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Original Article

Non-Surgical Periodontal Treatment and Its Effects on Patients' Oral Health-Related Quality of Life: A Pilot Case Series

George Triantafyllopoulos[1], Katerina Kavvadia[2]*, Christina Vrettou[2]

[1]Department of Preventive Dentistry, Periodontology and Implant Biology, Dental School, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece.
[2]Laboratory of Agronomy, School of Agriculture, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece.

***E-mail** ✉ Kavvadiakaterina.gr@yahoo.com

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ABSTRACT

This prospective investigation aimed to evaluate the oral health–related quality of life (OHRQoL) among individuals with periodontitis following nonsurgical periodontal therapy. A longitudinal case series design was implemented at the University Dental Clinic of Morales Meseguer Hospital in Murcia. The sample comprised 80 adults diagnosed with periodontitis, aged between 22 and 72 years. Participants completed the validated Spanish version of the Oral Health Impact Profile (OHIP-14sp) at two time points: the initial consultation and one month after completing nonsurgical periodontal therapy. Clinical parameters—probing depth, plaque index, and bleeding on probing—were recorded at baseline and post-treatment. Statistical analyses were conducted using Student's t-test and ANOVA. Significant improvements ($p < 0.05$) were found between pre- and post-treatment results across all domains except disability. Likewise, notable differences were observed according to disease stage or grade, though not by extent of the condition. Periodontitis adversely influences OHRQoL, particularly in advanced stages (III–IV). Basic periodontal therapy enhances OHRQoL within one month following treatment.

Keywords: Periodontitis, Nonsurgical periodontal therapy, Oral health–related quality of life, Scaling, Subgingival debridement, OHIP

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Introduction

Periodontitis is a long-term inflammatory and infectious disorder that irreversibly damages the supporting tissues of teeth and may result in tooth loss. According to the Global Burden of Disease (GBD) Study, it ranks as the sixth most common disease worldwide [1]. Approximately 11% of the global population suffers from severe periodontitis, contributing to edentulism in around 20% of individuals over 60 years old [1]. The widespread nature of this condition represents a significant public health concern, as it causes tooth loss and affects essential oral functions, speech, appearance, and social confidence—ultimately diminishing quality of life.

During its early stages, periodontitis typically progresses without noticeable symptoms. Over time, however, cumulative signs and discomfort become evident [2], which may severely impact patients' well-being in terms of duration, frequency, and intensity [3]. Improving these symptoms—and thereby improving oral comfort—is one of the key outcomes expected from periodontal therapy [4]. Historically, clinical assessment has focused on objective measures such as plaque index, probing pocket depth (PPD), bleeding on probing (BOP), clinical attachment level (CAL), and

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bone level (BL), often neglecting the patient's subjective experience.

Extending life expectancy and enhancing quality of life are two major health goals of the 21st century. The World Health Organization defines quality of life as an individual's perception of their position in life within their cultural and value context, considering their goals, expectations, and concerns.

In contemporary dentistry, recognizing patients' perceptions—both physical and psychological—is crucial. Understanding these perspectives allows clinicians to personalize care, improving treatment adherence and motivation. Clinical indices alone cannot adequately represent how periodontitis interferes with everyday oral functions [5].

To address this gap, oral epidemiology introduced the concept of Oral Health–Related Quality of Life (OHRQoL) assessments [6], which measure the effect of oral health and treatment on an individual's daily living. These tools quantify patient experiences, capturing perceived improvements or declines in oral health status through structured questionnaires using ordered, unidimensional response scales [7].

Scores are typically gathered twice—before and after therapy—to determine the measurable impact of treatment [8]. Among various OHRQoL instruments, the "Oral Health Impact Profile" (OHIP) is most widely applied, with its abbreviated form, OHIP-14, serving as a reliable option [9]. The Spanish version (OHIP-14sp), validated by Montero-Martín *et al*. [5], was used in this study.

The present research sought to determine how nonsurgical periodontal therapy influences the OHRQoL of patients treated by undergraduate dental students in a university setting. It also aimed to record patient-reported outcomes (PROMs) and examine their motivational effects on treatment continuation. Additionally, we investigated whether the impact of nonsurgical therapy in southern European populations varies by region.

All patients received care following the European Federation of Periodontology (EFP) S3 treatment guideline, which includes patient motivation, oral hygiene education, supragingival plaque removal, and subgingival instrumentation (Steps 1 and 2).

