

## Periodontal Aspects for Psoriasis: A Systematic Review

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### Abstract

**Purpose:** Psoriasis is a disease that requires careful management to minimize the risks of complications arising from therapeutic procedures. Psoriasis is often related to oral or systemic adverse events after routine medical or dental treatment. From dental diseases, those affecting the periodontium are the most related to psoriasis. Periodontal breakdown (periodontitis) is usually a consequence of inflammatory destruction as a result of poor oral hygiene and the subsequent accumulation of dental bacterial plaque or dysbiosis, present in children, adolescents and adults.

Dental techniques are usually invasive being likely to generate complications. Although there are many publications on dental aspects of psoriasis in the literature, few of them refer to involvement of procedures. Psoriasis and dentistry are related in different issues able to generate uncertain outcomes. The scope of present study is to assess the possibility that the periodontal disease can contribute to the worsening of psoriasis lesions and assess if the dental treatment can contribute to the improvement of psoriasis lesions?

**Methods:** We conducted systematic review of clinical trial literature.

**Findings:** Studies are few and with high level of incompleteness. The highest level of evidence obtained was 2 B (Clinical Trial Case Control). The methodological quality and risk of bias of included studies were assessed by different tools.

**Implications:** The aim the present study was to map the knowledge about psoriasis and dental health status and to evaluate the importance to state a minimum dental care protocol able to mitigate the impact on chronic psoriasis plaques.

**Keywords:** Dental Care; Oral Diseases; Drug Utilization; Psoriasis; Morbidity; Risk Stratification;

### Purpose

Epidemiological evidence suggests that analysis of progress and control of risk factors in multi factor diseases can have a predictive value in determining their prevalence and outcomes. Determination of chronological order, duration, intensity, and sequence of events related to each other are crucial in the appearance of clinical manifestations, and severity and prognosis of a disease. Indeed, this is the case of psoriasis, defined as an immune-mediated multiple-cause disease. Its causes overlap in

complex and intricate ways, and accurate inferences are possible only if a previous systematic analysis of risk factors is done. Although it seems clear that a genetic factor is a necessary cause, other risk factors must act for the disease to manifest [1].

The assumption explains the lack of continuous expression in the phenotype of the disease in the family line since psoriasis can skip generations. Among the intervening factors, low emotional ability to cope with everyday situations (leading to physical and psychological stress), unhealthy lifestyle (including sedentary lifestyle, smoking, consumption of alcohol and drugs), previous diseases, continuous use of medication, and interfering treatments (including dental care) can cause oral or systemic adverse events in many forms of psoriasis and should thus be considered [2]. Psoriasis is an immune-mediated multiple-cause disease, of genetic basis [1] that affects up to 8.5% of the population in the Western countries [2], which can lead to complications and requires careful management [3].

From the cutaneous forms of psoriasis, those with circumscribed thick white to silver plaques, surrounded by areas redness are more common [4]. Psoriasis can spread to the elbows, knees, shins, scalp, lower back, nails, genitals, mouth and joint areas with many grades of damage, an enormous life impact and emotional consequences [4].

Dental diseases also have immune-involvement with multiple causes and for psoriasis it can cause problems in complex and intricate ways [5]. Dental care is one of the health treatments that people more often have performed [6].

Relying on surgical resources and increasingly advanced pharmacological therapy, these treatments can become invasive and lead to complications, even in healthy patients [7]. The difficulties to state the implications between psoriasis and oral health are due to these issues not yet have been evaluated with a comprehensive literature review.

According to Health Based Evidence criteria, oral health status is able to contribute to the worsening or improving of psoriasis lesions in many ways [4], one of those is periodontitis.

The aim the present study was to map the scientific knowledge about psoriasis and periodontal health status in order

to contribute for a minimum dental care protocol able to mitigate the impact on the patient quality of life [4, 5].

