

Beyond Systemic Burden: Periodontitis and Oral Health-Related Quality of Life in Psoriatic Disease

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Abstract

Beyond Systemic Burden: Periodontitis and Oral Health-Related Quality of Life in Psoriatic Disease

Background: This cross-sectional study aimed to compare periodontal status and oral health-related quality of life (OHRQoL) among patients with psoriasis (PsO), psoriasis with psoriatic arthritis (PsO + PsA), and healthy controls, and to identify the independent contributions of periodontitis and psoriatic disease burden to OHRQoL.

Methods: This cross-sectional study included 250 participants (130 controls, 60 PsO, 60 PsO + PsA). OHRQoL was assessed using the Oral Health Impact Profile-14 (OHIP-14). Periodontal status was evaluated by full-mouth clinical examination, and oral hygiene behaviors were recorded. Psoriasis severity was assessed using the Psoriasis Area and Severity Index (PASI), whereas PsO + PsA activity and enthesitis were evaluated using the Disease Activity Index for Psoriatic Arthritis (DAPSA) and the Maastricht Ankylosing Spondylitis Enthesitis Score (MASES).

Results: Total OHIP-14 scores differed significantly among groups ($p < 0.001$), with the PsO + PsA group showing the poorest OHRQoL, particularly in the psychological disability, social disability, and handicap domains. Bleeding on probing, DMFT, and tooth loss were greater in the PsO + PsA group, although periodontitis prevalence did not differ significantly among groups. In multivariable analysis, periodontitis ($B = 5.629$, 95% CI 4.015–7.243, $p < 0.001$), PsO + PsA ($B = 2.880$, $p = 0.002$), and PsO ($B = 1.872$, $p = 0.034$) were independently associated with poorer OHRQoL. Among patients with PsO + PsA, OHIP-14 scores correlated with disease duration ($r = 0.409$, $p = 0.001$), DAPSA ($r = 0.433$, $p = 0.001$), and MASES ($r = 0.378$, $p = 0.003$), but not with periodontal parameters.

Conclusions: Periodontitis and psoriatic disease burden independently contribute to impaired OHRQoL in patients with psoriatic disease.

Clinical Relevance: Integration of routine periodontal screening into the multidisciplinary management of psoriasis and psoriatic arthritis, coordinated among dermatologists, rheumatologists, and dental practitioners, may represent a clinically meaningful strategy to optimize patient-reported outcomes.

INTRODUCTION

Periodontitis is a chronic, multifactorial inflammatory disease initiated by dysbiotic dental biofilm and characterized by progressive destruction of the tooth-supporting tissues [1]. The resulting dysregulated host immune response leads to connective tissue breakdown, alveolar bone loss, clinical attachment loss, and ultimately tooth loss [2]. Beyond its local effects, periodontitis is increasingly recognized as a condition with systemic implications because of its shared inflammatory mechanisms with several immune-mediated inflammatory diseases [3].

Psoriasis is a chronic immune-mediated inflammatory disease affecting approximately 2–3% of the global population. The disease is characterized by erythematous scaly plaques resulting from immune

dysregulation and keratinocyte hyperproliferation [4]. Although primarily a cutaneous disorder, psoriasis is now recognized as a systemic inflammatory condition with multiple extracutaneous manifestations. Approximately 6–40% of patients develop psoriatic arthritis (PsA), a chronic inflammatory musculoskeletal disease characterized by peripheral arthritis, enthesitis, dactylitis, and axial involvement [5]. As psoriasis and PsA share a common immunogenetic background but differ in systemic burden [6], comparing these conditions may provide insight into the relative contributions of systemic and periodontal factors to oral health outcomes.

Growing evidence supports a bidirectional association between periodontitis and psoriatic disease. Patients with psoriasis have a higher prevalence and greater severity of periodontitis than systemically healthy controls, while systematic reviews and meta-analyses suggest that periodontitis is associated with an increased risk of psoriasis [7–9]. This association may be particularly relevant in PsA, where greater periodontal burden has also been associated with systemic disease activity [10]. Shared immune dysregulation, particularly involving the interleukin-17 / interleukin-23 axis, together with chronic systemic inflammation, genetic susceptibility, neutrophil activation, and alterations in the oral microbiome, has been proposed to underlie this association [11–13]. However, previous research on psoriatic disease and periodontitis has primarily focused on disease prevalence and severity rather than on patient-reported oral health outcomes.

Oral health-related quality of life (OHRQoL) reflects the impact of oral conditions on physical, functional, psychological, and social well-being [14]. The Oral Health Impact Profile-14 (OHIP-14) is a widely validated instrument for assessing OHRQoL in periodontal research [15–18]. Periodontitis is consistently associated with poorer OHRQoL because its clinical manifestations, including gingival bleeding, impaired mastication, tooth mobility, tooth loss, halitosis, and aesthetic concerns, adversely affect patients' physical, psychological, and social well-being [14, 15]. Likewise, psoriasis, particularly when combined with PsA, may impair OHRQoL through its chronic inflammatory burden, musculoskeletal disability, and psychosocial impact[5] .

Despite growing evidence linking psoriasis and periodontitis, few studies have evaluated OHRQoL in patients with psoriatic disease, and existing studies have been limited by retrospective designs [11], heterogeneous OHRQoL assessment tools [19, 20], or the absence of a PsA comparator group [21, 22]. Furthermore, it remains unclear whether impaired OHRQoL primarily reflects periodontal disease, systemic disease burden, or the combined effects of both. Given that psoriasis and PsA are thought to arise from a largely shared pathogenic process [6, 23], this distinction can potentially be examined within a single, biologically related patient population. Clarifying these relationships is clinically relevant because identifying periodontitis as an independent contributor to impaired OHRQoL would support periodontal care as a potentially modifiable component of multidisciplinary management for patients with psoriatic disease.

