

# Higher Prevalence of Periodontitis and Decayed, Missing and Filled Teeth in Patients with Psoriasis

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## Abstract

**Objective** The aim of this study is to describe the prevalence and severity of periodontitis and decayed, missing and filled teeth (DMFT) index in patients with psoriasis. As a secondary aim, verify if periodontitis was a risk indicator for psoriasis.

**Materials and Methods** A total of 69 patients diagnosed with psoriasis ( $48.7 \pm 14.6$  years) and 74 healthy controls ( $40.3 \pm 12.9$  years) participated in the study. Probing pocket depth, clinical attachment loss (CAL), bleeding on probing, plaque index, and DMFT index were measured in all subjects. Periodontitis was defined as the presence of at least three interproximal sites with CAL  $\geq 3$  mm in different teeth and severe periodontitis should involve at least two interproximal sites in different teeth with CAL  $\geq 5$  mm.

**Statistical Analysis** The Mann–Whitney test was used to analyze the demographics and the clinical data. The significance level was 5%. A multivariate logistic regression was conducted, and the odds ratio were calculated to express the risk to develop psoriasis.

**Results** Patients with psoriasis had significantly more sites with CAL  $\geq 3$  mm ( $p < 0.03$ ) and CAL  $\geq 5$  mm ( $p < 0.0001$ ), less sites with plaque ( $p < 0.0001$ ), fewer teeth ( $p < 0.0001$ ), and a high DMFT index ( $p < 0.02$ ) as compared with controls. Severe periodontitis was significantly more frequent ( $87.1\% \times 58.1\%$ ) and was a risk indicator for psoriasis after adjusting for sex, age, race, and smoking habits (odds ratio: 3.7, 95% confidence interval: 1.5–9.0,  $p < 0.003$ ).

**Conclusion** Patients with psoriasis have higher prevalence of severe periodontitis and higher DMFT than control patients. Severe periodontitis may be a risk indicator for psoriasis.

## Keywords

- psoriasis
- periodontal disease
- decayed, missing and filled teeth index
- chronic diseases

## Introduction

Psoriasis is a chronic inflammatory disorder manifested in the skin and characterized by T cell-mediated hyperproliferation of keratinocytes.<sup>1</sup> The prevalence is similar in male and female, affecting 1 to 3% of the population.<sup>2</sup> It is considered a multifactorial disease, including infections, genetic, and

behavior factors that may influence the dysfunction of the T cell expression and may begin the skin lesions.<sup>3</sup> Periodontitis is an inflammatory disease involving the supporting tissues of the teeth, with connective tissue attachment and alveolar bone losses, that may lead to dental loss. Severe periodontitis affects 10 to 15% of the adult population. Both diseases have been associated with other chronic disease such as

rheumatoid arthritis, diabetes mellitus, inflammatory bowel disease, arterial refractory hypertension, and cardiovascular diseases.<sup>4-8</sup>

In psoriasis patients, the oral lesions may occur before, during or after the dermatologic manifestation of the disease.<sup>9</sup> Oral findings in these patients indicated high prevalence of fissured tongue, geographic tongue, and angular cheilitis.<sup>10</sup> The dental and periodontal status may have an important influence in these patients. Sharma et al<sup>11</sup> showed a high mean value of probing pocket depth, probing attachment loss and missing teeth in psoriasis group as compared with healthy group. Skudutyte-Rysstad et al<sup>12</sup> observed significantly higher prevalence of moderate and severe periodontitis in psoriasis individuals, as compared with healthy controls. Moreover, a significantly fewer teeth were also present in the psoriasis group. Preus et al<sup>13</sup> described that patients with psoriasis have lower radiographic bone level and higher number of missing teeth than the control group. Santarelli et al<sup>14</sup> showed that psoriasis patients have an increased prevalence of gingivitis or periodontitis. On the other hand, Fadel et al<sup>15</sup> related no differences in the profiles of caries and periodontal disease between individuals with or without psoriasis.