## Methods

It was conducted a systematic review in accordance to the Cochrane Collaboration for Qualitative Research Group (CCQR; Bangor University, Wales, UK) [8] within the Evidence-Based Health Program model at the service (GEPSOS) Grupo Estudos Pesquisas Saúde Oral Sistêmica Baseada Evidências, Ambulatório Multidisciplinar Psoríase I Departamento Dermatologia Unifesp São Paulo Brazil, and received ethics committee approval from the Ethics Comittee from Unifesp. The results were reported according to guidance from the Cochrane Collaboration and PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) [9]. It was used the following databases as source up to 27 Feb 2016: Cochrane Skin Group Specialized Register; Cochrane Central Register of Controlled Trials (CENTRAL) 2014, Issue 5; MEDLINE from 1946 (via Pubmed); Embase from 1974; CINAHL (Cumulative Index to Nursing and Allied Health Literature) from 1981; Salford Database of Psoriasis trials; ISI Web of Science; Health STAR; LILACS (Literatura Latino-Americana e do Caribe em Ciências da Saúde); IBECs (Índice Bibliográfico Español en Ciencias de la Salud), Rayyan (Qatar Computing Research Institute) and hand search at Unifesp Library. The search strategy for MEDLINE can be seen in Box 1.

The search was designed to assess randomized controlled clinical trials and non-randomized controlled clinical trials that investigated dental improvement of psoriasis as the primary end point without limit for either date of publication or language. The studies retrieved were assessed for eligibility by reading the title and abstract. All eligible studies were read in full text in the

evaluation for inclusion. Both the process of assessing eligibility for the inclusion of studies was performed by two independent evaluators regarding the validity, content and disagreements were consensus resolved. The extraction of data from selected studies was based on standard of the Cochrane Collaboration data extraction form modified to meet the needs of the present review.

The assessment of methodological quality was done according to the study design of the publication. For the evaluation of the risk of bias for included RCTs, were used the criteria described in the Cochrane Handbook for Systematic Reviews of Interventions according to the following domains: Random sequence generation (selection bias); Allocation concealment (selection bias); Blinding of participants and personnel (performance bias); Blinding of outcome assessment (detection bias); Incomplete outcome data (attrition bias); Selective reporting (reporting bias); Other bias (other sources of bias related to a particular trial design, e.g. cross-over or cluster-randomized, or specific circumstances, e.g. interventions mixed).

Each of the items was judged as low risk of bias, high risk of bias or unclear risk of bias, for included studies [10]. The assessment of methodological quality for non-randomized trials were done according the Consolidated Standards of Reporting Trials CONSORT statements [11], and was applied Appendix B Criteria Used In Quality Assessment Of Non-Randomized Studies [12]. The assessment of methodological quality for cohort studies, it were used the NEWCASTLE - OTTAWA Quality Assessment Scale [13]. The measurement tool adopted to assess the methodological quality for any systematic reviews was adopted the AMSTAR guideline [14]. The present study was also submitted to the register at International Prospective Register of Systematic Reviews PROSPERO [15].

## Findings

According to PRISMA statement the flow of information through the different phases of a systematic review concerning the identification, screening, eligibility and inclusion of studies was made [9]. 830 Studies were identified through search strategy and 10 studies were included. **Table 1**

The concordance rate between evaluators was 98% [16]. None of included studies were able to answer question completely, but 10 studies related to the dental treatments inducing systemic favorable outcomes for psoriasis, partially filled the inclusion criteria of present review with 292.461 participants **Table 2**.

Under these circumstances, due the practical relevance of the theme, it was stated to perform a qualitative analysis of included studies [10]. References made contributions to answer each of the prior stated issues. Psoriasis and oral health status can influence themselves reciprocally for observed outcomes [17].

