Dermatology Practical & Conceptual

# Oral Diseases During Systemic Psoriatic Drugs: A Review of the Literature and Case Series

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**Key words:** psoriasis, anti-psoriatic drugs, oral health, oral adverse drug reactions

**Citation:** Raimondo A, Di Spirito F, Lembo S. Oral Diseases During Systemic Psoriatic Drugs: A Review of the Literature and Case Series. *Dermatol Pract Concept.* 2024;14(2):e2024107. DOI: https://doi.org/10.5826/dpc.1402a107

**Accepted:** November 29, 2023; **Published:** April 2024



**Funding:** None.

**Competing Interests:** None.

**Authorship:** All authors have contributed significantly to this publication.

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## ABSTRACT

**Introduction:** The oral health of psoriatic patients seems to be compromised compared to that of control individuals: many published studies have investigated the relationship between psoriatic disease and gingivitis, periodontitis, and missing teeth. However, data from these studies are not consistent nor exhaustive. Moreover, no study has considered the possible specific effects of conventional and biological systemic psoriatic treatments.

**Objective:** We report a narrative review of the literature about the possible link between anti-psoriatic drugs and oral disease onset and present case series of patients that have experienced oral disease during systemic therapy for psoriasis.

**Methods:** This is a narrative review. The literature search was performed using the MEDLINE database. From the selected articles, additional references were identified by a manual search among the cited literature.

**Results:** Oral adverse events during psoriatic therapies can be found in sporadic cases. The specific mechanisms of interplay between oral anatomic structures and the pathway targeted by the systemic agents will be investigated in depth.

**Conclusion:** All psoriatic patients who are candidates for conventional or biological systemic therapy should have regular oral health check-ups with a dentist and a dermatologist to prevent oral complications. Dermatologists and oral medicine specialists should be ready to recognize and manage this increasing number of oral adverse drug reactions during systemic treatments for psoriatic disease so as to provide patients with sufficient information about this risk and to stress the fundamental importance of regular dental assessments and good oral hygiene.

## Introduction

Psoriatic disease is a complex and multifactorial disorder with systemic involvement and auto-inflammatory pathogenesis [1]. Oral psoriatic lesions do not follow a predictable pattern: angular cheilitis and fissured white-coated geographic tongue lesions are examples of oral clinical manifestations associated with psoriasis [2, 3]. Patients with psoriasis also have an increased risk of developing other illnesses, such as inflammatory bowel disease, cardiovascular disease, metabolic syndrome, and diabetes as well as articular and bone inflammation [2-6]. Moreover, many published studies have reported that oral health in psoriatic patients seems to be compromised compared to that of control individuals. Based on a recent meta-analysis, periodontal disease is more frequent in psoriasis patients, with a reported statistically significant increase in odds ratio, with differing severity [7]. Psoriasis represents a risk factor for periodontitis in these patients. Although there are similarities in the risk factors and comorbidities between psoriasis and periodontal disease, their relationship's pathophysiology is still speculative [2, 8]. Current systemic therapeutic strategies, including disease-modifying anti-rheumatic drugs (DMARDs) and biological agents, permit the almost or complete clearance of psoriatic skin manifestations, with an improvement in quality of life. Biological agents are categorized by their target in anti-TNF-α, anti-IL17, and anti-IL23. Moreover, oral therapy for psoriatic disease is available: an inhibitor of the enzyme phosphodiesterase E4 (PDE4). The possible specific effects on the oral health of DMADRs, biologics, and small-molecule systemic psoriatic treatments are underestimated and reported as sporadic cases in the literature.

## Objective and Methods

The purpose of this narrative review was to collect the literature on this topic, focusing on studies that describe oral adverse drug reactions (ADRs) in the context of systemic drug therapy for psoriasis. The literature search was performed on MEDLINE via PubMed and Google Scholar databases using these search terms: “oral diseases,” “psoriasis,” “psoriatic systemic drugs,” “biologic therapy,” and “oral adverse event,” with diverse matches among them. The inclusion criteria were all types of articles indexed on PubMed and related to psoriatic patients. The exclusion criteria were full text not available and not in English. From the selected articles, additional references were identified by a manual search among the cited literature.

Moreover, we report a case series of psoriatic patients that have experienced oral disease during anti-psoriatic systemic therapies.

