

Original

Use of the Arabic version of Oral Health Impact Profile-14 to evaluate the impact of periodontal disease on oral health-related quality of life among Jordanian adults

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Abstract: We used the short-form of the Oral Health Impact Profile (OHIP-14) to assess the impact of periodontal diseases on the quality of life of Jordanian adults. A systematic random sample of 400 individuals was selected from patients referred to the periodontics clinic at the Dental Teaching Center in Irbid, Jordan. Those willing to participate were examined by specifically trained dentists and requested to complete the Arabic short-form version of the OHIP-14 questionnaire. Multivariate analysis of differences in OHIP-14 subscales among the periodontal disease groups was conducted using the general linear model multivariate procedure. This study included 400 adults (164 men and 236 women) aged between 18 and 60 years, with a mean (SD) of 36.7 (11.9) years. Of the 400 participants, 41.8% had chronic gingivitis, 19.8% had mild periodontitis, 23.3% had moderate periodontitis, and 15.3% had severe periodontitis. "Fairly often" or "very often" was reported for one or more items of the OHIP-14 by fewer than one-third of patients with gingivitis (32.9%) or mild periodontitis (31.6%), by about one-half of patients with moderate periodontitis (53.8%), and by about two-thirds of those with severe periodontitis (63.9%). There was a statistically significant association between the severity of periodontal

disease and OHIP-14 scores ($P < 0.05$). Severe chronic periodontitis had a significantly greater impact on quality of life, specifically with regard to physical pain and physical disability ($P < 0.05$). Physical pain and physical disability were the dimensions most affected, and all OHIP-14 scores were significantly associated with severity of periodontal disease after adjusting for common confounders. (J Oral Sci 54, 113-120, 2012)

Keywords: periodontal disease; clinical attachment level; quality of life.

Introduction

Periodontal diseases cause a wide range of clinical signs and symptoms, some of which can have a considerable impact on quality of life (QoL) (1). Oral Health-Related Quality of Life (OHRQoL) is a multidimensional construct that reflects comfort when eating, sleeping, and engaging in social interaction; self-esteem; and satisfaction with oral health (2).

A number of studies have observed that periodontal diseases have negative effects on the QoL of affected individuals (3-9). These negative effects were reported to be greater among patients with severe periodontitis. Some studies have shown that periodontitis can affect not only the ability to eat, speak, and socialize but also interpersonal relationships and daily activities (3,5-9). Interestingly, it can even affect patients' smiling pattern and smile-related QoL (10).

A better understanding of the consequences of periodontal disease and its treatment on patients' perception

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of the link between oral health and QoL might assist in ensuring that planning and evaluation of periodontal care and treatment adequately address the needs and concerns of patients (11,12). As compared with simple knowledge of the effects of oral diseases on teeth and surrounding tissue, people are more likely to behave positively when they have a more comprehensive understanding of how such diseases affect their general health and QoL (13). We assessed the impact of periodontal diseases on QoL among a sample of Jordanian adults.

Methods

Participants

This cross-sectional study enrolled patients who were referred to dental clinics at the Department of Periodontology at the Dental Teaching Center of Jordan University of Science and Technology in Irbid, Jordan, which provides care for university students, employees, and their families who are insured and receive treatment from highly qualified consultants. The dental students provide dental treatment free of charge to the general population of north Jordan as part of their clinical training. Moreover, in accordance with agreements between Jordan University of Science and Technology and other institutions, employees of the government receive specialized dental treatment against appropriate fees.

A systematic random sample of 400 patients who were aged 18 years or older and had at least 15 teeth present was selected over the 6-month period from January through June 2009. For systematic random sampling, a number within the sampling interval was chosen. We selected a random number between 1 and 10 using random number tables. Then, every 10th person aged 18 years or older after the first number chosen was selected each day for the entire study period. Selection of every 10th person allowed participants to be interviewed and examined without delay. During sampling, any patient who met the exclusion criteria was excluded and replaced by the next patient. The exclusion criteria were: 1) presence of a mental or psychological disorder or use of antipsychotic medication, 2) need for antibiotic coverage during routine dental procedures, 3) presence of removable dentures, 4) presence of carious lesions or symptomatic oral lesions.