The primary goal was to evaluate early post-therapy changes in quality of life after nonsurgical periodontal treatment. Secondary objectives included analyzing whether periodontal stage, grade, or disease extent influence OHRQoL within this Spanish cohort.

Materials and Methods

Study population

This observational cohort included 80 sequential participants with a clinical diagnosis of periodontitis of any stage (I–IV) and grade (A–C). The research took place between September 2021 and May 2022, corresponding to the university's clinical calendar. Recruitment followed a non-probabilistic, sequential approach, enrolling individuals as they presented to the University Dental Clinic, Morales Meseguer Hospital (Murcia, Spain).

All subjects who consented to participate filled out the Spanish validated short form of the Oral Health Impact Profile (OHIP-14sp), a condensed version of the original 49-item OHIP instrument [6]. This 14-item tool measures the frequency of oral health–related discomfort and is grouped into seven dimensions, each comprising two items:

1. Functional limitation – e.g., speech difficulty, loss of taste acuity.
2. Handicap – e.g., reduced life satisfaction, complete inability to function.
3. Psychological disability – e.g., feeling embarrassed, difficulty relaxing.
4. Psychological discomfort – e.g., self-consciousness, tension.
5. Physical disability – e.g., interrupted meals, dissatisfaction with diet.
6. Physical pain – e.g., food-related pain, aching during chewing.
7. Social disability – e.g., irritability, difficulty managing daily tasks.

Responses were recorded on a five-point Likert scale (0–4):

0 = never, 1 = hardly ever, 2 = sometimes, 3 = fairly often, 4 = very often.

Summing all responses yields a total OHIP score (0–56), where higher scores reflect poorer OHRQoL. Separate sums may also be calculated for each domain. The methodological framework followed that described by Theodoridis *et al*. for southern European populations to allow cross-regional comparison [10].

Ethical considerations

Ethical clearance was obtained from the University of Murcia Research Ethics Committee (approval ID: 3354/2021; 30 June 2021). The research conformed to the World Medical Association's Declaration of Helsinki (1964) for human subjects. It was designed as a prospective longitudinal case-series.

All participants were informed of study procedures, potential risks, and expected benefits before signing written informed consent.

Inclusion criteria

1. Periodontal pockets ≥ 4 mm with bleeding on probing or deep pockets ≥ 6 mm.
2. Age > 18 years.
3. Signed consent form.
4. Minimum of 15 teeth present.
5. Completion of basic periodontal therapy and a follow-up one month after the last scaling/root planing session.
6. Ability to understand and correctly complete the OHIP-14sp.

Exclusion criteria

1. Pregnancy or lactation.
2. Systemic illness affecting immune response.
3. Previous nonsurgical or surgical periodontal therapy within 12 months.
4. Neoplastic disease or history of maxillofacial radiotherapy in the preceding five years.

Procedures

During the first appointment, students collected a detailed periodontal and medical history and classified each case as healthy, gingivitis, or periodontitis according to its stage, grade, and extent [11]. Patients diagnosed with periodontitis were briefed on the required therapy and study protocol. Those who agreed received written information, provided consent, and completed the baseline OHIP-14sp questionnaire.

Treatment adhered to the European Federation of Periodontology (EFP) S3 guideline for stages I–III. Each patient was educated about oral hygiene and encouraged to eliminate harmful behaviors, such as smoking. Supragingival scaling was performed using ultrasonic devices. Subgingival instrumentation was carried out with a limited set of Gracey curettes in areas presenting bleeding with pockets > 4 mm or deep pockets ≥ 6 mm.

At the one-month follow-up, during periodontal re-evaluation, participants completed the second OHIP-14sp (post-therapy).