### DMADRs, Psoriasis, and Oral Disease

Conventional systemic therapies are used to treat moderate-severe psoriatic patients who are not responsive to topical medications and/or to phototherapy. These therapies include acitretin, cyclosporine, and methotrexate.

#### *Acitretin*

This is an oral retinoid, which is a synthetic form of vitamin A, and it is approved to treat psoriasis. Possible side effects are hair loss, dry skin and eyes, increased sensitivity to sunlight, peeling fingertips and nail changes, depression, headache, and decreased night vision. Regarding potential oral ADR, chapped lips and dry mouth are common, as are bleeding gums [9]. There are few data in the literature about other oral ADRs in psoriatic patients during acitretin therapy. However, we report two cases of destructive periodontitis resulting in tooth loss.

#### Case 1

A 52-year-old female with severe recalcitrant palmoplantar psoriasis was started on 25 mg of acitretin daily. She is a smoker and had a personal history of periodontal disease in follow-up. After two months, clinical psoriatic manifestations significantly improved, but the patient experienced a rapid worsening of her periodontal status with the loss of three teeth of the lower arch.

#### Case 2

A 53-year-old female with moderate psoriasis localized at the palmoplantar, elbow, and pretibial areas was started on 25 mg of acitretin daily. No signs of psoriatic arthritis or pain were present. The patient is a heavy smoker (about 15 cigarettes per day). After one month, as she achieved a good clinical response, the dosage was reduced to 20 mg/day. However, after three months, the therapy was discontinued due to the onset of significant side effects, including telogen effluvium, dyspepsia with weight loss (about 14 kg in 6 months), acute sacroiliitis, and a rapid worsening of pre-existing chronic periodontitis that led to the loss of five upper jaw teeth. After discontinuing acitretin, the patient started a biological drug.

#### *Cyclosporin*

**Cyclosporin (CsA)** is an immunosuppressive drug approved for the treatment of moderate-to-severe psoriasis. The most common side effects are decreased kidney function, headache, high blood pressure, the elevation of cholesterol serum level, hypertrichosis, and tingling or burning of the arms or legs. The most common oral ADR is gingival hyperplasia, reported in about 15% of psoriatic patients and in up to 80% of transplant patients [10]. This well-recognized ADR is not related to the dose or to the duration of treatment. Predictive

factors are the level of dental plaque and gingival inflammation. For this reason, correct oral hygiene and meticulous plaque control are indispensable to prevent this ADR. Dermatologists should be more sensitive to this aspect, and they should recommend the patient to consult a dentist before starting CsA therapy to correct some risk factors, such as appropriate oral hygiene, smoking cessation, adequate diet, and possible concurrent medication interaction. The combination of CsA and nifedipine exponentially increase the severity of gingival hyperplasia. Interestingly, it has been shown that females have a higher risk of developing ADRs during CsA therapy [17]. Female physiology, such as hormonal status and menopause, seems to have an important role that should be considered; hormonal changes are reflected in differing oral health related to estrogen and progesterone levels. It has been supposed that menstrual cycles, pregnancy, and menopause influence drug pharmacokinetics and pharmacodynamics, with an effect on its tolerability [11].