Therefore, the present study aimed to (i) compare periodontal status and OHRQoL among patients with psoriasis, patients with PsA, and systemically healthy controls; (ii) evaluate the associations of OHRQoL

with periodontal parameters and disease-related characteristics within each study group; and (iii) identify independent determinants of impaired OHRQoL.

MATERIALS AND METHODS

Study Design and Ethical Approval

This cross-sectional prospective study was conducted between May 2023 and July 2024 at Akdeniz University, Antalya, Türkiye. Ethical approval was obtained from the Clinical Research Ethics Committee of Akdeniz University Faculty of Medicine (Approval No. KAEK-248; March 22, 2023). Written informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki (2013 revision) and reported following the STROBE statement for cross-sectional studies [24].

Study Population

Individuals undergoing routine follow-up for psoriasis at the Department of Dermatology and patients with concomitant psoriasis and psoriatic arthritis attending the Rheumatology Division of the Department of Physical Medicine and Rehabilitation, Akdeniz University Faculty of Medicine, were informed about the study protocol. Patients who fulfilled the eligibility criteria and voluntarily agreed to participate were referred to the Department of Periodontology, Akdeniz University Faculty of Dentistry, for a comprehensive periodontal examination.

A total of 250 participants were enrolled: 60 patients with psoriasis (PsO), 60 patients with psoriasis and psoriatic arthritis (PsO + PsA), and 130 systemically healthy controls. Psoriasis was diagnosed by board-certified dermatologist (EA) based on clinical findings and, when necessary, histopathological examination [25]. Psoriatic arthritis was diagnosed by experienced rheumatologist (CK) according to the Classification Criteria for Psoriatic Arthritis (CASPAR) [26]. During the same period, systemically healthy controls were consecutively recruited from individuals attending the Department of Periodontology for routine dental care. Controls had no history of psoriasis, psoriatic arthritis, or other autoimmune diseases and met the same eligibility criteria as the patient groups, where applicable.

Participants were eligible if they were ≥ 18 years of age, had at least 15 natural teeth (excluding third molars), and had not received periodontal treatment or systemic antibiotics within the preceding 3 months. Exclusion criteria included pregnancy or lactation; use of medications associated with gingival enlargement (e.g., calcium channel blockers, phenytoin, or cyclosporine); oral mucosal diseases; systemic infectious diseases (e.g., tuberculosis, hepatitis, or HIV/AIDS); and immunosuppressive therapy for conditions other than psoriasis or psoriatic arthritis. All participants completed the questionnaires before the periodontal examination.

Sociodemographic and Oral Health Behavior Assessment

Sociodemographic characteristics (age and sex), anthropometric measures (height and weight), smoking status, and oral health behaviors (toothbrushing frequency, interdental cleaning, and regular dental visits) were recorded using a structured questionnaire.

Oral Health-Related Quality of Life

OHRQoL was assessed using the validated Turkish version of the OHIP-14 [27, 28], originally developed by Slade [16]. The OHIP-14 comprises 14 items across seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each item is rated on a 5-point Likert scale (0 = never to 4 = always), yielding a total score ranging from 0 to 56, with higher scores indicating poorer OHRQoL.

Periodontal Examination and Diagnosis

All periodontal examinations were performed by a single calibrated examiner (TP) using a Williams periodontal probe (Hu-Friedy®, Chicago, IL, USA). Plaque index (PI) (24), probing pocket depth (PPD), clinical attachment level (CAL), and bleeding on probing (BOP) were recorded at six sites per tooth. The DMFT index was calculated as the total number of decayed, missing, and filled permanent teeth. Periodontal diagnoses were established according to the 2017 World Workshop Classification of Periodontal and Peri-Implant Diseases and Conditions [1, 29]. Examiner calibration was performed using 10 non-study participants. Repeated examinations within a 24-hour interval demonstrated excellent intra-examiner reliability for PPD and CAL measurements (ICC > 0.91) [30].

Dermatological and Rheumatological Assessments

All dermatologic and rheumatologic assessments were performed on the same day as the periodontal examination. In patients with PsO, disease severity and dermatology-specific quality of life were assessed using the Psoriasis Area and Severity Index (PASI) and the Dermatology Life Quality Index (DLQI), respectively. In patients with PsO + PsA, disease activity, enthesal involvement, and quality of life were assessed using the Disease Activity Index for Psoriatic Arthritis (DAPSA), the Maastricht Ankylosing Spondylitis Enthesitis Score (MASES), and the Ankylosing Spondylitis Quality of Life questionnaire (ASQoL), respectively. Information on current systemic therapy, disease duration, and C-reactive protein (CRP) levels was obtained from the electronic medical records.

Statistical Analysis

The total OHIP-14 score was defined a priori as the primary outcome. Sample size was calculated using G*Power (version 3.1.9.7) for a one-way ANOVA comparing three independent groups. As no previous study had evaluated OHIP-14 in a directly comparable population, the expected effect size was

estimated from the closest available study, by Mishra et al. [22], yielding an assumed Cohen's f of 0.40. With a two-sided α of 0.05 and 90% power, the minimum required sample size was 84 participants. A total of 250 participants were enrolled (130 controls, 60 PsO, 60 PsO + PsA), exceeding this requirement and also exceeding the minimum sample size required for the multivariable regression model assuming a medium effect size ($f^2 = 0.15$, minimum $n = 141$).