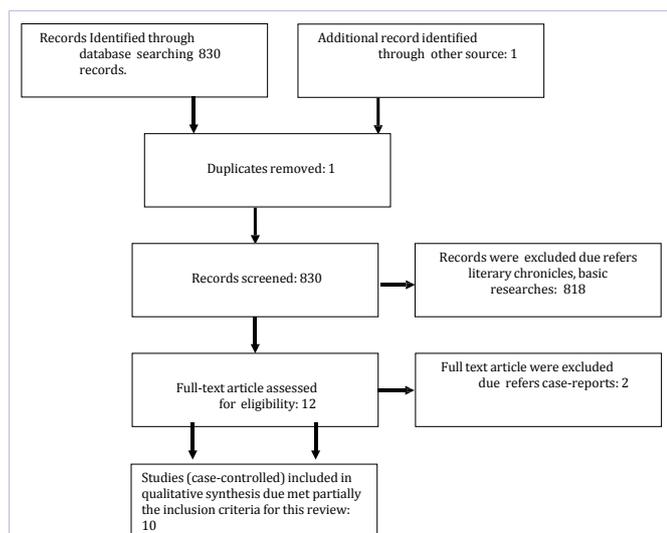
The global prevalence of dental diseases is high: 4% to 12% adults in U.S.A are affected with advanced periodontal diseases [17]. Evidences demonstrate that psoriasis has many factor origins, with the coexistence of underlying endogenous of those to its onset, in both, for triggering and for exacerbation, like skin

#1 "Psoriasis"[Mesh] OR "Psoriasis"[Text Word] OR "Pustulosis of Palms and Soles"[Text Word] OR "Pustulosis Palmaris et Plantaris"[Text Word] OR "Palmoplantaris Pustulosis"[Text Word] OR "Pustular Psoriasis of Palms and Soles"[Text Word] OR "Arthritis, Psoriatic"[Mesh] OR "Psoriatic Arthritis"[Text Word] OR "Psoriasis Arthropathica"[Text Word] OR "Psoriasis, Arthritic"[Text Word] OR "Arthritic Psoriasis"[Text Word] OR "Psoriasis, Arthritis"[Text Word] OR "Glossitis, Benign Migratory"[Mesh] OR "Benign Migratory Glossitis"[Text Word] OR "Migratory Glossitis, Benign"[Text Word] OR "Tongue, Fissured"[Text Word] OR "Glossitis Areata Exfoliativa"[Text Word] OR "Geographic Tongue"[Text Word] OR "Stomatitis Areata Migrans"[Text Word]

#2 "Oral Health"[Mesh] OR "Dentistry"[Mesh] OR "Tongue"[Mesh] OR "Tongue, Fissured"[Mesh] OR "Fissured Tongue"[Text Word] OR "Fissured Tongues"[Text Word] OR "Tongues, Fissured"[Text Word] OR "Lingua Plicata"[Text Word] OR "Scrotal Tongue"[Text Word] OR "Tongue, Furrowed"[Text Word] OR "Furrowed Tongue"[Text Word] OR "Furrowed Tongues"[Text Word] OR "Tongues, Furrowed"[Text Word] OR "Tongues, Fissure"[Text Word] OR "Stomatitis"[Mesh] OR "Stomatitides"[Text Word] OR "Oral Mucositis"[Text Word] OR "Mucositides, Oral"[Text Word] OR "Oral Mucositides"[Text Word] OR "Oromucositis"[Text Word] OR "Oromucositides"[Text Word] OR "Mucositis, Oral"[Text Word]

#3 #1 and #2

**Box 1** - Search strategy for Medline via Pubmed.



**Table 1:**

trauma, smoking [18] (physical, pharmacological, electrical, surgical), successive pharyngeal infections, especially the upper respiratory tract infections [19], improper bowel, liver functions, inadequate nutrition, metabolic, immune disorders [20] and periodontal diseases [21].

From oral diseases, those affecting the periodontium are the most related to psoriasis. Periodontal breakdown (periodontitis) is usually a consequence of inflammatory destruction as a result of poor oral hygiene and the subsequent accumulation of dental bacterial plaque or dysbiosis, present in children, adolescents and adults. In general many studies demonstrated that psoriasis patients experience more bone loss when compared to gender and age matched controls, possibly a first of its kind study investigating the co morbidity between both the diseases. [22-32].