### *Methotrexate*

Methotrexate (MTX) it is an antagonist of folic acid with immunomodulator action. At high doses, it is used as a chemotherapeutic drug, while at a low dose (no more than 25 mg/week), it has anti-inflammatory effects, and it represents a valid therapeutic option for many inflammatory disorders. The addition of folic acid is the most important antidote to managing acute MTX toxicity, improving gastrointestinal tolerance, and preventing severe hematological disorders [12]. Regarding oral ADR, mucositis or oral ulcers are the most frequent events, which appear in 11-17% of MTX-treated patients [14,15]. The severity of these oral side effects of MTX can range widely, and it is seldom easy to treat them. What the most efficient care for patients with oral ulcers who take MTX at low doses is has been addressed by a systematic review of oral ulcers caused by low doses of MTX. The systematic review consists of sixteen research papers with a total of 24 individuals who experienced mouth ulcers while receiving low-dose MTX therapy. The mean patient age was 65.45 years, the mean MTX treatment duration was 52.91 months (SD: 80.75), and the average MTX dose was 10.93 mg/week (SD: 5.45). Except for one patient, all patients took MTX orally. The lingual dorsum, hard palate, gingiva, retromolar region, keratinized gingiva, and lip were the sites of the lesion. The lesions typically appeared after 35.63 days on average (SD: 52.57). The average recovery duration was 19.9 days (SD=10.63). Only three out of the 24 patients identified themselves as non-smokers. Moreover, only 50% of the patients mentioned using any concurrent medications. The most common management was MTX withdrawal and supplementation of folic acid, followed by only interruption of MTX. Some authors associated the abandonment of MTX with folic acid and systemic corticosteroid therapy. Frequently, patients who experienced this ADR did not reassume MTX. All these studies have many risks of bias, a lack of important information on patient history, and a short follow-up (the average follow-up period for these patients was 19.2 months, with an SD of 17.81). Moreover, differential diagnosis with other entities, including lichenoid reactions, is very difficult due to incomplete medical history. Indeed, overdosage and interactions with other medicines, particularly nonsteroidal anti-inflammatory medications, are the most frequent causes of MTX toxicity. Oral ulcers due to MTX therapy is an ADR that the specialists do not underestimate because these ulcers can be associated with a lymphoproliferative disorder, and they can cause malnutrition and the death of the fragile patient.

#### Case 1

We have previously described a 60-year-old female with palmoplantar psoriasis who was unresponsive to topical therapy and was switched to MTX 10 mg/week administered subcutaneously, along with 10 mg of folate the next day. The patient's palmar-plantar psoriasis manifestations significantly improved three months later, but the challenge was managing the medication and concurrent SARS-CoV-2 vaccination. After that, we advised stopping MTX one week before and one week after receiving the COVID-19 vaccine. The patient experienced diffuse erythema over the entire body surface three days after the immunization, swelling on the right periocular area and in the mouth, and ulcer on the soles of the her feet (Figure 1). Corticosteroids (40 mg/day) and antihistamines (10 mg/day) were then administered to the patient, with full recovery in one month [22].

#### Case 2

A 61-year-old female with plaque psoriasis, psoriatic arthritis, and mild comorbidities (hypertension and dyslipidemia) started methotrexate treatment at a dose of 15 mg/week plus 10 mg of folate the day after. However, after one month, the therapy was discontinued because of the emergence of numerous adverse outcomes like myalgia, pulpitis, and gingival bleeding. The patient experienced severe ulcerative gingival stomatitis with ulcers and erosions that affected the buccal mucosa, the gingiva, and the tongue. Clinical oral manifestations resolved after suspension of MTX and appropriate topical therapy with antiseptic and corticosteroid agents.

## Biological Agents, Small Molecules, Psoriasis, and Oral Disease

Biological therapies are agents that have specific targets, including cytokines, receptors, and signaling molecules. They have revolutionized the therapeutic approach to psoriasis, obtaining clearance or near clearance of clinical manifestations. To date, the literature lacks documents that report