Both periodontitis and psoriasis share several risk factors, including smoking, obesity, and diabetes mellitus.<sup>16-18</sup> Keller and Lin<sup>19</sup> and Nakib et al<sup>20</sup> observed an increased risk for psoriasis among patients with chronic periodontitis. A systematic review and meta-analysis observed that individuals with periodontitis showed a significantly increased risk for developing psoriasis.<sup>21</sup> In Brazil, no study has investigated the periodontal prevalence and risk of oral complications in such patients. Therefore, our aim was to describe the prevalence and severity of periodontitis and decayed, missing and filled teeth (DMFT) index in patients with psoriasis. As a secondary aim, the risk for patients with periodontal disease to develop psoriasis was analyzed.

## Materials and Methods

Participated in this study 143 patients, 69 psoriasis patients were included in the case group ( $48.7 \pm 14.6$  years of age), while 74 healthy individuals were considered as control group ( $40.3 \pm 12.9$  years of age). Edentulous individuals, pregnant women, patients that suffered stroke or acute myocardial infarction were excluded. The patients should not have used antibiotics 6 months prior to the study. In the control group, individuals should not have received anti-inflammatory at least 3 months prior to the study. All subjects signed a term of consent. When the patient was younger than 18 years old, one of the parents or the guardians consented the participation in this work. The study was approved by the ethical committee of the Rio de Janeiro State University (protocol number: CEP/HUPE: 0026.0.228.000-11).

The patients were selected from the department of dermatology at the immunosuppressed and biological medicines ambulatory from Pedro Ernesto University Hospital of the Rio de Janeiro State University, and the diagnosis of psoriasis was done by a dermatologist. The systemic medication included methotrexate, cyclosporine, and/ or acitretin, diaminodiphenyl sulfone, fexofenadine or hydroxyzine hydrochloride. Thirteen patients with psoriasis were not taking any systemic medication at the moment of the study, but previously they had used immunosuppressed or biological medicine. Fifty-six patients received previously or were still under some topic treatment. The control group subjects did not show any clinical signs of ongoing systemic disease.

The individuals filled out a questionnaire with information about their age, gender, ethnicity, previous medical conditions (arterial hypertension, diabetes mellitus, chronic kidney disease, rheumatoid arthritis and inflammatory bowel disease, smoking habits, and oral history (including the last visit in dentist).

The clinical examination was performed in six sites of all present teeth (mesio-buccal, buccal, disto-buccal, disto-lingual, lingual, and mesio-lingual), except the third molars. The clinical data were assessed by the one examiner (FCB) using North Caroline periodontal probe (Hu-Friedy PC 15; Chicago, Illinois, United States) and included bleeding on probing (BOP), plaque index (PI), probing pocket depth, and CAL. BOP and PI were defined as present or absent, and the percentage of positive sites was calculated. The intraexaminer calibration has an agreement of 94% within the  $\pm 1$  mm for the measurements of PPD and CAL. Periodontitis was defined as the presence of, at least, three interproximal sites with CAL  $\geq 3$  mm in different teeth and severe periodontitis should involve, at least, two interproximal sites in different teeth with CAL  $\geq 5$  mm. The teeth were examined for decayed, missing and filled index (DMFT index) and the intraoral examination for assessment of mucosal lesions followed the World Health Organization.<sup>22</sup> The oral lesions, such as fissured tongue and geographic tongue, were examined in the case group.

## Statistical Analysis

Sample size calculation estimated a prevalence of periodontitis of 40 and 65% in the control and case groups, respectively. Considering a power of 80%, the calculation included 70 patients on each group. The Kolmogorov-Zmirnov Z normality test was applied to verify the distribution of the data. Normally distributed data were described as mean and standard deviation, while non-normally distributed data were described as median and interquartile range. The Mann-Whitney test was used to compare the demographics and the clinical data. A multivariate logistic regression was conducted, and the odds ratio were calculated to express the risk to develop psoriasis. The level of significance of 5% ( $p < 0.05$ ) was established. Statistical

Package for Social Sciences 23 (SPSS, Inc.; Chicago, Illinois, United States) was used to calculate the data.