Data collection

This study was approved by the Institutional Review Board of Jordan University of Science and Technology. Informed verbal consent was obtained from all eligible participants. Using a structured questionnaire, personal interviews were held to collect baseline data from each

participant. The questionnaire asked about sociodemographic and other relevant characteristics, including age (years), sex, marital status, years of education, total family income (Jordanian dinars), family size, self-reported history of chronic conditions, regular use of medication at the time of data collection, smoking status, frequency of brushing, and previous dental visits and periodontal treatments during the past 6 months. Participants were also asked if they had ever received a diagnosis of, or been told by a physician that they have, any chronic illnesses.

Instrument

The OHIP-14 was used to measure the impact of periodontal diseases on QoL. The OHIP-14 is a self-administered questionnaire that measures QoL using 14 items to capture measures of seven dimensions: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each dimension is measured by two questions. Subjects were asked how frequently they had experienced negative impacts in these dimensions during the preceding 12 months. Responses to the items were recorded by using a five-point Likert scale: 0, never; 1, hardly ever; 2, occasionally; 3, fairly often; 4, very often. An impact was recorded as present for any item if the response was fairly often or very often (≥ 3 on the 5-point Likert scale). The percentage of subjects reporting fairly often or very often on one or more items of OHIP-14 was calculated (14). The overall score for the OHIP-14 was obtained by summing all responses and thus ranged from 0 to 56 points (14,15). The English version of the OHIP-14 was translated to Arabic and linguistically and culturally adapted to our setting by using the back-translation technique (16). In this procedure, two bilingual periodontists independently translated the English version to Arabic. They then conferred and produced a consensus Arabic version, which was translated back to English by a professional translator who had never seen the original version. The conceptual equivalence between the English version of OHIP-14 and the back-translated version was confirmed by an expert committee of five researchers in periodontics and public health. The Arabic version was pilot tested on 30 selected patients to assess face validity and content validity within the target population. The comprehensiveness of the instrument was tested by asking about difficulties in understanding the items. All changes that were required to improve the intelligibility of the OHIP-14 were carried out during pilot testing. In producing the final Arabic version, we changed the question text from "How often you had problems with your

teeth, mouth or denture” to “How often you had problems with your teeth and gums” to focus on the effect of periodontal problems.

Psychometric properties

The psychometric properties, validity, and reliability of the Arabic version of the OHIP-14 were tested. A group of 40 patients was requested to complete the final questionnaire on two different occasions separated by 7 days to assess the test-retest reliability. The item validity of the OHIP-14 was considered to be satisfactory if the correlations between items and the hypothesized scale (item internal consistency) exceeded 0.40 and if the correlation between each item and its hypothesized scale (corrected for overlap) was higher than the correlation between that item and the other scales (item discriminant validity). Scale validity was considered to be satisfactory if the reliability of scale scores using internal consistency methods (Cronbach’s alpha) was acceptable (≥ 0.70) (17).

Clinical examination

All participants underwent a clinical periodontal examination by a professional dental hygienist. The oral hygiene of six selected teeth and the periodontal status of all teeth, excluding third molars, were assessed using the plaque index (PI) of Loe and Silness (18), the gingival index (GI) of Silness and Loe (19), probing pocket depth (PPD), and clinical attachment loss (CAL). The six selected teeth were the Ramfjord teeth, which include the maxillary right first molar, the maxillary left central incisor, the maxillary left first premolar, the mandibular left first molar, the mandibular right central incisor, and the mandibular right first premolar. Sterile dental mirrors and explorers were used to assess plaque accumulation and gingival status, and William’s periodontal probes (Astir Intermedica, London, UK) were used to measure PPD and CAL. Six representative teeth and four surfaces (mesiofacial, midfacial, distofacial, and midlingual) of each studied tooth were assessed and scored for PI. PPD and CAL were measured at six sites (mesiofacial, midfacial, distofacial, mesiolingual, midlingual, and distolingual) per tooth for all teeth, excluding third molars. The numbers of decayed teeth (DT), filled teeth (FT), and missing teeth (MT) for each participant were recorded according to WHO criteria (20). The mean PI, GI, PPD, and CAL over all examined surfaces or sites, as well as the percentages of sites with $CAL \geq 3$, $CAL \geq 4$ mm, $PPD \geq 3$ mm, and $PPD \geq 4$ mm were calculated for each participant. The percentages of sites meeting the severity criteria for PPD and CAL were calculated for each subject