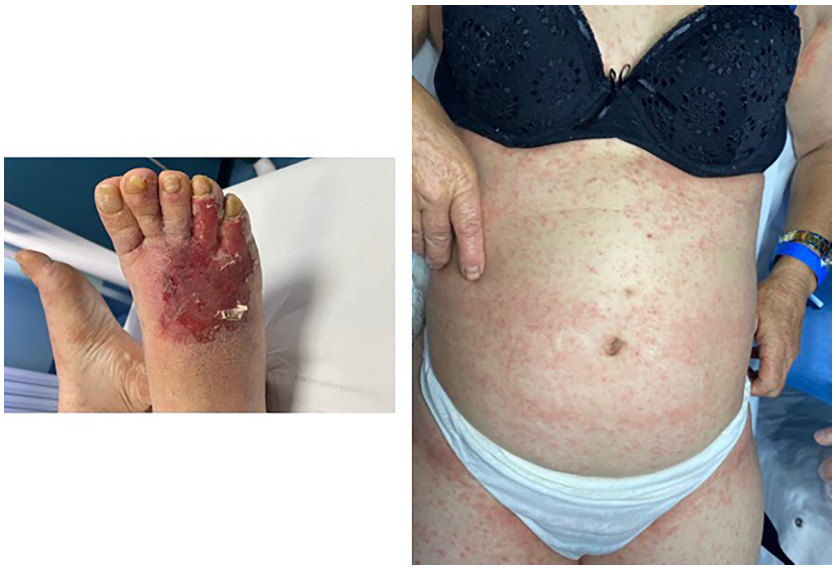

**Figure 1.** Cutaneous eruption in a psoriatic patient after SARS-CoV-2 vaccine during MTX therapy.

oral ADRs in the course of biological therapy for psoriasis. Many papers have described the possible link between psoriasis and periodontal disease (PD) but not the possible effects on the latest biological drugs. Recently, this aspect has been investigated in patients with rheumatoid arthritis (RA) suffering from concomitant PD in therapy with anti-TNF-α biologic agents (infliximab, adalimumab, etanercept, certolizumab pegol, golimumab) [16, 17]. These studies in accordance with the evidence that anti-TNFα inhibitors worsen periodontal parameters and gingival inflammation and slightly increase concentrations of antibodies against P. gingivalis. However, they decrease the gingival destruction of bone. A recent study reported that biological therapy, such as anti-TNF-α and anti-IL6 receptor therapy, may not lessen the severity of PD in RA patients and does not affect the activity of the disease. Interestingly, this study described a significant negative correlation between PD severity and the therapeutic response of RA patients: PD severity correlated with reduced effectiveness of the biological treatment. Consequently, PD therapy strategies may be helpful in enhancing RA patients' therapeutic responses [26]. Another longitudinal observation study had as its objective to assess the effect of MTX and etanercept treatment on the periodontal condition of RA patients. The results showed that MTX or anti-TNFα treatment did not improve the periodontal condition, demonstrating a negligible influence [17-19]. Future large studies are needed to explore in depth the impact of anti-TNF therapies on PD, especially in the psoriatic population. Another important class of biological drugs is the anti-interleukins (IL), including anti-IL-17 and IL-23. They have a good safety and effectiveness profile for the treatment of moderate-severe psoriasis. Regarding the IL-17 inhibitors (secukinumab, ixekizumab, brodalumab, and bimekizumab) and oral ADRs, the most frequently reported event is Candida infection. This side effect is due to the important role that IL-17A plays in innate and adaptative responses against Candida infections. However, in most cases, the appropriate local and occasionally systemic antifungal therapy resolves the infection without biological drug withdrawal. According to a recent comprehensive study, individuals receiving brodalumab, secukinumab, or ixekizumab had a risk of developing a Candida infection of 4%, 1.7%, or 3.3%, respectively. The frequent localizations are oral and genital, with forms of mild to moderate severity [20]. Candida is a commensal, and many factors can promote its transition to a pathological condition. Recognizing predisposing factors (medical conditions, a prior history of recurrent oral candidiasis, etc.) and acting on them can reduce risk. There are reported cases of a severe form of candidiasis, such as the mucocutaneous form, and atypical clinical manifestations for which the differential diagnosis with leukoplakia, oral lichen planus, or non-specific lichenoid reaction is not easy and requires other diagnostic procedures, including biopsy [20, 21]. Considering the high prevalence of psoriatic diseases in the general population and the large group of patients who undergo biological therapy with these agents, a well-structured randomized control study is necessary to evaluate in depth the adverse effects of long-term IL-17 inhibitor therapy on oral health.

To date, no oral ADRs are reported in patients during anti-IL-23 biological therapies (guselkumab, tildrakizumab, risankizumab) as well as small molecule agents (apremilast).

### Case

We have previously described the case of a 49-year-old female with severe psoriasis who began biological therapy with ixekizumab in 2018. A PASI 100 score was reported after 12 weeks, and this brilliant result remained constant for approximately one year, after which the patient described episodes of perionyxes, conjunctivitis, and vulvovaginitis with burning symptoms, itching, and foul-smelling discharges. The physical examination revealed a geographic tongue with a red atrophic plaque and whitish-yellow areas that could not be removed by scraping, numerous areas of de-epithelization at the level of the hard palate and the lower gingival arch, and angular cheilitis with erythema and fissures (Figure 2) [22].

