
	DiII	6.80	0.24	6.35	0.13	7.35	0.28	8.48	0.00
	DiIII	6.68	0.18	6.00	0.16	7.19	0.33	20.14	0.00
	F	1.93		2.49		1.43			
	P	0.13		0.06		0.23			
Psychosocial	Di0	13.26	0.20	10.85	0.12	14.09	0.18	104.56	0.00
	DiI	13.18	0.11	10.80	0.10	14.07	0.10	213.63	0.00
	DiII	12.80	0.17	10.58	0.13	13.85	0.34	66.05	0.00
	DiIII	12.50	0.26	10.53	0.14	13.83	0.30	58.83	0.00
	F	2.71		1.33		0.30			
	P	0.06		0.26		0.82			
Physical	Di0	11.20	0.18	8.90	0.18	11.85	0.10	82.10	0.00
	DiI	11.14	0.10	8.88	0.13	11.83	0.05	242.89	0.00
	DiII	11.02	0.14	8.65	0.16	11.71	0.14	100.92	0.00
	DiIII	11.00	0.32	8.15	0.22	11.50	0.22	50.54	0.00
	F	0.30		3.09		1.60			
	P	0.82		0.03		0.19			
OHRQoL	Di0	31.25	0.37	26.25	0.28	33.42	0.21	136.42	0.00
	DiI	30.94	0.20	26.11	0.22	33.26	0.17	324.36	0.00
	DiII	30.87	0.36	25.80	0.25	33.05	0.61	109.66	0.00
	DiIII	30.80	0.54	24.69	0.34	33.00	0.73	82.40	0.00
	F	0.50		5.04		0.34			
	P	0.68		0.00		0.79			

Regarding the TMJ function, results showed that the mean values of OHRQoL with its domains were higher among the fully dentate group followed by the implant and finally the partially edentulous groups for all parts of Helkimo Clinical Dysfunction Index with a statistically significant difference among the three groups and a decrease with increasing severity of TMD, especially the physical domain of quality of life. This was in agreement with the results stated by frequent previous research.^[21,37,38] This may be as a result of the possibility that TMD experience is linked to impairment in a number of OHRQoL characteristics. For instance, the most prevalent symptom of TMD is orofacial discomfort, which is quite debilitating patients' quality of life.^[23,38] Additionally, it has been noted in another oral health condition that excruciating pain may interact with other quality-of-life factors including mood and the capacity to carry out everyday tasks like job or school. Additionally, TMD sufferers have trouble chewing, which is known to have a poor impact on OHRQoL.^[39] The symptoms of this chewing issue are frequently alleviated by dietary changes. Dietary alterations are included in the conservative management strategies for TMD, which has been shown to significantly impact food enjoyment, a crucial component of OHRQoL. Additionally, TMD sufferers may hear a clicking or grating, which may interfere with their ability to socialize.^[38,39]

CONCLUSION

Within the confines of this research, it was established that OHRQoL improved following oral implant treatment. Additionally, the severity of a temporomandibular condition has a detrimental effect on OHRQoL, particularly when joint and muscle clinical symptoms are present at the same time. To confirm the long-term advantages of oral implantology with regard to OHRQoL and temporomandibular dysfunction, a study with a longer follow-up time is required. Analyzing the potential impacts of numerous implant management methods might also be quite interesting.

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Conflicts of interest

There are no conflicts of interest.

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