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). The internal consistency of the OHIP-14 was assessed using Cronbach's alpha ($\alpha = 0.715$). Continuous variables are presented as mean $\pm$ standard deviation (SD) or median (interquartile range [IQR]), as appropriate, and categorical variables as frequencies and percentages. Data normality was assessed using the Shapiro–Wilk test. Between-group comparisons were performed using one-way analysis of variance (ANOVA) or the Kruskal–Wallis test with Dunn–Bonferroni post hoc correction, as appropriate. Categorical variables were compared using the chi-square or Fisher's exact test. Spearman correlation analyses were performed separately within each study group to investigate the associations between OHIP-14 total scores and periodontal parameters, as well as disease-related variables, including disease duration and disease activity measures where applicable.

Multivariable linear regression analysis was performed to identify factors independently associated with OHIP-14 total scores. The OHIP-14 total score was specified as the dependent variable. Periodontitis was entered as a dichotomous variable (present vs. absent, based on the 2017 World Workshop Classification [29]) rather than as continuous clinical indices (PI, BOP, PPD, CAL), because these indices were strongly intercorrelated and their simultaneous inclusion would have introduced multicollinearity. Psoriatic disease status (control, psoriasis, PsO + PsA), periodontal status (periodontitis present vs. no periodontitis), age, sex, body mass index, smoking status, antidepressant use, and comorbid systemic disease were entered simultaneously using the Enter method. Covariates were selected a priori based on previous evidence and biological plausibility as potential determinants of OHRQoL and periodontal disease rather than on univariable statistical significance. Specifically, age, body mass index, and smoking status were included as established determinants of periodontal status; antidepressant use was included as a proxy for psychological burden previously associated with OHRQoL; and sex and comorbid systemic disease were included as general demographic and health-related confounders potentially affecting both periodontal status and OHRQoL. Because covariates were included solely to control for potential confounding of the association between periodontitis and OHRQoL, their regression coefficients were not interpreted as independent, causally meaningful associations in isolation from the model's primary purpose; interpretation was restricted to the adjusted associations of periodontitis and psoriatic disease status with OHIP-14 scores [31]. Regression coefficients (B), standardized coefficients (β), 95% confidence intervals (CI), and p values were reported. No missing data were identified; therefore, complete-case analysis was performed. Statistical significance was set at $p < 0.05$.

RESULTS

Demographic and Clinical Characteristics

Of the 276 individuals assessed for eligibility, 26 were excluded because they did not meet the eligibility criteria (insufficient remaining teeth, $n = 10$; recent antibiotic use or periodontal treatment within the previous 3 months, $n = 12$; infectious disease, $n = 1$) or declined to participate ($n = 3$) (Supplementary Fig. 1). The final study population comprised 250 participants: 60 patients with PsO, 60 patients with PsO + PsA, and 130 systemically healthy controls (Table 1). Sex distribution and smoking status were comparable among the groups (both $p > 0.05$). Compared with controls, patients with PsO + PsA were older ($p = 0.045$), had a higher BMI ($p = 0.006$), and showed a higher prevalence of comorbid systemic diseases ($p = 0.043$) and antidepressant use ($p = 0.026$). Disease-specific characteristics of the PsO and PsO + PsA groups are also presented in Table 1.

Table 1
Demographic and clinical characteristics of the study groups

Variable	Control (n = 130)	PsO (n = 60)	PsO + PsA (n = 60)	p value
General characteristics				
Age, years, median [Q1–Q3]	44.0 [35.8–52.0]	42.5 [32.0–56.8]	47.0 [41.3–54.0]	0.045 [#]
Female, n (%)	74 (56.9)	31 (51.7)	39 (65.0)	0.327 [†]
BMI, kg/m ²	26.26 ± 4.28	27.75 ± 4.80	28.26 ± 4.05	0.006 [§]
Current smokers, n (%)	29 (22.3)	19 (31.7)	22 (36.7)	0.094 [†]
Comorbid systemic diseases, n (%)	16 (12.3)	9 (15.0)	16 (26.7) ^a	0.043 [†]
Antidepressant use, n (%)	5 (3.8)	5 (8.3)	9 (15.0) ^a	0.026 [†]
Disease-specific characteristics				
Disease duration (years)	-	15.95 ± 10.97	12.85 ± 8.61	
C-reactive protein (mg/L)	-	3.77 ± 4.95	5.56 ± 8.50	
PASI	-	3.08 ± 4.66	1.89 ± 3.25	
DLQI	-	5.78 ± 5.69	3.95 ± 5.23	
MASES	-	-	3.37 ± 3.23	
DAPSA	-	-	13.43 ± 11.10	
ASQoL	-	-	3.50 ± 3.62	
Current systemic therapy, n (%)				
DMARD	-	28 (46.7)	19 (31.7)	
Anti-TNF	-	4 (6.7)	20 (33.3)	
IL-17 inhibitor	-	7 (11.7)	9 (15.0)	
IL-23 inhibitor	-	6 (10.0)	3 (5.0)	
IL-12/23 inhibitor	-	5 (8.3)	2 (3.3)	
Corticosteroid	-	-	1 (1.7)	
NSAIDs	-	-	6 (10.0)	