## Results

The demographic data from case and control patients were reported in ►Table 1. Patients in the case group were significantly older and presented a higher prevalence of arterial hypertension. There were 13 and 9 smokers in the case group and control group, respectively. There was no diabetic patient in both groups. Patients with psoriasis had 49% of fissured tongue and 16% of geographic tongue. Total 13% of the patients presented both lesions. Psoriasis patients had significantly fewer teeth ( $p < 0.0001$ ), higher DMFT index ( $p = 0.02$ ), higher number of sites with CAL  $\geq 3$  mm ( $p < 0.03$ ) and CAL  $\geq 5$  mm ( $p < 0.0001$ ), and lower number of sites with plaque ( $p < 0.0001$ ) as compared with the control patients (►Table 2). The prevalence

of severe and generalized periodontitis was significantly higher in the case group.

Arterial hypertension (OR: 3.2, 95% CI: 1.01–7.9,  $p < 0.009$ ) and severe periodontitis (OR: 3.7, 95% CI: 1.5–9.0,  $p < 0.003$ ) were risk indicators for the presence of psoriasis after adjusting the model for sex, age, race, and smoking habits (►Table 3).

## Discussion

In the present study, the extension and severity of periodontitis were significantly higher among psoriasis patients than the control group. This finding is in line with Sharma et al<sup>11</sup> that showed significantly higher mean values of PPD and CAL among 33 psoriasis patients, as compared with 35 healthy subjects. The authors suggested that the periodontal status was associated with the severity of psoriasis. Skudutyte-Rysstad et al<sup>12</sup> showed a significantly higher prevalence of

**Table 1** Mean ( $\pm$  standard deviation) for age and frequency of sex, race, smoking status and arterial hypertension in case ( $n = 69$ ) and the control groups ( $n = 74$ )

Variable	Case group	Control group	p-Value
	( $n = 69$ )	( $n = 74$ )	
Age (y)	48.7 ( $\pm 14.6$ ) <sup>a</sup>	40.3 ( $\pm 12.9$ )	<0.0001
Sex female (%)	50	63.5	0.13
Race White (%)	37.1	38.2	0.9
Current smokers (%)	18.6	12.2	0.08
Arterial hypertension	36.2 <sup>a</sup>	13.5	0.002

<sup>a</sup>Significantly higher than control.

Note: The Mann–Whitney test was used to analyze these data.

**Table 2** Median (interquartile range) for the number of teeth; decayed, missing and filled tooth index; percentage of probing pocket depth, clinical attachment loss, sites with plaque and bleeding on probing in case ( $n = 69$ ) and control ( $n = 74$ ) groups

Variable	Case group	Control group	p-Value
	( $n = 69$ )	( $n = 74$ )	
Number of teeth	21 (13.5) <sup>a</sup>	25 (6.3)	<0.0001
Decayed	1 (2)	2 (4)	0.04
Missing	7 (13.5) <sup>a</sup>	3 (6.3)	<0.0001
Filled	4 (7)	5 (6)	0.43
DMFT index	17 (12) <sup>a</sup>	12.5 (11.3)	0.02
% of PPD $\geq 4$ mm	3.7 (7.4)	3.4 (6.7)	0.92
% of PPD $\geq 6$ mm	0 (1.8)	0 (1.3)	0.72
% of CAL $\geq 3$ mm	21.2 (40.4) <sup>a</sup>	10.9 (26)	0.03
% of CAL $\geq 5$ mm	15.8 (37.2) <sup>a</sup>	2 (7.8)	<0.0001
% of sites with plaque	27 (28.7) <sup>b</sup>	52.7 (42.8)	<0.0001
% of sites with BOP	18.9 (22)	24.4 (29.4)	0.07
% Severe periodontitis	87.1 <sup>a</sup>	58.1	<0.0001
% Generalized periodontitis	42.9 <sup>a</sup>	23	0.02

Abbreviations: BOP, bleeding on probing; CAL, clinical attachment loss; DMFT, decayed, missing and filled tooth index; PPD, probing pocket depth.

<sup>a</sup>Significantly higher than control group.

<sup>b</sup>Significantly lower than control group.

Note: The Mann–Whitney test was used to evaluate these clinical data.