## Conclusions and Perspectives

ADRs are potentially harmful side effects associated with the use of drugs. The growth of new target therapies for the management of autoimmune and autoinflammatory diseases is correlated to the increase in novel and unexpected ADRs, which need to be managed rapidly and appropriately. Psoriatic patients frequently have many comorbidities, such as psoriatic arthritis (PsA), which negatively affect oral health. In particular, the involvement of temporomandibular joint (TMJ) causes malocclusion, restricted jaw movement range, preauricular edema, and impaired eating function. The impact of this condition on the individual's daily life can be very negative and requires specific therapeutic actions [23]. Recently, the prevalence of atypical oral lesions in the course of conventional as well as biological therapies is enhanced, even if the specific mechanisms of interplay between oral anatomic structures and the pathway targeted by the systemic agents will be investigated in depth. Dermatologists and oral medicine specialists should be ready to recognize and manage this increasing number of oral ADRs during systemic treatments for psoriatic disease, providing patients with sufficient information about this risk and stressing the fundamental importance of regular dental assessments and good oral hygiene so as to avoid side effects (Table 1). Psoriatic

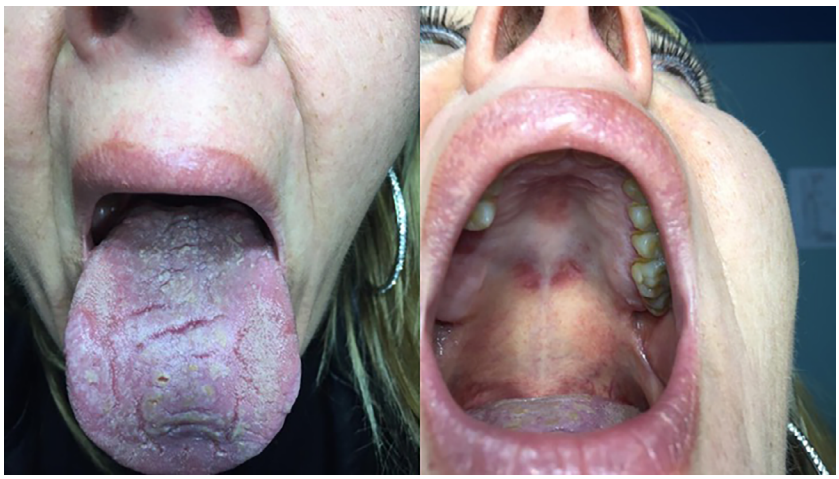

**Figure 2.** During treatment with an anti-IL-17A biological agent, a patient with psoriasis developed Candida infection. A geographic tongue with red atrophic plaque, whitish-yellow patches, and numerous de-epithelization areas at the hard palate level can be observed in the image.

**Table 1. Key considerations for conducting surveillance on oral health in patients with psoriasis.**

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| **Regular Dental Check-ups and Oral Health Assessment**: encourage patients with psoriasis to schedule routine dental examinations with a dentist who is skilled in any potential oral health complications linked to the skin condition. The best frequency for these examinations should be twice annually. |
| **Patient Education**: psoriatic patients should be informed by dermatologists and dentists about the value of maintaining proper oral hygiene. This includes using mouthwash, flossing, and brushing the teeth as prescribed. The possible effects of psoriasis and its therapies on dental health should also be discussed with patients. |
| **Oral Hydration**: encourage patients to maintain adequate oral hydration to help avoid dry mouth, a problem that affects many people with psoriasis. It can be helpful to drink water throughout the day and, if necessary, to use substitutes for saliva. |
| **Stress Management**: since stress can exacerbate both psoriasis symptoms and oral health problems, it is possible to advise psoriatic patients on stress management techniques. Stress-reduction strategies and exercises for relaxation can be helpful. |
| **Patient Communication**: ensure that the patient, dermatologist, and dentist are in constant communication. For the proper course of action to be taken, patients should be encouraged to report any oral symptoms or discomfort as soon as possible. |

patients who receive conventional or biological systemic therapy should be meticulously examined by a dentist and dermatologist with regular follow-up to prevent oral health complications. Many risk factors are modifiable [24], such as oral hygiene, anti-septic agents, smoking cessation, and a diet rich in fruits and vegetables and low in fat and sugar. Gender attention is another important factor to consider in the management of chronic conditions such as psoriatic disease. Long-term studies should be done in the future to find out whether and how much an improvement in oral health connects with the course of psoriasis as well as whether and how much anti-psoriatic therapies affect oral wellbeing.