Variable	Control (n = 130)	PsO (n = 60)	PsO + PsA (n = 60)	p value
⊠ Significantly different from the control group				
# Kruskal–Wallis test with Dunn's post hoc test				
§ One-way ANOVA with Tukey HSD post hoc test.				
† Pearson χ^2 test or Fisher's exact test, as appropriate.				
CRP: C-reactive protein; MASES: Maastricht Ankylosing Spondylitis Enthesitis Score; ASQoL: Ankylosing Spondylitis Quality of Life; DAPSA: Disease Activity Index for Psoriatic Arthritis; PASI: Psoriasis Area and Severity Index; DLQI: Dermatology Life Quality Index; DMARD: disease-modifying antirheumatic drug; NSAIDs: non-steroidal anti-inflammatory drugs. Data are presented as mean $\pm$ SD, median (IQR), or n (%), as appropriate. Disease-specific variables are presented descriptively because several indices are specific to one disease group and were not applicable to systemically healthy controls. Participants may have received more than one systemic medication; therefore, the percentages do not total 100%.				

Oral hygiene behaviors

Toothbrushing frequency and interdental cleaning habits did not differ significantly among the groups ($p = 0.177$ and $p = 0.063$, respectively). However, regular dental visits differed significantly among the groups ($p = 0.026$); participants with PsO and PsO + PsA reported lower rates of regular dental attendance than controls. (Table 2)

Table 2
Oral hygiene behaviors and clinical periodontal characteristics of the study groups

Variable	Control (n = 130)	PsO (n = 60)	PsO + PsA (n = 60)	p value
Oral hygiene behaviors				
Toothbrushing frequency, n (%)				0.177 [‡]
Once daily	55 (42.3)	27 (45.0)	34 (56.7)	
Twice daily	75 (57.7)	33 (55.0)	26 (43.3)	
Interdental cleaning, n (%)				0.063 [‡]
No	96 (73.8)	49 (81.7)	53 (88.3)	
Yes	34 (26.2)	11 (18.3)	7 (11.7)	
Regular dental visits, n (%)				0.026 [‡]
Yes	42 (32.3)	11 (18.3)	10 (16.7)	
No	88 (67.7)	49 (81.7)	50 (83.3)	
Clinical periodontal characteristics				
Plaque Index	1.37 (1.00–1.95)	1.53 (1.25–2.02)	1.55 (1.25–2.04)	0.085 [†]
Bleeding on Probing	0.62 (0.33–0.84)	0.57 (0.35–0.75)	0.67 (0.47–1.00) ^a	0.039 [†]
Probing Pocket Depth	2.05 (1.83–3.13)	2.07 (1.89–2.81)	2.39 (1.95–3.28)	0.125 [†]
Clinical Attachment Level	2.12 (1.85–3.22)	2.12 (1.90–2.81)	2.47 (1.95–3.31)	0.280 [†]
DMFT	7 (4–10)	8 (6–13)	12 (7–16) ^a	< 0.001 [†]
Data are presented as median (Q1–Q3) or n (%).				
† Kruskal–Wallis test followed by Dunn's post hoc test.				
‡ Pearson's χ^2 test or Fisher's exact test, as appropriate.				
§ Percentages were calculated among participants diagnosed with periodontitis.				
^a Significantly different from the control group according to Dunn's post hoc test (p < 0.05).				

Variable	Control (n = 130)	PsO (n = 60)	PsO + PsA (n = 60)	p value
Number of teeth	27 (25–28)	26 (24–28)	25 (21–27) ^a	< 0.001 [†]
Periodontal diagnosis, n (%)				< 0.001 [‡]
Periodontal health	26 (20.0)	0 (0.0)	0 (0.0)	
Gingivitis	63 (48.5)	40 (66.7)	32 (53.3)	
Periodontitis	41 (31.5)	20 (33.3)	28 (46.7)	
Periodontitis stage, n (%) [§]	n = 41	n = 20	n = 28	0.228 [‡]
Stage I	3 (7.3)	2 (10.0)	3 (10.7)	
Stage II	12 (29.3)	6 (30.0)	12 (42.9)	
Stage III	25 (61.0)	11 (55.0)	10 (35.7)	
Stage IV	1 (2.4)	1 (5.0)	3 (10.7)	
Data are presented as median (Q1–Q3) or n (%).				
† Kruskal–Wallis test followed by Dunn's post hoc test.				
‡ Pearson's χ^2 test or Fisher's exact test, as appropriate.				
§ Percentages were calculated among participants diagnosed with periodontitis.				
a Significantly different from the control group according to Dunn's post hoc test ($p < 0.05$).				

Clinical periodontal characteristics

As shown in Table 2, PI, PPD, and CAL were comparable among the three groups (all $p > 0.05$). In contrast, BOP was significantly higher in the PsO + PsA group than in controls ($p = 0.039$). The PsO + PsA group had higher DMFT scores and fewer remaining teeth than controls (both $p < 0.001$). Although the overall distribution of periodontal diagnoses differed significantly among the groups ($p < 0.001$), neither the prevalence of periodontitis nor the distribution of periodontitis stages differed significantly ($p = 0.118$ and $p = 0.228$, respectively).

Oral health-related quality of life

Total OHIP-14 scores differed significantly among the groups ($p < 0.001$), with higher scores in the PsO + PsA group than in controls ($p < 0.001$). Among the seven domains, only psychological disability, social disability, and handicap differed significantly. Psychological disability scores were higher in both the PsO ($p = 0.010$) and PsO + PsA ($p < 0.001$) groups than in controls, whereas social disability and handicap

scores were higher in the PsO + PsA group than in both the control and PsO groups (all $p \leq 0.005$). (Table 3)

Table 3
Comparison of OHIP-14 total and domain scores among the study groups.