**Table 3** Odds ratio for the association of psoriasis and severe periodontitis

	OR (95% CI)	p-Value
Smokers (yes)	1.3 (0.91–1.88)	0.15
Arterial hypertension (yes)	3.2 (1.01–7.9)	0.009
Sex (female)	1.9 (0.9–3.9)	0.09
Age	0.12 (0.97–1.04)	0.73
Severe periodontitis (yes)	3.7 (1.5–9.0)	0.003

Abbreviations: CI, confidence interval; OR, odds ratio.

moderate or severe periodontitis in a group of 50 psoriasis patients. Kathariya and Pradeep<sup>23</sup> observed a higher prevalence of periodontitis in a psoriasis group, as compared with the control group. On the other hand, Fadel et al<sup>15</sup> related no differences in the periodontal disease experience. The differences observed may be related to the methodology used. Sharma et al,<sup>11</sup> Skudutyte-Rysstad et al,<sup>12</sup> and our study examined four to six sites of all teeth, while Fadel et al<sup>15</sup> examined only six teeth (community periodontal index of treatment needs), which usually underestimate the prevalence of periodontitis.

In our study, BOP was not significantly different between case and control groups. This finding is in line Fadel et al,<sup>15</sup> although both groups of their study showed a suboptimal oral hygiene level. Although Skudutyte-Rysstad et al<sup>12</sup> and Yarkac et al<sup>24</sup> observed significantly higher mean values of BOP in the psoriasis group, Kathariya and Pradeep<sup>23</sup> observed that PI and gingival index were significantly higher in the psoriasis group. In our study, 80% of the patients in the case group were using a systematic immunosuppressive medication. It may be suggested that the immunosuppressive and anti-inflammatory medications taken by the patients in the case group may have reduced the inflammatory tissue response. This fact was described in other studies dealing with chronic diseases.<sup>6,25</sup> As Skudutyte-Rysstad et al,<sup>12</sup> our study was not able to distinguish whether the observed differences could be attributed to the psoriasis or were a consequence of the medications used.

Severe periodontitis was a risk indicator for the development of psoriasis (odds ratio [OR]: 3.7, 95% confidence interval [CI]: 1.5–9.0,  $p < 0.003$ ) in this population. Other studies showed similar results. Keller and Lin,<sup>19</sup> in a retrospective cohort, showed an OR of 1.52 (95% CI: 1.38–1.70;  $p = 0.05$ ) after adjusting. Lazaridou et al<sup>26</sup> described an OR of 3.33 (95% CI: 1.51–7.32;  $p = 0.003$ ). Nakib et al<sup>20</sup> observed an increased multivariate risk of psoriasis for those with moderate to severe periodontal bone loss relative risk of 1.49 (95% CI: 1.08–2.05). Ungprasert et al<sup>21</sup> in a meta-analysis observed that individuals with periodontitis had a significantly higher OR of 1.55 (95% CI: 1.35–1.77) for developing psoriasis. Smoking is an important risk factor for periodontitis. However, in our study, smoking did not influence the results; as there was no significant difference of smokers among both groups and after the multivariate analysis, smoking was not considered a significant risk indicator.

The DMFT index was significantly higher among psoriasis patients as compared with the control group. Fadel et al<sup>15</sup> described the same significant differences between both groups. There were no differences in the mean number of decayed teeth. The significantly higher number of missing teeth in the psoriasis group is in line with other studies<sup>11–13,23</sup> and may reflect a worse dental maintenance. The age of the patients might have influenced a higher DMFT index. However, in our study, a multivariate analysis showed that age was not an important factor for higher DMFT index.

Limitations of this study include the selection of the case and the control groups. The case group was selected from patients attending a dermatological clinic at a hospital environment, while the control group was selected from the general population and it is less likely to have health problems. Also, the type and severity index of psoriasis were not informed; therefore, it was not possible to establish a correlation with the psoriasis severity.

In conclusion, the present study showed that psoriasis patients had a higher prevalence of severe periodontitis and higher mean value of DMFT index, with more decayed and missing teeth, as compared with health controls. In addition, severe periodontitis may be a risk indicator to psoriasis.

#### Conflict of Interest

None declared.

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