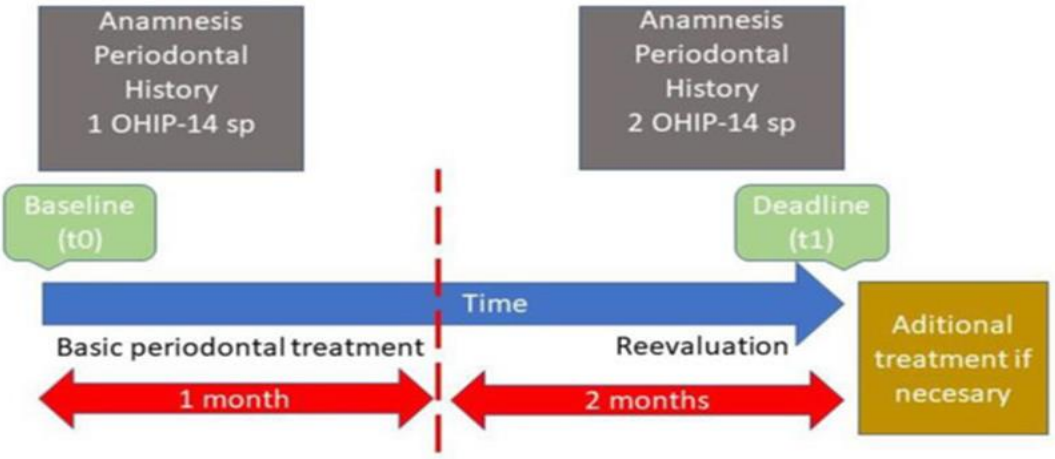


Figure 1 illustrates the study workflow.

At study completion, patients with residual probing depths > 6 mm and bleeding were advised to undergo additional periodontal therapy, including surgical management when required.

Statistical analysis

The determination of the required sample size was based on earlier investigations [10, 12, 13] and verified through Elsevier's primary care support sample size calculator (https://www.fisterra.com/formacion/metodologia-investigacion/determinacion-tamano-muestral/#sec4; accessed 1 September 2021). The OHIP-14 variable was selected for this purpose, estimating a precision of 1.5 score units. Considering $\alpha = 0.05$ and statistical power at 80%, a minimum of 65 participants was necessary. To compensate for possible attrition, 15% was added, giving a total of 76 subjects. This figure corresponds closely to the sample calculated by Theodoridis *et al*. [10] in their Greek cohort.

All analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 23.0 (SPSS Inc., Chicago, IL, USA). Normality of each variable was examined using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Descriptive and inferential statistics were evaluated through Tukey's exploratory analysis and the Student's t-test for the seven OHIP-14 questionnaire domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap, as well as the total OHIP-14sp pre- and post-treatment scores. The impact of stage, grade, and disease extent on oral health–related quality of life (OHRQoL) was tested using one-way ANOVA.

The significance threshold was established at $p < 0.05$, with 5% and 95% confidence intervals.

Results and Discussion

No participants were lost during the follow-up, and all 80 enrolled individuals completed the one-month reassessment.

The cohort comprised 80 periodontal patients (43 males and 37 females), with a mean age of 51.21 ± 12.91 years (median = 54; range = 22–72 years). The average tooth count was 25.69 ± 0.70 (median = 26; range = 15–30). Eight participants (10.25%) had between 15–20 teeth, twenty-four (30.77%) had 21–25 teeth, and the majority—48 individuals (61.53%)—had 26–32 teeth. Periodontitis was generalized in 68.8% of cases.

Regarding disease staging and grading: 9 participants (11.3%) presented stage I, 15 (18.8%) stage II, 36 (45%) stage III, and 18 (22.5%) stage IV. For grading, 14 individuals (17.5%) were grade A, 51 (63.7%) grade B, and 13 (16.3%) grade C; in two instances, both parameters were unrecorded.

Prior to therapy, the mean OHIP-14sp total score for the cohort was 11.70 ± 8.38 (median = 10; range = 0–38), with 2 participants (2.5%) scoring zero. Following treatment, the mean total score decreased to 9.37 ± 8.16 (median = 8; range = 0–34), with the same number of zero scores.

Table 1 summarizes the mean values and standard deviations for the seven OHIP-14sp domains—functional limitation, physical pain, psychological discomfort, physical, psychological, and social disability, and handicap—before and after treatment.

Table 1. Mean and standard deviation for OHIP-14sp pre- (OHIP-14sp1) and post-treatment (OHIP-14sp2) domains and overall score.