Variable	Control (n = 130)	PsO (n = 60)	PsO + PsA (n = 60)	p value
OHIP-14 total score	11.13 ± 6.48 11 (6–16)	13.18 ± 6.18 13 (8.25–17)	15.42 ± 5.58 15 (12–17.75) ^a	< 0.001 [†]
Functional limitation	1.05 ± 1.39 1 (0–2)	1.03 ± 1.10 1 (0–2)	1.08 ± 1.17 1 (0–2)	0.666 [†]
Physical pain	2.62 ± 1.70 3 (1–4)	2.70 ± 2.14 2.5 (1–4)	2.98 ± 2.01 3 (2–4)	0.559 [†]
Psychological discomfort	2.71 ± 1.75 3 (1–4)	3.05 ± 1.70 3 (2–4)	3.35 ± 2.04 4 (2–5)	0.076 [†]
Physical disability	2.45 ± 1.80 2 (1–4)	2.73 ± 1.88 3 (1–4)	2.93 ± 1.98 3 (1.25–4)	0.326 [†]
Psychological disability	1.22 ± 1.39 1 (0–2)	1.85 ± 1.40 2 (1–3) ^a	2.48 ± 1.89 2 (1–4) ^a	< 0.001 [†]
Social disability	0.64 ± 0.91 0 (0–1)	0.97 ± 1.43 0 (0–2)	1.57 ± 1.41 2 (0–2) ^{a,b}	< 0.001 [†]
Handicap	0.45 ± 0.85 0 (0–1)	0.85 ± 0.95 1 (0–2)	1.02 ± 0.91 1 (0–1) ^{a,b}	< 0.001 [†]
Data are presented as mean ± SD and median (Q1–Q3).				
† Kruskal-Wallis test followed by Dunn-Bonferroni post hoc comparisons.				
a Significantly different from the control group (Dunn's post hoc, Bonferroni corrected): OHIP-14 total score (PsO + PsA vs control, $p < 0.001$); psychological disability (PsO vs control, $p = 0.010$; PsO + PsA vs control, $p < 0.001$); social disability (PsO + PsA vs control, $p < 0.001$); handicap (PsO + PsA vs control, $p < 0.001$).				
b Significantly different from the PsO group (Dunn's post hoc, Bonferroni corrected): social disability ($p = 0.005$) and handicap ($p = 0.005$).				

Correlation analysis

Correlations between OHIP-14 total scores and periodontal and disease-related parameters are presented in Table 4. In the control group, higher OHIP-14 scores were significantly associated with poorer periodontal status, showing positive correlations with PI, BOP, PPD, CAL, and DMFT, and a negative correlation with the number of remaining teeth (all $p < 0.001$). In patients with psoriasis, OHIP-14 scores showed weak positive correlations with BOP ($r = 0.258$, $p = 0.046$) and disease duration ($r = 0.328$, $p = 0.010$). In contrast, among patients with PsA, OHIP-14 scores were positively correlated with disease duration ($r = 0.409$, $p = 0.001$), DAPSA ($r = 0.433$, $p = 0.001$), and MASES ($r = 0.378$, $p = 0.003$), whereas no significant correlations were observed with periodontal clinical parameters.

Table 4
Correlations between OHIP-14 total score and periodontal and disease-related parameters

Variable	Control (n = 130)	PsO (n = 60)	PsO + PsA (n = 60)
Periodontal variables			
PI	0.406**	0.064	-0.041
BOP	0.595**	0.258*	0.254
PPD	0.615**	0.193	0.224
CAL	0.585**	0.216	0.235
Number of teeth	-0.308**	-0.052	-0.082
DMFT	0.453**	0.149	0.146
Disease-related variables			
Disease duration	—	0.328*	0.409**
PASI	—	0.236	0.191
DAPSA	—	—	0.433**
MASES	—	—	0.378**
CRP	—	0.187	0.022
DLQI	—	0.204	0.234
ASQoL	—	—	0.090
Values are Spearman correlation coefficients (r).			
** $p < 0.01$, * $p < 0.05$.			
— Not assessed / not applicable in this group.			

Multivariable linear regression analysis

The results of the multivariable linear regression analysis are presented in Table 5. In the adjusted model, periodontitis ($\beta = 0.420$, $p < 0.001$), psoriatic arthritis ($\beta = 0.192$, $p = 0.002$), female sex ($\beta = 0.140$, $p = 0.016$) and psoriasis ($\beta = 0.125$, $p = 0.034$) were independently associated with poorer OHRQoL. In contrast, age, BMI, current smoking, antidepressant use, and comorbid systemic disease were not independently associated with OHIP-14 scores (all $p > 0.05$). (Fig. 1)

Table 5
Multivariable linear regression analysis of factors associated with OHIP-14 total score