Table 1 Sociodemographic, clinical, and other relevant characteristics of participants

Variable	n (%)
Age (years)	
<30	150 (37.5)
30-40	98 (24.5)
>40	152 (38.0)
Sex	
Male	164 (41.0)
Female	236 (59.0)
Marital status	
Single	131 (32.8)
Married	269 (67.3)
Years of education	
≤ 12	212 (53.0)
> 12	188 (47.0)
Family income (Jordanian dinars)	
≤ 300	213 (53.3)
> 300	187 (46.8)
Family size	
≤ 5	140 (35.0)
> 5	260 (65.0)
Smoking	
Yes	95 (23.8)
No	305 (76.3)
Systemic disease	
Yes	46 (11.5)
No	354 (88.5)
Frequency of brushing/day	
≤ 1	216 (54.0)
> 1	184 (46.0)
Frequency of dental visits	
Regular	57 (14.3)
Irregular	105 (26.3)
For pain	238 (59.5)
History of periodontal treatment	
Yes	158 (39.5)
No	242 (60.5)

by dividing the number of sites meeting the criteria by the total number of sites measured. Periodontitis was defined as the presence of four or more teeth with one site or more with $PPD \geq 4$ mm and $CAL \geq 3$ mm. The severity of chronic periodontitis was classified as mild (attachment loss of 1 to 2 mm), moderate (attachment loss of 3 to 4 mm), and severe (attachment loss of 5 mm or more) (21). A carefully trained clinical examiner conducted the clinical examinations 15 days before the start of the study. Intra-examiner reproducibility for the PPD and CAL examinations was assessed by double recordings in 23 subjects. The repeat recordings were made 7 days after the first clinical examination. The intraclass correlation coefficients for intra-examiner reproducibility were 0.87 for mean PPD and 0.93 for mean CAL. Regarding intra-rater agreement on periodontitis diagnosis, the overall intra-rater percentage of agreement and kappa

Table 2 Oral hygiene and periodontal status of participants by age

Variable	Age (years)			Total Mean (SD)	<i>P</i> value
	< 30 Mean (SD)	30-40 Mean (SD)	> 40 Mean (SD)		
Plaque index (PI)	1.27 (0.48)	1.31 (0.45)	1.41 (0.45)	1.34 (0.47)	0.023
Gingival index (GI)	1.78 (0.45)	1.85 (0.24)	1.81 (0.27)	1.81 (0.35)	0.292
Probing pocket depth (PPD)	2.05 (0.70)	2.48 (0.79)	2.77 (0.64)	2.43 (0.77)	< 0.005
Clinical attachment loss (CAL)	2.12 (0.85)	2.82 (1.15)	3.77 (1.34)	2.92 (1.34)	< 0.005
Percentage of sites with:					
PPD \geq 3	18.3 (24.6)	35.1 (30)	49.5 (23.1)	34.3 (28.6)	< 0.005
PPD \geq 4	7.8 (17.8)	19.9 (22.7)	24.2 (19.1)	17.0 (20.9)	< 0.005
PPD \geq 5	3.9 (10.7)	9.0 (13.9)	9.2 (11.6)	7.1 (12.2)	< 0.005
CAL \geq 3	19.7 (26.0)	43.0 (34.2)	67.8 (28.0)	43.7 (35.7)	< 0.005
CAL \geq 4	9.8 (21.0)	29.8 (30.7)	51.4 (29.9)	30.5 (32.6)	< 0.005
CAL \geq 5	5.4 (14.4)	16.2 (22.6)	23.8 (27.7)	18.5 (25.2)	< 0.005

statistic were 0.91 and 0.81, respectively, indicating very good agreement.

Statistical analysis

The Statistical Package for Social Sciences (SPSS, version 11.5, Chicago, IL, USA) was used for data processing and data analysis. The characteristics of variables were described using frequency distribution for categorical variables and mean and standard deviation for continuous variables. The chi-square test was used to assess associations between categorical variables. The general linear model multivariate procedure was used for multivariate analysis of differences in OHIP-14 subscales among periodontal disease groups. This procedure provided regression analysis and analysis of variance for multiple dependent variables (subscales) by different explanatory variables and covariates. A *P* value of less than 0.05 was considered statistically significant.