A study of Antal et al [18], a hospital-based study, with 82 psoriasis and 89 controls received a full-mouth periodontal examination. The participants were divided into smoker and non-smoker groups. As a result was demonstrated that psoriasis in itself increased the likelihood of severe periodontal disease to OR 4.373 (as compared to non-smoker controls,  $p < 0.05$ ), while smoking increased it to OR 24.278 (as compared to non-smoker controls,  $p < 0.001$ ) in the studied population. The risk of severe periodontal disease in psoriasis turned out to be six times higher in smokers than in non-smokers, and corroborate those of other studies regarding the link between psoriasis and periodontal disease, but they also seem to reveal a powerful detrimental effect of smoking on the periodontal health of psoriasis patients, whereby the authors propose that smoking may have a permissive effect on the development of severe periodontal disease in psoriasis.

The study of Lazadiou et al [33] evaluated the possible association of chronic plaque psoriasis and severe periodontitis, with a hospital based case-control study with 100 patients with CPP and 100 age- and gender-matched controls. Mean age

for both groups was  $57.2 \pm 5.3$  years. Forty three percent of patients and controls were males. Significant correlations were noted between psoriasis and 1) periodontitis ( $\rho = 0.219$ ,  $P = 0.02$ ) and 2) metabolic syndrome ( $\rho = 0.191$ ,  $P = 0.07$ ) using Spearman's Rho correlation co-efficient. Univariate logistic regression reported significant relations between psoriasis and periodontitis (OR = 3.329, 95% CI: 1.513-7.324,  $P = 0.003$ ), psoriasis and metabolic syndrome (OR = 2.293, 95% CI: 1.250-4.207,  $P = 0.007$ ). On the contrary, a non-significant relation between psoriasis and active smoking status was detected (OR = 1.041, 95% CI: 0.597-1.817,  $P = 0.887$ ). In a multivariate analysis model we found a significant correlation of psoriasis and periodontitis when controlled for the presence of metabolic syndrome (OR = 2.486, 95% CI: 1.002-5.842,  $P = 0.049$ ). The conclusion is that periodontitis may be associated with psoriasis.

The study of Nakib et al. [23] about periodontal disease associated with systemic inflammation and arising risks for autoimmune diseases were assessed in a large prospective cohort, with 60,457 women in many aspects as history of tooth loss and number of natural teeth, psoriasis risk, age, cigarette smoking, body mass index, alcohol intake and physical activity. For those participants with mild periodontal bone loss (RR = 1.35, 95% CI = 1.03-1.75) and moderate-to-severe periodontal bone loss (RR = 1.49, 95% CI = 1.08-2.05) the psoriasis risk was higher as compared to those without periodontal bone loss, after adjusting for age, cigarette smoking, body mass index, alcohol intake, physical activity and tooth loss. Number of natural teeth and tooth loss were not associated with risk of psoriasis in this study. The conclusion was the history of periodontal bone loss may increase risk of subsequent psoriasis. A limitation of study is that it is based on self-reported measures.

The study of Yamada et al. [19] describes a case of psoriasis in which exacerbation of the cutaneous disease was accompanied by gingival epithelial changes and periodontal bursts, together with a report on the light microscopy of biopsies from periodontal lesions.

The study of Üstün et al [21] demonstrated that rheumatological diseases and periodontal disease are both characterized by dysregulation of the host inflammatory response. The aim of this study was to determine the possible relationship between periodontitis and psoriatic arthritis (PsA). Fifty-one adults with PsA (27 men and 24 women; mean age  $41.73 \pm 11.27$  years) and 50 age- and gender-balanced systemically healthy control subjects participated in the study. Participants' periodontal status was determined by probing pocket depth, clinical attachment loss (CAL), plaque index, and gingival index. The CAL levels of the PsA group were significantly higher than those of the control group ( $p < 0.05$ ). There were no statistically significant differences in the frequency of periodontitis, probing pocket depth, plaque index, or gingival index between the two groups. The results of the present study show that periodontitis severity as determined by CAL was higher in the PsA group; therefore, periodontal evaluation must consider when PsA is also diagnosed.