Variable	B (95% CI)	Standardized β	p value
Primary exposures of interest			
PsO	1.872 (0.140 to 3.604)	0.125	0.034
PsO + PsA	2.880 (1.078 to 4.682)	0.192	0.002
Periodontitis	5.629 (4.015 to 7.243)	0.420	< 0.001
Adjustment covariates			
Age (years)	0.034 (– 0.031 to 0.100)	0.064	0.302
Female sex	1.816 (0.348 to 3.285)	0.140	0.016
BMI (kg/m ²)	0.109 (– 0.058 to 0.276)	0.075	0.201
Current smoking	0.075 (– 1.508 to 1.657)	0.005	0.926
Antidepressant use	–0.536 (– 3.266 to 2.194)	–0.022	0.699
Comorbid systemic diseases	0.464 (– 1.503 to 2.432)	0.027	0.642
Reference categories were male sex, non-smoker, systemically healthy control, absence of periodontitis, no antidepressant use, and no comorbid systemic disease. Reference categories were systemically healthy controls for PsO and PsO + PsA, absence of periodontitis for periodontitis, male sex for female sex, and non-current smoking for current smoking. Periodontitis and psoriatic disease status were the primary exposures of interest; remaining covariates were included solely for confounding adjustment and were not interpreted as independent, causally meaningful associations. Values are presented as unstandardized regression coefficients (B), 95% confidence intervals (CI), standardized regression coefficients (β), and P values. Model statistics: $R = 0.532$, $R^2 = 0.283$, adjusted $R^2 = 0.256$, $F(9, 240) = 10.530$, $p < 0.001$.			

DISCUSSION

The present study comprehensively evaluated OHRQoL, periodontal status, and dermatologic and rheumatologic disease activity measures in patients with PsO and PsO + PSA, compared these findings with those of systemically healthy controls, and assessed their independent contributions to OHRQoL. The principal findings were that patients with PsO + PSA exhibited significantly poorer OHRQoL than systemically healthy controls and presented with greater gingival inflammation, higher DMFT scores, fewer remaining teeth, and a higher, though not statistically significant, prevalence of periodontitis. Multivariable regression analysis showed that periodontitis remained significantly associated with poorer OHRQoL after adjustment for demographic characteristics, behavioral factors, and psoriatic disease status. Furthermore, greater psoriatic disease burden was associated with poorer OHRQoL, as demonstrated by significant associations with disease duration, DAPSA, and MASES. Collectively, these findings indicate that both periodontal disease and the systemic burden of psoriatic disease independently contribute to impaired OHRQoL.

In the present study, both the PsO and PsO + PsA groups exhibited poorer OHRQoL than systemically healthy controls, with significant impairment observed in patients with psoriatic arthritis (Table 3). These findings are consistent with the limited available evidence indicating that psoriatic disease adversely affects OHRQoL. Costa et al. (2021) [19] first demonstrated that both psoriasis and periodontitis were associated with poorer OHRQoL, with the greatest impairment observed in patients with concomitant periodontitis. Mishra et al. [22] then reported significantly poorer OHRQoL among patients with concomitant psoriatic arthritis and periodontitis than healthy controls (18). In contrast, Ustaoglu et al. [21] found no significant difference in overall OHIP-14 scores between patients with psoriasis and healthy controls, although functional limitation was significantly impaired. More recently, Costa et al. (2024) [20] using the OIDP instrument, similarly reported poorer OHRQoL in patients with psoriatic disease, with the greatest impairment observed in those with psoriatic arthritis. Overall, these findings suggest that OHRQoL is adversely affected in patients with psoriatic disease, particularly in those with psoriatic arthritis.

An important finding of the present study was that significant between-group differences were confined to the psychological disability, social disability, and handicap domains of OHIP-14, whereas functional limitation, physical pain, psychological discomfort, and physical disability remained comparable among the groups (Table 3). A similar pattern has been reported in other immune-mediated rheumatic diseases. Schmalz et al. [32] observed that patients with ankylosing spondylitis experienced greater impairment predominantly in psychosocial OHIP-14 domains, whereas oral function-related domains remained comparable to healthy controls. Similarly, Mühlberg et al. [33] found that OHRQoL was significantly impaired in patients with rheumatoid arthritis despite the absence of a clear association with periodontal or dental status. In contrast, Mishra et al., [22] using a four-domain classification of the OHIP-14, reported that oral function, together with psychosocial impact, represented the most affected dimensions in patients with psoriatic arthritis and periodontitis, whereas orofacial pain and orofacial appearance were less affected. These differences are likely attributable to the alternative four-domain OHIP-14 classification used in that study. Taken together, the available evidence and the results of this

study suggest that chronic immune-mediated inflammatory diseases predominantly impair the psychosocial rather than the functional dimensions of OHRQoL.

Several mechanisms may explain the poorer OHRQoL observed in patients with psoriatic disease, particularly those with psoriatic arthritis. Psoriasis is associated with a substantial psychosocial burden, including impaired body image, perceived stigma, anxiety, and social withdrawal, which may negatively influence patients' perceptions of their oral health. Consistent with this, Luna et al.[34] reported a higher prevalence of depression in patients with more severe psoriasis, particularly those with concomitant psoriatic arthritis. In the present study, this burden was reflected by significantly higher psychological disability scores in both the PsO and PsO + PsA groups. Furthermore, the additional impairment in the social disability and handicap domains among patients with PsO + PsA suggests that the musculoskeletal manifestations of the disease further compromise social participation and daily functioning.

The present findings further support the contribution of a greater cumulative disease burden to impaired OHRQoL in patients with psoriatic arthritis. OHIP-14 scores were positively correlated with disease duration, DAPSA, and MASES, indicating that increasing cumulative disease burden, inflammatory activity, and enthesal involvement are associated with progressively poorer OHRQoL (Table 4). These findings are in agreement with Costa et al. [20] who demonstrated that increasing psoriasis and periodontitis severity were independently associated with poorer OHRQoL, and with Schmalz et al., [32] who found that disease activity in rheumatoid arthritis correlated particularly with the psychosocial dimensions of OHIP-14. Together, these findings suggest that increasing inflammatory burden may adversely influence patients' perceptions of their oral health beyond its effects on oral function alone.