Results

Participant characteristics

This study comprised 400 adults (164 men and 236 women) aged between 18 and 60 years, with a mean (SD) of 36.7 (11.9) years. Their sociodemographic, clinical, and other relevant characteristics are shown in Table 1. Fewer than half (47.0%) had more than 12 years of education.

Oral hygiene and periodontal status

Of the 400 patients, 41.8% had chronic gingivitis, 19.8% had mild periodontitis, 23.3% had moderate periodontitis, and 15.3% had severe periodontitis. Overall, the mean number of missing teeth was 2.5 (3.2), and 38.8% of participants had no missing teeth. The oral

hygiene and periodontal status of participants according to age is shown in Table 2. The severity and extent of periodontal disease increased with advancing age.

Psychometric properties of the OHIP-14

Table 3 shows the psychometric properties, reliability, and validity of the Arabic version of the OHIP-14. Cronbach's alpha was 0.89, indicating high internal consistency of the OHIP-14. The correlation between OHIP subscales and the OHIP total score ranged from 0.64 to 0.77. The test-retest correlation coefficient ranged from 0.81 to 0.97 for all individual items and from 0.85 to 0.97 for the subscale scores, indicating that the subscales are reproducible on different occasions. Item internal consistency and item discriminant validity were satisfactory for all subscales because the correlations between items and their hypothesized subscales (item internal consistency) exceeded 0.40 and the correlation between each item and its hypothesized scale (corrected for overlap) was higher than the correlation between that item and the other subscales (item discriminant validity).

Impact of periodontal diseases on QoL

Table 4 shows the distribution of responses to OHIP items for all subjects. Figure 1 shows the percentages of patients reporting fairly often/very often on one or more items of the OHIP-14 by periodontal disease severity. Fairly often/very often was reported on one or more items of OHIP-14 by fewer than one-third of patients with gingivitis (32.9%) or mild periodontitis (31.6%), about one-half of those with moderate periodontitis (53.8%), and about two-thirds of those with severe periodontitis (63.9%).

Physical pain was the most frequently reported

Table 3 Psychometric properties, validity, and reliability of OHIP-14 (Arabic version)

Component	Mean \pm SD	Range	Correlation between total OHIP score and OHIP subscales	Item internal consistency*	Item discriminant validity**	Test-retest validity
OHIP 1 Functional limitation	0.58 (1.08)	0-7	0.64	(0.63, 0.84)	(0.13, 0.24)	0.85
OHIP 2 Physical pain	2.79 (1.83)	0-8	0.73	(0.75, 0.81)	(0.14, 0.35)	0.95
OHIP 3 Psychological discomfort	1.48 (1.41)	0-7	0.64	(0.49, 0.91)	(0.05, 0.10)	0.88
OHIP 4 Physical disability	1.46 (1.53)	0-8	0.74	(0.80, 0.82)	(0.10, 0.38)	0.96
OHIP 5 Psychological disability	1.95 (1.72)	0-7	0.77	(0.70, 0.84)	(0.06, 0.34)	0.90
OHIP 6 Social disability	1.34 (1.53)	0-7	0.77	(0.71, 0.88)	(0.08, 0.33)	0.97
OHIP 7 Handicap	1.42 (1.56)	0-6	0.71	(0.60, 0.90)	(0.10, 0.46)	0.92
OHIP		0-34		(0.51, 0.67)		0.93

OHIP-14: Oral Health Impact Profile-14 * The range of correlations between items that are included in the hypothesized subscale and the hypothesized subscale score (item internal consistency). Item internal consistency is satisfactory if correlations between the items and their subscale scores exceed 0.40. ** The range of correlations between items of a hypothesized subscale and the total scores of other subscales (item discriminant validity). Item discriminant validity is satisfactory if the correlation between each item and its hypothesized scale is higher than the correlation between that item and the other subscales