**Table 2:** Assessment Included studies characteristics.

Study	N	Design	Oral disease	Life Style	Outcome	Higgins Domains Tools
Preus 2010	155 Psoriasis / 155 Control	Case-control	Alveolar bone loss on bite-wing x rays	Not cited	Psoriatic patients had more bone loss and loss of teeth compared to controls	High level bias
Rahul et al, 2011	100patients, 50 with CP and 50 with psoriasis	Cross-sectional	Probing pocket depth(PPD), clinical attachment loss (CAL)and alveolar bone loss	Not cited	Prevalence of periodontitis is higher in psoriasis subjects as compared to controls	High level bias
Keller JJ et al, 2012	115 Psoriasis / 115 Control	Cohort	Probing pocket depth and clinical attachment loss	Not cited	Increased risk for psoriasis among patients with CPD	High level bias
Lazidou u 2013	100 Psoriasis / 100 Control	Case-control	Probing pocket depth, and other indices	Active smoking status	Periodontitis may be associated with psoriasis	High level bias
Üstün 2013	51Psoriasis / 51 Control	Case-Control	Probing pocket depth, and other indices	Not cited	Periodontitis may be associated with psoriasis	High level bias
Nakib S et al, 2013	60,457 women	Cohort	Self-reported alveolar bone loss, loss of teeth	Not cited	Periodontal bone loss may increase risk of subsequent psoriasis	High level bias
Fadel HT et al 2013	89 psoriasis / 54 controls	Case-control	Probing pocket depth, Bleeding on probing and alveolar bone level	Not cited	No difference in periodontal profiles, though psoriatic pt's had few teeth remaining.	High level bias
Skudutyt e-Rysstad 2014	60patients with psoriasis and 120 healthy controls	Cross-sectional	Probing pocket depth(PPD), clinical attachment loss(CAL)and alveolar bone loss	Not cited	Periodontitis more common in moderate/severe psoriasis compared to controls	High level bias
Antal M et al, 2014	82 psoriasis patients and 89 controls	Case-control	Bleeding on probing, clinical attachment level and probing depth	Active smoking status	Risk of severe periodontal disease in psoriasis was six times higher in smokers than in nonsmokers.	High level bias
Sharma et al, 2015	33 psoriasis patients and 35 healthy controls	Case-control	Probing pocket depth(PPD), clinical attachment loss (CAL)and alveolar bone loss	Not cited	Psoriasis patients had poor periodontal status compared to controls	High level bias

Aldahish et al. [34] observed that psoriasis patients had significantly more missing teeth and more areas with plaque and bleeding on probing, and 36% of psoriasis cases had one or more sites with radiographic bone loss  $\geq 3$  mm, compared to 13% of controls.

The study of Yussuf et al [35] with 51 patients recommended that periodontal evaluation is an important procedure in psoriatic arthritis. There is a study [34] about non-plaque-related to the chronic mucus cutaneous diseases, a special form of psoriasis in gums defined as desquamative gingivitis.

The study of Rysstad et al [37] compared the prevalence of periodontitis and alveolar bone loss among individuals with psoriasis and a group of randomly selected controls, in 60 psoriasis and 120 controls. The prevalence of moderate and severe periodontitis was significantly higher among psoriasis

individuals (24%) compared to healthy controls (10%). Similarly, 36% of psoriasis cases had one or more sites with radiographic bone loss  $\geq 3$  mm, compared to 13% of controls. Logistic regression analysis showed that the association between moderate/severe periodontitis and psoriasis remained statistically significant when adjusted for propensity score, but was attenuated when smoking was entered into the model. The association between psoriasis and one or more sites with bone loss  $\geq 3$  mm remained statistically significant when adjusted for propensity score and smoking and regularity of dental visits. In the propensity score (age, gender and education) matched sample (n = 100) psoriasis remained significantly associated with moderate/severe periodontitis and radiographic bone loss. The conclusion was the periodontitis and radiographic bone loss is more common among patients with moderate/severe psoriasis compared with the general population.

The study of Rahul et al [22] investigated the periodontal disease in psoriasis and establish an association exists between them, and it was demonstrated a significantly higher gingival, plaque index scores with an increased PPD and tooth loss compared to controls. The study observed the presence significantly greater number of *A.actinomycetemcomitans* and *P.gingivalis* positive samples [22].