The observed association between MASES and OHRQoL may also be explained by the functional limitations associated with enthesal involvement. Supporting this interpretation, studies in ankylosing spondylitis have shown that greater enthesal involvement and impaired mobility are associated with increased periodontal inflammation, particularly BOP and CAL [35]. Reduced hand function, joint stiffness, and enthesitis-related pain may similarly compromise effective plaque control in patients with psoriatic arthritis, which may partly explain the greater gingival inflammation observed in the PsO + PsA group and its association with poorer OHRQoL.

The most clinically relevant finding was that periodontitis remained independently associated with poorer OHRQoL after adjustment for demographic characteristics, lifestyle factors, and psoriatic disease status (Table 5; Fig. 1). This finding indicates that the contribution of periodontitis to impaired OHRQoL persists even after accounting for the burden of psoriatic disease and other potential confounders. Because periodontitis is characterized by chronic inflammation, bleeding, attachment loss, tooth loss, and impaired oral function, it may substantially influence patients' daily activities and psychosocial well-being [17, 18, 36]. Consistent with our findings, Costa et al.[19] reported that both psoriasis and periodontitis independently contributed to impaired OHRQoL, with periodontitis showing the stronger association. Likewise, a recent meta-analysis by Bortolaso et al.[37] demonstrated that periodontitis is

consistently associated with poorer OHRQoL across systemic diseases, with one of the strongest associations observed in psoriasis. Our findings extend this evidence by demonstrating that periodontitis remained independently associated with poorer OHRQoL after adjustment for psoriatic disease status and other potential confounders, supporting periodontal health as a potentially modifiable target for improving patient-reported outcomes in patients with psoriatic disease.

The present findings have important implications for the clinical management of patients with psoriatic disease. Regular dental attendance was lower in both patient groups than in controls (16.7% in the PsO + PsA group, 18.3% in the PsO group, and 32.3% in controls), despite patients with PsO + PsA exhibiting greater gingival inflammation, higher DMFT scores, and fewer remaining teeth (Table 2). These findings suggest that preventive dental care may be insufficient for patients with psoriatic disease, particularly those with concomitant PsA. Moreover, the significant associations between PsA disease activity (DAPSA and MASES) and OHRQoL indicate that patients with more active disease may be especially vulnerable to impaired OHRQoL. Although disease activity was associated with poorer OHRQoL among patients with PsA, periodontitis remained independently associated with OHRQoL in the whole-cohort adjusted analysis, emphasizing that periodontal health should be considered alongside systemic disease management. Importantly, unlike the underlying systemic disease, periodontitis represents a potentially preventable and treatable condition, making periodontal care a modifiable target for improving patient-reported outcomes. Accordingly, closer collaboration between periodontists, dermatologists, and rheumatologists, together with encouragement of regular dental attendance and effective oral hygiene practices, may promote earlier identification and management of periodontal disease and ultimately improve both periodontal health and OHRQoL in this patient population.

To our knowledge, this is the first study to jointly evaluate OHRQoL, periodontal status, and dermatologic and rheumatologic disease activity measures in patients with psoriasis and psoriatic arthritis compared with systemically healthy controls. By comparing two phenotypes of the same underlying disease that differ in systemic burden, this study design allowed the contribution of periodontitis to be separated from that of systemic disease activity — a distinction reflected in our findings, in which periodontitis remained independently associated with OHRQoL regardless of disease group, while disease duration, DAPSA, and MASES were independently associated with OHRQoL specifically within the PsO + PsA group.

However, several limitations should be acknowledged. First, the cross-sectional design precludes causal inference between periodontal disease, psoriatic disease activity, and OHRQoL. Second, participants were recruited from a single tertiary referral center, which may limit the generalizability of the findings. Third, patients with psoriatic disease received heterogeneous systemic therapies, including conventional DMARDs, biologic agents, and NSAIDs, which may have modified both systemic and periodontal inflammatory responses and potentially masked differences in periodontal status between groups. Because the number of patients receiving each treatment regimen was limited, treatment-specific analyses were not feasible, and residual confounding related to systemic therapy cannot be excluded. Although age was adjusted for in the multivariable analyses, the higher age of the PsO + PsA group

compared with controls should also be considered when interpreting the findings. Future multicenter studies with larger, treatment-stratified cohorts are needed to confirm these findings and determine whether periodontal treatment improves OHRQoL and disease activity in patients with psoriatic disease. Nevertheless, the present findings indicate that both periodontitis and psoriatic disease independently contribute to impaired OHRQoL.

In conclusion, patients with psoriatic disease, particularly those with concomitant psoriatic arthritis, exhibited significantly poorer OHRQoL than systemically healthy controls. By comparing two phenotypes of the same underlying disease spectrum, this study demonstrated that periodontal disease and the systemic burden of psoriatic disease act through separable pathways: periodontitis remained independently associated with impaired OHRQoL regardless of psoriatic disease status, while greater disease burden was independently associated with poorer OHRQoL among patients with psoriatic arthritis. These findings underscore periodontitis as a clinically relevant and potentially modifiable contributor to OHRQoL in patients with psoriatic disease, and support the integration of routine periodontal assessment into the multidisciplinary management of psoriasis and psoriatic arthritis, through close collaboration among periodontists, dermatologists, and rheumatologists.