Domain	Mean (SD) OHIP-14sp1	Mean (SD) OHIP-14sp2	Matched Differences				
			Mean	SE	95% CI Lower	95% CI Upper	p-Value
Functional limitation	2.13 (1.76)	1.55 (1.71)	0.57	0.12	0.32	0.83	**
Physical discomfort	3.61 (1.89)	3.09 (1.70)	0.52	0.17	0.18	0.87	**
Psychological unease	2.73 (2.51)	2.25 (2.49)	0.47	0.16	0.14	0.80	**
Physical impairment	0.84 (1.58)	0.60 (1.31)	0.23	0.11	0.01	0.46	*
Psychological impairment	1.43 (1.82)	1.09 (1.65)	0.33	0.13	0.06	0.61	*
Social impairment	0.64 (1.20)	0.45 (0.99)	0.18	0.08	0.02	0.34	*
Handicap	0.44 (1.11)	0.34 (1.02)	0.10	0.06	−0.03	0.23	0.13
Total OHIP-14sp score	11.70 (8.38)	9.38 (8.16)	2.32	0.39	1.54	3.10	**

SD: standard deviation; SE: standard error; CI: confidence interval; $p < 0.05$; $p < 0.01$.

Significant differences were observed between pre- and post-treatment values for all domains except "handicap" **(Table 1)**. Concerning disease grade, stage, and extent, statistically significant effects were detected for grade **(Table 2)** and stage **(Table 3)**, but not for extent.

Table 2. ANOVA results for significant post-treatment variables according to periodontal grade (A–C).

Dependent Variable	Grade Comparison	Reference Grade	Difference in Means (DM)	Standard Error (SE)	95% CI Lower	95% CI Upper	p-Value
Physical discomfort	Grade A	Grade B	−0.943	0.067	−1.95	−0.07	0.067
	Grade A	Grade C	−1.401	0.034	−2.69	−0.11	0.034 *

DM: difference of means; SE: standard error; CI: confidence interval; $p < 0.05$.

Table 3. ANOVA results for significant pre- and post-treatment variables according to periodontal stage (I–IV).

Dependent Variable	Stage Comparison	Reference Stage	Difference in Means (DM)	Standard Error (SE)	95% CI Lower	95% CI Upper	p-Value
Psychological unease (Pretreatment)	Stage III	Stage IV	−1.55	0.71	−2.97	−0.14	*

Physical impairment (Pretreatment)	Stage IV	Stage I	1.27	0.62	0.03	2.53	*
		Stage II	1.45	0.53	0.38	2.53	**
		Stage III	0.94	0.44	0.06	1.83	*
Psychological impairment (Pretreatment)	Stage II	Stage III	−1.39	0.54	−2.49	−0.30	*
Social impairment (Pretreatment)	Stage IV	Stage I	1.11	0.47	0.16	2.06	*
		Stage II	1.13	0.40	0.32	1.95	**
		Stage III	0.72	0.33	0.05	1.39	*
Handicap (Pretreatment)	Stage IV	Stage I	0.94	0.44	0.06	1.82	*
		Stage II	0.87	0.37	0.12	1.63	*
Psychological unease (Post-treatment)	Stage IV	Stage I	2.00	1.00	0.01	3.99	*
		Stage III	1.55	0.70	0.15	2.97	*
Handicap (Post-treatment)	Stage IV	Stage II	0.72	0.35	0.02	1.42	*
Total OHIP-14sp (Pretreatment)	Stage II	Stage IV	−6.18	2.89	−11.95	−0.42	*

DM: difference of means; SE: standard error; CI: confidence interval; $p < 0.05$; $p < 0.014$.

Patient-reported outcome measures (PROMs) are increasingly recognized as essential indicators of well-being, surpassing traditional clinical parameters such as PPD, CAL, BOP, or BL [2, 3, 14–16]. Nonetheless, only a limited number of clinical reports incorporate these subjective metrics.

To capture patients' own perceptions, preferences, and limitations, various assessment tools have been introduced in dentistry. Among these, the Oral Health Impact Profile (OHIP) and its country-specific versions are considered robust for detecting treatment-related changes in oral conditions. Although both OHIP-49 and OHIP-14 are validated instruments, the latter is favored due to its brevity, ease of application, and demonstrated validity and reliability **(Figure 2)**.