The study of Pietrzak et al [24] investigated the association between periodontal disease and psoriasis and concluded it can be valid. There are reports about improvement in skin forms of psoriasis after an adequate periodontal treatment [33-42].

The study of Preus et al. [38] using dental bite-wing X-rays were obtained from 155 psoriasis patients aged 45-60 years, as well as from 155 age- and gender-matched controls. All X-rays were examined by the same investigator for accumulated destructive periodontitis using bone level and loss of teeth as endpoints. As a result, it was observed a significantly lower radiographic bone level ( $p < 0.001$ ) and a significantly higher number of missing teeth ( $p < 0.001$ ) were observed in the psoriasis cases compared to the controls. The study indicates that psoriasis patients experience more bone loss than age- and gender-matched controls.

The study Keller et al [39] investigated the association between psoriasis and chronic periodontitis (CP) in Taiwan. In total 115 365 patients with CP were included in the study cohort and 115 365 patients without CP were included in the comparison cohort, and was individually tracked each patient for a 5-year period to identify those who had subsequently received a diagnosis of psoriasis. A Cox proportional hazards regression was performed to compute the 5-year risk of subsequent psoriasis following a diagnosis of CP. It was found that the incidence rate of psoriasis during the 5-year follow-up period was 1.88 [95% confidence interval (CI) 1.77 to 1.99] per 1000 person-years in patients with CP and 1.22 (95% CI 1.14 to 1.32) per 1000 person-years in comparison patients. After censoring those who died during the follow-up period, and adjusting for monthly income and geographical region, compared with comparison patients, the Hazard Ratio (HR) of psoriasis for patients with CP was 1.52 (95% CI 1.38 to 1.70). Furthermore, the study subjects who had undergone a gingivectomy or periodontal flap operation had only a slightly higher adjusted risk of psoriasis than comparison patients (HR 1.26). The study detected an increased risk for psoriasis among patients with CP. Treatment for CP attenuated, but did not nullify, the risk for subsequent psoriasis.

Fadel et al. [40] assessed the risk of dental decay and periodontal disease in 89 individuals with mild-to-moderate chronic plaque psoriasis and 89 without psoriasis. Individuals with psoriasis had lower salivary pH, fewer remaining teeth, fewer sites with probing depth  $\leq 4$  mm, and a lower radiographic alveolar bone level than individuals without psoriasis ( $P < 0.05$ ). Differences in alveolar bone levels were no longer significant, particularly after introducing the confounder sex into the regression model. Similar numbers of decayed and filled teeth, sites with deep pockets, sites that bled on probing, and risk

profiles were observed. Individuals with PsoA exhibited a lower stimulated salivary secretion rate than those without psoriasis ( $P < 0.05$ ).

## Conclusions

The strengths of the present study were in the broad literature search, explicit methods, selection and evaluation of duplicate studies, assessment of the methodological quality of the included studies, summaries of the findings. The retrieved studies varied widely in many aspects. The limitations of present review were the impossibility to state any unit analysis issues, nor subgroup analysis and investigation of heterogeneity; it was not available to consider the *P* value for each assessed study. The reasons for that were the lack of inclusion of unpublished studies and sparse studies with poor methodological quality which did not allow us to make any statistical analysis, nor measure of treatment effect, and lack of inclusion of unpublished studies. However, it would be interesting to compare dental health studies in other systemic autoimmune diseases (lupus, for example) or chronic skin (vitiligo, for example) but also no such studies were found.

There were no differences in profiles of dental decay and periodontal disease experience and risk between individuals with and without psoriasis. Fewer remaining teeth were observed in individuals with psoriasis. However, the exact reason for tooth loss could not be identified. Meanwhile, the reduced salivary pH in individuals with psoriasis and salivary secretion in individuals with PsoA may pose some risk for future dental decay [40] **Table 2.**

No study had high enough methodological standards that could permit establishing a cause-effect relationship between these variables. It is known that dental diseases influences the individual's overall health, but in psoriasis can generates complex, intricate, and uncertain outcomes. Even not performing the analysis of the intrinsic mechanism of the phenomena, it is known that some factors, e.g. the periodontal disease microbiota may aggravate or predispose to systemic diseases.