## References


1. Ritchlin CT, Colbert RA, Gladman DD. Psoriatic arthritis. *N Engl J Med*. 2017;376(10):957–970. PMID: 28273019 DOI: 10.1056/NEJMra1505557
2. Kamiya, K.; Kishimoto, M.; Sugai, J.; Komine, M.; Ohtsuki, M. Risk Factors for the Development of Psoriasis. *Int. J. Mol. Sci.* 2019;20(18):4347. PMID: 31491865 PMCID: PMC6769762 DOI: 10.3390/ijms20184347
3. Olejnik, M.; Osmola-Mańkowska, A.; Ślebioda, Z.; Adamski, Z.; Dorocka-Bobkowska, B. Oral Mucosal Lesions in Psoriatic Patients Based on Disease Severity and Treatment Approach. *J. Oral Pathol. Med. Off. Publ. Int. Assoc. Oral Pathol. Am. Acad. Oral Pathol.* 2020;49(8): 822–828.
4. Kavanaugh A, Helliwell P, Ritchlin CT. Psoriatic arthritis and burden of disease: patient perspectives from the population-based multinational assessment of psoriasis and psoriatic arthritis (MAPP) survey. *Rheumatol Ther.* 2016;3(1):91–102. PMID: 33245622 DOI: 10.1111/jop.13095
5. Gelfand JM, Gladman DD, Mease PJ, et al. Epidemiology of psoriatic arthritis in the population of the United States. *J Am Acad Dermatol.* 2005;53(4):573. PMID: 16198775 DOI: 10.1016/j.jaad.2005.03.046
6. Wilson FC, Icen M, Crowson CS, et al. Incidence and Clinical Predictors of Psoriatic Arthritis in Patients With Psoriasis: A Population-Based Study. *Arthritis Rheum.* 2009;61(2):233-239. PMID: 19177544 PMCID: PMC3061343 DOI: 10.1002/art.24172
7. Nijakowski K, Gruszczyński D, Kolasińska J, Kopała D, Surdacka A. Periodontal Disease in Patients with Psoriasis: A Systematic Review. *Int J Environ Res Public Health*. 2022;19(18):11302. PMID: 36141573 PMCID: PMC9516998 DOI: 10.3390/ijerph 191811302
8. Kinane, D.F.; Stathopoulou, P.G.; Papapanou, P.N. Periodontal Diseases. *Nat. Rev. Dis. Primer* 2017;3:17038. PMID: 28805207 DOI: 10.1038/nrdp.2017.38
9. Lee CS, Li K. A review of acitretin for the treatment of psoriasis. *Expert Opin Drug Saf.* 2009;8(6):769-79. PMID: 19998529 DOI: 10.1517/14740330903393732
10. Colombo MD, Cassano N, Bellia G, Vena GA. Cyclosporine regimens in plaque psoriasis: an overview with special emphasis on dose, duration, and old and new treatment approaches. *Scientific World Journal.* 2013;2013:805705. PMID: 23983647 PMCID: PMC3745987 DOI: 10.1155/2013/805705
11. Lauritano D, Palmieri A, Lucchese A, Di Stasio D, Moreo G, Carinci F. Role of Cyclosporine in Gingival Hyperplasia: An In Vitro Study on Gingival Fibroblasts. *Int J Mol Sci*. 2020;21(2):595. PMID: 31963361 PMCID: PMC7014429 DOI: 10.3390/ijms 21020595
12. Colombo D, Banfi G, Cassano N, Graziottin A, Vena GA, Fiori GG, Zagni E, Stingeni L, Chimenti S, Berardesca E, Micali G, Albertini G, De Simone C, Bellia G; GENDER ATTENTION study group. The GENDER ATTENTION Observational Study: Gender and Hormonal Status Differences in the Incidence of Adverse Events During Cyclosporine Treatment in Psoriatic Patients. *Adv Ther.* 2017 ;34(6):1349-1363. PMID: 28432647 PMCID: PMC5487861 DOI: 10.1007/s12325-017-0526-7
13. Dhir V, Sandhu A, Kaur J, Pinto B, Kumar P, Kaur P, et al. Comparison of two different folic acid doses with methotrexate—a randomized controlled trial (FOLVARI Study). *Arthritis Res Ther.* 2015;17:156. PMID: 26063325 PMCID: PMC4483203 DOI: 10.1186/s13075-015-0668-4