Preguntas OHIP-14sp		Nunca	Casi Nunca	Algunas Veces	Frecuentemente	Siempre
1	¿Ha sentido que su aliento se ha deteriorado por problemas en sus dientes, boca o prótesis?					
2	¿Ha sentido que su digestión ha empeorado por problemas con sus dientes, boca o prótesis?					
3	¿Ha tenido dientes sensibles con alimentos o líquidos fríos?					
4	¿Ha tenido dolor de dientes?					
5	¿Los problemas de dientes lo/a han hecho sentir totalmente infeliz?					
6	¿Se ha sentido inconforme con la apariencia de sus dientes, boca o prótesis?					
7	¿Ha sido poco clara la forma en la que habla por problemas con sus dientes, boca o prótesis?					
8	¿La gente ha malentendido alguna de sus palabras por problemas con sus dientes, boca o prótesis?					
9	¿Su sueño ha sido interrumpido por problemas con sus dientes, boca o prótesis?					
10	Ha estado molesto/a o irritado/a por problemas con sus dientes, boca o prótesis?					
11	¿Ha sido menos tolerante con su pareja o familia pro problemas con sus dientes, boca o prótesis?					
12	¿Ha tenido dificultades haciendo su trabajo habitual por problemas con sus dientes, boca o prótesis?					
13	¿Ha sido totalmente incapaz de funcionar por problemas con sus dientes, boca o prótesis?					
14	¿Ha sido incapaz de trabajar a su capacidad total por problemas con sus dientes, boca o prótesis?					
Total=						

Nunca=0; Casi Nunca=1; Algunas veces=2; Frecuentemente=3; Siempre=4

Figure 2. Spanish version of the Oral Health Impact Profile 14 questionnaire (OHIP-14sp).

In both situations—prior to and following periodontal therapy—the dimension that exerted the greatest impact on patients was "physical pain", mainly referring to toothache or hypersensitivity. The next most influential factor was "psychological discomfort", associated with dissatisfaction over dental appearance, followed by "functional limitation", which arises when tooth loss due to periodontal disease interferes with chewing and digestion, particularly if teeth are not replaced with prosthetic restorations.

Although periodontal disease rarely produces acute pain except in necrotizing forms or abscesses, many patients experience sensitivity and difficulty chewing. The loss of periodontal attachment and the treatment process can expose the root surface through gingival recession [17], resulting in heightened sensitivity. From an aesthetic perspective, these recessions cause teeth to appear elongated, create papillary loss and "black triangles," and consequently lead to aesthetic and emotional distress [18].

Our findings align with Habashneh *et al*. [19], who also identified physical pain as the most prominent factor affecting patients. Likewise, the results correspond to those obtained in studies of nonsurgical periodontal therapy [20, 21] and to the systematic review by Shanbhag *et al*. [22]. Interestingly, the latter authors reported that surgical interventions exerted only a minor influence on OHRQoL. A reasonable explanation could be that individuals requiring surgery often present with advanced, irreversible tissue loss, where significant recovery is unlikely.

Concerning the "handicap" dimension—interpreted as an inability to function or work because of dental issues—scores were consistently low both before and after treatment, with no significant change detected. This indicates that periodontal conditions or their management do not prevent individuals from performing their daily occupational activities and, consequently, contribute minimally to the overall OHRQoL score.

Nevertheless, the persistence of this handicap component is notable. We attribute it to the irreversible nature of periodontitis. While other dimensions show improvement and patients often experience symptomatic relief, the functional deficits caused by the loss of tooth support remain. Similarly, Theodoridis *et al*. [10] observed no improvement in physical or psychological disability, consistent with patients' feelings of vulnerability regarding their disease and with the irreversible damage typical of advanced stages.

Conversely, total OHIP-14sp scores were significantly reduced following nonsurgical therapy, reflecting a clear enhancement in OHRQoL. Comparable improvements were reported by Goel and Baral [23], Mendez *et al*. [24], and Botelho *et al*. [25].

When analyzing outcomes by disease grade, no statistically significant differences were detected among groups except for post-treatment physical pain. Specifically, patients with grade C periodontitis exhibited greater physical pain than those with grade A. This can be attributed to the higher progression rate and poorer therapeutic response associated with grade C disease [26], which may prevent noticeable improvement in this domain after treatment.

A comparable trend was reported by Goergen [27], who found that nonperiodontal or stage I grade B patients showed low OHIP-14 scores, whereas stage II grade C and stage III/IV grade B or C patients demonstrated the highest values.

Regarding disease extent, there were no significant differences in OHRQoL between localized and generalized periodontitis patients, either before or after therapy. However, when evaluating disease stage, meaningful differences emerged.