It is known that the lack of control of hygiene can lead into infection of the respiratory tract, especially in patients with some comorbidities, like diabetes which can result in cardiovascular diseases (CVD), frequent in psoriasis [43, 44].

Postmortem studies from cardiovascular diseases patients demonstrate the similarity among microbiota dental bio-films from periodontal disease and those found in the large arteries of atherosclerotic plaques, inclusive, a clinical condition highly prevalent in psoriasis [45].

There are reports about periodontitis and chronic plaque psoriasis and other clinical conditions associated, including one study related the jaw bone loss in patients with moderate to severe psoriasis and periodontal disease is greater than the average bone loss in patient clinically similar conditions, but without periodontal disease [45, 46].

The study of Ganzetti et al. [47] compared the prevalence of periodontal diseases and alveolar bone loss among individuals

with skin forms psoriasis and a group of randomly selected controls showed the prevalence of moderate and severe forms was significantly higher among psoriasis (24%) when compared to healthy controls (10%) **Table 3**

According the results it is important that further studies should enhance the main aspects of methodological quality and randomized clinical trials with good quality of evidence need to be conducted to ensure that this scenario is adequately evaluated. For the practice, regarding the diagnosis, treatment and control, will give better outcome than we have be seen today.

**Implications**

1. Psoriasis patients should be careful regarding controls of their dental hygiene, in order to reduce as much as possible the chances of a dental emergency event [48].
2. Psoriasis is a disease of great complexity, it is recommended professional must adopt an assessment risk scales, such as the “physical status classification

system” from the American Society of Anesthesiologists (ASA) [49]. **Table 4**

3. Psoriasis requires the observation of the technical assumptions e.g. the American Dental Association, it is recommended professional must adopt guidelines, prior to any interventions, concerning to the degree of coverage and invasiveness of each dental procedure and the risk of adverse events before, during and after the consultation for psoriasis patients [50].
4. Conventional treatments for psoriasis or its diseases related are able to produce oral adverse events.
5. For psoriasis, dental procedures must to follow the principles of necessity and opportunity, whenever possible, at least a more conservative and less invasive treatment option.
6. It is essential that dentists are informed by patients about their clinical condition in details and both discuss about

**Table 3:** APPENDIX B. Criteria Used in Quality Assessment of Non-Randomized Studies.

Study	Participants	Outcomes assessed and reported	Measurement same for all subjects	Confounding controlled	Interventions
Preus 2010	155 Psoriasis / 155 Control	Yes	Yes	No	Yes
Keller 2012	115 365 Psoriasis / 115 365 Control	Yes	Yes	No	Yes
Lazidouou 2013	100 Psoriasis /100 Control	Yes	Yes	No	Yes
Nakib S et al, 2013 21	60,457 women	Yes	Yes	Yes	Yes
Antal M et al, 2014	82 psoriasis patients and 89 controls	Yes	Yes	Yes	No
Sharma et al, 2015	33 psoriasis patients and 35 healthy controls	Yes	Yes	Yes	Yes
Fadel 2013	85 Psoriasis /54 Control	Yes	Yes	No	Yes
Rahul et al,2011	100 patients, 50 with CP and 50 with psoriasis	Yes	Yes	Yes	Yes
Üstün 2013	51 Psoriasis / 51 Control	Yes	Yes	No	Yes
Skudutyte - Rysstad 2014	50 Psoriasis/ 121 Control	Yes	Yes	No	Yes

**Table 4:** American Society of Anesthesiologists (ASA) scale.

Scale	Characteristics of individuals or patients
ASA 1	Healthy individuals without systemic disease
ASA 2	<b>Individuals with mild-to-moderate systemic disease</b>
ASA 3	Patients with severe systemic disease, with limited or altered although not disabling activity
ASA 4	Patients with severe systemic disabling disease and constant risk of death
ASA 5	<b>Patients terminally ill</b>
ASA 6	Patient in a state of brain death, with potential organ donor

it. It is important the patients verify how informed their dentists are about the condition, and when necessary, they should tell their dentists about it.

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