14. Lalani R, Lyu H, Vanni K, Solomon DH. Low-Dose Methotrexate and Mucocutaneous Adverse Events: Results of a Systematic Literature Review and Meta-Analysis of Randomized Controlled Trials. *Arthritis Care Res (Hoboken)*. 2020;72(8):1140-1146. PMID: 31150157 PMCID: PMC6885092 DOI: 10.1002/acr.23999
15. Deeming GM, Collingwood J, Pemberton MN. Methotrexate and oral ulceration. *Br Dent J.* 2005;198(2):83-5. PMID: 15702101 DOI: 10.1038/sj.bdj.4811972
16. Lembo S, Martora F, Grimaldi A, Raimondo A. Cutaneous Eruption after SARS-CoV-2 Vaccine in Psoriatic Patient Treated with Methotrexate. *Indian J Dermatol.* 2022;67(5):626. PMID: 36865874 PMCID: PMC9971768 DOI: 10.4103/ijd.ijd_361_22
17. De Smit MJ, Westra J, Posthumus MD, Springer G, van Winkelhoff AJ, Vissink A, Brouwer E, Bijl M. Effect of Anti-Rheumatic Treatment on the Periodontal Condition of Rheumatoid Arthritis Patients. *Int J Environ Res Public Health*. 2021;18(5):2529. PMID: 33806304 PMCID: PMC7967392 DOI: 10.3390/ijerph18052529
18. Lakio, L.; Antinheimo, J.; Paju, S.; Buhlin, K.; Pussinen, P.J.; Alfthan, G. Tracking of plasma antibodies against Aggregati-bacter actinomycetemcomitans and Porphyromonas gingivalis during 15 years. *J. Oral Microbiol.* 2009, 1. PMID: 21523211 PMCID: PMC3077000 DOI: 10.3402/jom.v1i0.1979
19. Tachibana M, Yonemoto Y, Okamura K, Suto T, Sakane H, Kaneko T, Dam TT, Okura C, Tajika T, Tsushima Y, Chikuda H. Does periodontitis affect the treatment response of biologics in the treatment of rheumatoid arthritis? *Arthritis Res Ther.* 2020;22(1):178. PMID: 32711580 PMCID: PMC7382136 DOI: 10.1186/s13075-020-02269-x
20. Picciani BL, Michalski-Santos B, Carneiro S, Sampaio AL, Avelleira JC, Azulay DR, Pinto JM, Dias EP. Oral candidiasis in patients with psoriasis: correlation of oral examination and cytopathological evaluation with psoriasis disease severity and treatment. *J Am Acad Dermatol.* 2013;68(6):986-991. PMID: 23384796 DOI: 10.1016/j.jaad.2012.11.033
21. Picciani BLS, Dziedzic A, Werneck JT, Marinho MA, Dick TNA, Quintanilha NR, Dias EP. Atypical oral candidiasis in a psoriatic patient during targeted immunotherapy with an interleukin 17 inhibitor (secukinumab). *BMC Oral Health*. 2021;21(1):292. PMID: 34103043 PMCID: PMC8186152 DOI: 10.1186 /s12903-021-01653-6

22. Raimondo A, Salzano FA, Lembo S. Disseminated mucocutaneous Candida infection during anti IL-17A therapy in a psoriatic patient. *Ital J Dermatol Venerol*. 2021;156(3):400-401. PMID: 33228332 DOI: 10.23736/S2784-8671.20.06673-0
23. Qamar Z, Alghamdi AMS, Haydarah NKB, Balateef AA, Alamoudi AA, Abumismar MA, Shivakumar S, Cicciù M, Minervini G. Impact of temporomandibular disorders on oral health-related quality of life: A systematic review and meta-analysis. *J Oral Rehabil*. 2023;50(8):706-714. doi: 10.1111/joor.13472. PMID: 37078711
24. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. *Int J Health Sci (Qassim)*. 2017;11(2):72-80. PMID: 28539867 PMCID: PMC5426403