Before treatment, those diagnosed with stage IV (severe) periodontitis presented significantly higher values in the physical disability and social disability domains than patients in stages I–III. This suggests that only in the most severe stages do patients perceive a functional or speech-related deficit that affects their social interactions. In the psychological disability domain, stage IV patients also scored higher than stage III, indicating that psychological burden intensifies at the most advanced stage of the disease. Likewise, stage IV participants recorded higher handicap values than those in stages I and II, implying that severe cases can occasionally interfere with professional or routine activities. These findings demonstrate that pretreatment OHIP-14sp scores rise with disease severity, showing a decline in OHRQoL in advanced periodontitis.

Following nonsurgical periodontal therapy, stage-dependent variations persisted—particularly in stage IV patients—but were confined to the psychological discomfort and handicap domains. This observation suggests that such treatment cannot restore aesthetics or full chewing function in individuals with advanced attachment loss or missing teeth, although these limitations do not significantly influence the overall post-treatment OHIP-14sp score.

These findings are consistent with those reported by Karaaslan and Dikilitaş [28] and Habashneh *et al*. [19]. Conversely, Ustaoğlu *et al*. [29] observed that the dimensions of "functional limitation" and "social disability" exerted a stronger influence on individuals

with advanced periodontitis than on other patient groups. Likewise, our outcomes correspond with studies performed in Greece, a country that shares a similar Mediterranean context [10]. From our perspective, quality of life (QoL) should be interpreted in accordance with the WHO framework, which emphasizes the incorporation of cultural and environmental variables, as these factors vary depending on geographical and societal conditions.

This research, however, presents certain limitations. The most evident one is the short duration of follow-up, which was limited to one month after the final session of scaling and root planing. Particularly in patients with severe periodontitis, both tissue recovery and perceptible improvements in oral well-being generally require more time. Although a 6–8 week interval is typically advised for re-evaluation in advanced stages, a 1-month control period was chosen in this study for several practical reasons.

Firstly, after completing nonsurgical therapy, patient outcomes tend to diverge considerably. A small subset exhibits rapid improvement and moves directly to maintenance therapy, whereas the majority necessitates additional nonsurgical sessions due to residual inflammation or persistent bleeding pockets ≥4 mm.

Moreover, some patients—despite undergoing repeat therapy—eventually require periodontal surgery, which extends healing and reassessment periods depending on the type of surgical intervention performed.

Another goal of our study design was to ensure comparability with the work of Theodoridis *et al*., who examined post-nonsurgical outcomes in a southern European cohort. That author also assessed the effects of surgical procedures and concluded that they produced no significant difference in OHRQoL scores.

A further limitation arises from the specific population attending the University Dental Clinic, which may restrict the generalizability of our results to the broader population. Because patients undergo a screening and diagnostic process before referral to the periodontics unit, most participants were already well-informed about their condition and demonstrated high treatment adherence, further reinforced by student supervision. Consequently, the study participation rate was 100%, a consistency we attribute to personalized student follow-up and the short overall observation period (2 months).

Additionally, the clinic's multidisciplinary structure should be acknowledged. Some participants required only periodontal care, while others simultaneously received conservative, orthodontic, prosthetic, or implant-related treatments. The interdepartmental collaboration among these units, including those managing adult, pediatric, and special-needs patients, enhanced the comprehensive care perspective of this investigation.

For these reasons, the present work should be considered a pilot study providing preliminary evidence.

Future research should focus on establishing a PROM-based reference map for nonsurgical periodontal interventions across southern European populations. Additionally, extending the follow-up period to 6 or 12 months could offer insight into long-term improvements in OHIP-14 scores relative to baseline measurements.

It would also be beneficial to continue exploring correlations between clinical parameters—such as bone loss (BL), probing pocket depth (PPD), bleeding on probing (BOP), and clinical attachment level (CAL)—and patient-reported satisfaction.

Conclusion

In summary, periodontal disease exerts a detrimental effect on oral health–related quality of life (OHRQoL), particularly in advanced cases. However, basic periodontal therapy contributes to a significant improvement in OHRQoL within one month following treatment. Furthermore, while the severity (degree) of periodontitis influences post-treatment physical pain, the extent of disease involvement appears to have no measurable effect on overall OHRQoL.

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Conflict of Interest: None

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Ethics Statement: None

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