Table 4 Distribution of responses to individual OHIP items

	Never <i>n</i> (%)	Hardly ever <i>n</i> (%)	Occasionally <i>n</i> (%)	Fairly often <i>n</i> (%)	Very often <i>n</i> (%)
Functional limitation					
trouble pronouncing words	373 (93.3)	7 (1.8)	15 (3.8)	0 (0.0)	5 (1.3)
worsened sense of taste	300 (75.0)	38 (9.5)	49 (12.3)	11 (2.8)	2 (0.5)
Physical pain					
painful aching	117 (29.3)	60 (15.0)	174 (43.5)	37 (9.3)	12 (3.0)
uncomfortable to eat	143 (35.8)	58 (14.5)	135 (33.8)	35 (8.8)	29 (7.3)
Psychological discomfort					
self-conscious	349 (87.3)	25 (6.3)	20 (5.0)	4 (1.0)	1 (0.3)
felt nervous	156 (39.0)	58 (14.5)	132 (33.0)	27 (6.8)	27 (6.8)
Physical disability					
diet has been unsatisfactory	293 (73.3)	38 (9.5)	49 (12.3)	16 (4.0)	4 (1.0)
interrupted meals	169 (42.3)	100 (25.0)	112 (28.0)	15 (3.8)	3 (0.8)
Psychological disability					
difficult to relax	193 (48.3)	96 (24.0)	93 (23.3)	15 (3.8)	3 (0.8)
embarrassment	193 (48.3)	51 (12.8)	98 (24.5)	36 (9.0)	22 (5.5)
Social disability					
irritable with other people	233 (58.3)	50 (12.5)	81 (20.3)	24 (6.0)	12 (3.0)
difficulty doing usual jobs	259 (64.8)	80 (20.0)	57 (14.3)	4 (1.0)	0 (0.0)
Handicap					
less satisfaction	204 (51.0)	53 (13.3)	89 (22.3)	27 (6.8)	27 (6.8)
unable to function	297 (74.3)	63 (15.8)	35 (8.8)	5 (1.3)	0 (0.0)

OHIP-14: Oral Health Impact Profile-14

complaint among participants (Table 5). All subscale scores, except that for functional limitation, significantly differed by periodontal disease severity. The average OHIP-14 score was significantly higher in patients with severe or moderate periodontitis than in patients with

chronic gingivitis or mild periodontitis. As compared with patients with gingivitis or mild periodontitis, patients with severe periodontitis had significantly higher average scores for the physical pain, physical disability, social disability, and handicap subscales. Patients with

Table 5 Multivariate analysis of differences on OHIP-14 subscales by periodontal disease severity

Components	Chronic Gingivitis (n = 167) (A) Mean (SD)	Mild Periodontitis (n = 79) (B) Mean (SD)	Moderate periodontitis (n = 93) (C) Mean (SD)	Severe periodontitis (n = 61) (D) Mean (SD)	Significant pairs
OHIP 1 Functional limitation	0.45 (0.89)	0.53 (1.0)	0.62 (1.1)	0.95 (1.48)	None
OHIP 2 Physical pain	2.32 (1.65)	2.14 (1.47)	3.27 (1.9)	4.18 (1.73)	A vs C, A vs D B vs C, B vs D C vs D
OHIP 3 Psychological discomfort	1.38 (1.35)	1.20 (1.35)	1.71 (1.59)	1.75 (1.28)	B vs D
OHIP 4 Physical disability	1.22 (1.36)	0.98 (1.24)	1.59 (1.54)	2.49 (1.78)	A vs D, B vs D C vs D
OHIP 5 Psychological disability	1.80 (1.64)	1.9 (1.74)	1.59 (1.54)	2.31 (1.74)	A vs D
OHIP 6 Social disability	1.21 (1.46)	1.03 (1.42)	1.55 (1.57)	1.77 (1.69)	A vs C, A vs D B vs D
OHIP 7 Handicap	1.14 (1.44)	1.03 (1.24)	1.78 (1.66)	2.11 (1.74)	A vs D, B vs C B vs D
OHIP-14	9.53 (7.12)	8.93 (6.61)	12.55 (7.35)	15.57 (7.49)	A vs C, A vs D B vs C, B vs D

OHIP-14: Oral Health Impact Profile-14

Adjusted for age, sex, years of education, medical illnesses, smoking status, and family income.