Declarations

Ethical approval:

Ethical approval for this study was obtained from the Clinical Research Ethics Committee of Akdeniz University Faculty of Medicine (Approval No. KAEK-248; March 22, 2023). The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to their enrollment in the study.

Competing interests:

The authors declare no competing interests.

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Author Contribution

Özlem Daltaban: Conceptualization, Methodology, Formal analysis, Supervision, Project administration, Writing – original draft, Writing – review & editing. Tarık Polat: Investigation, Data curation, Formal analysis, Writing – review & editing. Cahit Kaçar: Investigation (rheumatologic evaluation), Validation, Resources, Writing – review & editing. Erkan Alpsoy: Investigation (dermatologic evaluation), Validation,

Resources, Writing – review & editing. Kemal Üstün: Methodology, Supervision, Validation, Writing – review & editing. All authors have read and approved the final manuscript.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request

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Figures

Figure 1. Multivariable-adjusted associations with OHIP-14 total score

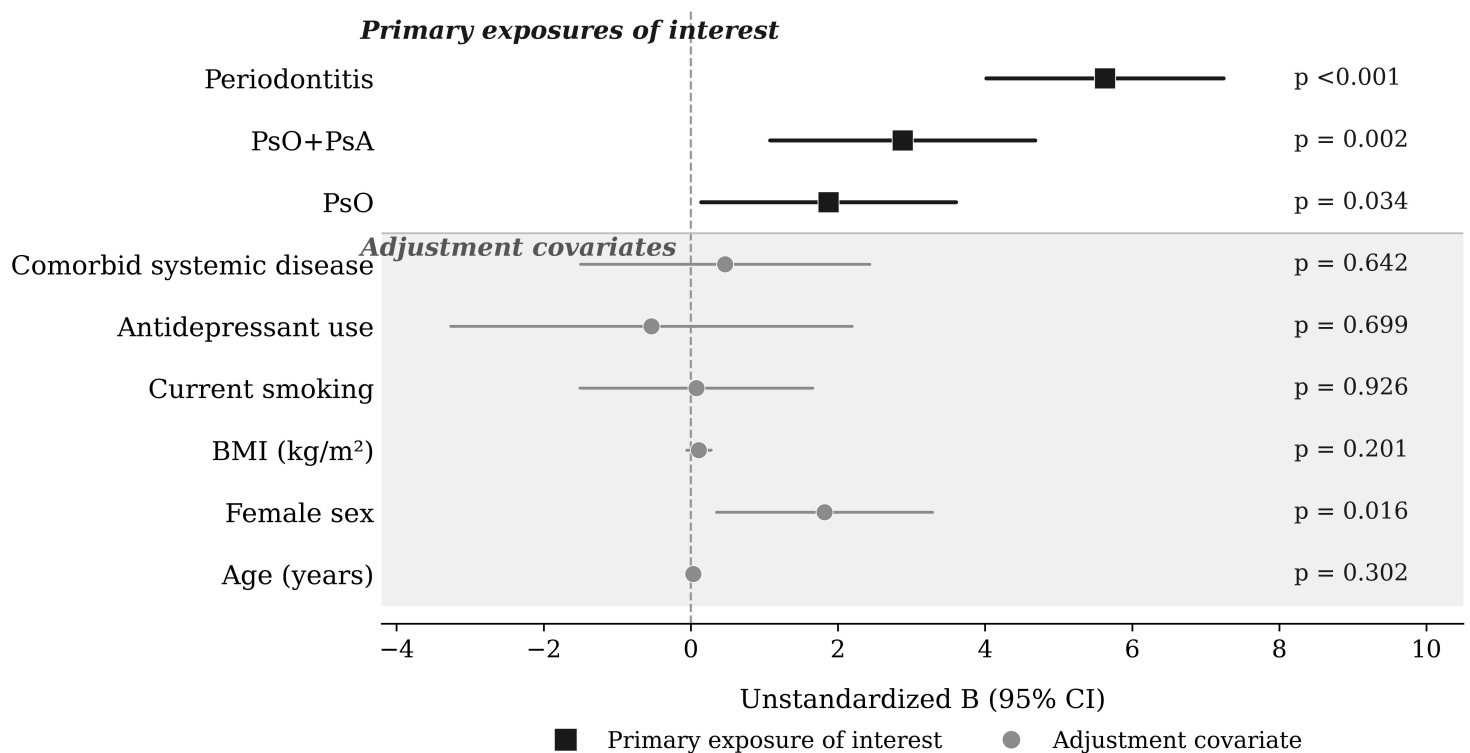


Figure 1

Forest plot of multivariable-adjusted associations with Oral Health Impact Profile-14 (OHIP-14) total score. Squares and circles represent unstandardized regression coefficients (B); horizontal lines represent 95% confidence intervals (CI). Periodontitis and psoriatic disease status (PsO, PsO+PsA) were the primary exposures of interest (black squares); the remaining variables (age, female sex, BMI, current smoking, antidepressant use, and comorbid systemic disease) were included solely to adjust for potential confounding and are not interpreted as independent, causally meaningful associations (gray circles). Reference categories were male sex, non-smoker, absence of periodontitis, no antidepressant use, no comorbid systemic disease, and systemically healthy controls (for PsO and PsO+PsA). The dashed vertical line indicates no association ($B = 0$). PsO, psoriasis; PsA, psoriatic arthritis; BMI, body mass index.

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