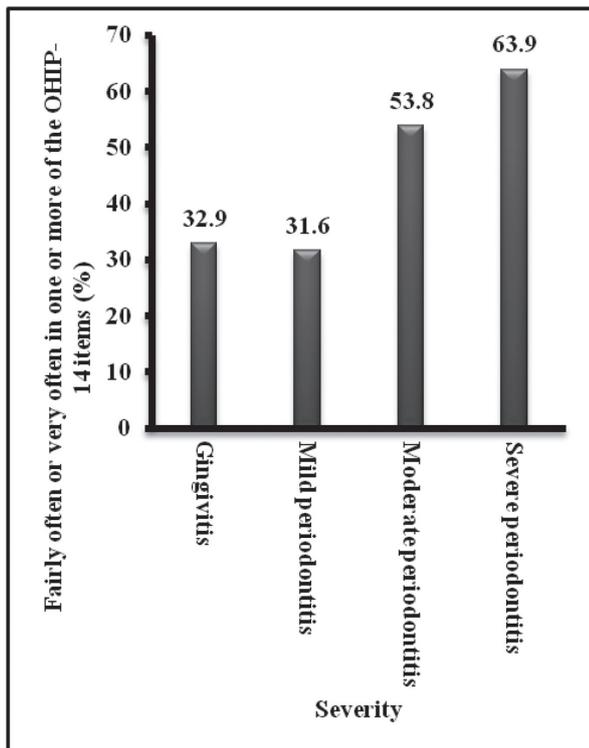


Fig. 1 Distribution of responses to OHIP-14 according to periodontal condition.

severe periodontitis had significantly higher mean scores for physical pain and physical disability than did patients with moderate periodontitis. Among patients with severe periodontitis, the average score for the psychological

discomfort subscale was significantly higher than that for patients with mild periodontitis and the average score for the psychological disability domain was significantly higher than that for patients with chronic gingivitis. The average score on the physical pain scale for patients with moderate periodontitis was higher than that for patients with chronic gingivitis or mild periodontitis. In the social disability domain, the average score for patients with severe periodontitis was significantly higher than that for patients with mild periodontitis or chronic gingivitis. Furthermore, the average score for patients with moderate periodontitis was higher than that for patients with gingivitis. The average score in the handicap domain for patients with moderate periodontitis was significantly higher than that for patients with mild periodontitis.

Discussion

This study comprised 167 patients with chronic gingivitis, 79 with mild chronic periodontitis, 93 with moderate chronic periodontitis, and 61 with severe chronic periodontitis. The impact of periodontal disease on QoL was assessed using the OHIP-14, which has been shown to be reliable (14) and sensitive to changes (22,23), and to have adequate cross-cultural consistency (24). The OHIP-14 is the most widely used instrument for evaluating the adverse impact of oral conditions on well being.

Jowett et al., Ng and Leung, and Drumond-Santana et al. (4,8,25) used the OHIP-14 to assess the impact of

periodontal disease on QoL. Another measure used to study periodontal disease and QoL is the OHQoL-UK instrument (3,9). However, we chose not to use the OHQoL-UK because it measures both the positive and negative aspects of the relationship between oral health and QoL. In the present study, we focused exclusively on the negative impact of oral health on QoL.

The OHIP-14 measure was translated into Arabic and shown to be valid and reliable. Cronbach's alpha for the OHIP-14 was 0.89. Item internal consistency and item discriminate validity were satisfactory for all subscales.

Overall, severe or moderate periodontal disease had a negative impact on QoL. This finding is in agreement with that reported by Ng and Leung (4). The impact of periodontal diseases on patient QoL was moderate in some domains, mainly physical pain and psychological disability. Ng and Leung (4) reported a perceived impact on the domains of physical pain and psychological disability, and studies using the OHQoL-UK measure also reported a perceived impact on physical domains (3,9). We found that the severity of periodontal disease was not significantly associated with functional limitation subscales. In contrast, Ng and Leung (4) and Araújo et al. (25) reported that oral health had a considerable impact on functional limitation.

In a comparison of responses to the OHIP-14 index by individuals with chronic gingivitis and those with chronic periodontitis, a higher impact on QoL was observed in the latter group in all OHIP-14 domains. Patients with severe periodontitis had the highest scores in all domains. These findings are consistent with those of other studies (26,27). However, because the study participants were selected from patients referred to our Department of Periodontology, it is reasonable to assume that they had more oral-health complaints, as compared with a normal population, and were more health conscious, which might limit the generalizability of our results.

In conclusion, periodontal disease had a negative impact on quality of life, and this impact was greater in patients with severe periodontal disease. These findings have significant implications for the use of Oral Health-Related Quality of Life measures as objective clinical parameters in periodontal disease assessment, planning, treatment, and subsequent evaluation of periodontal care. Community-based preventive programs are needed to assist in managing the effects of periodontal disease on the population.

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