Subject Area: Oral and Dental Surgery

Oral Mucosal and Dental Affection in Patients with Systemic Lupus Erythematosus: A clinical Survey

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ORIGINAL STUDY

Oral mucosal and dental affection in patients with systemic lupus erythematosus: a clinical survey

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Abstract

Background: Systemic lupus erythematosus (SLE) is a chronic autoimmune disease predominantly affecting young females. Systemic involvement along with variable clinical presentations characterizes SLE. Various oral and dental manifestations have been described in SLE including oral ulcerations, candida infection, and periodontal disease. We aimed to detect oral mucosal and dental disease in SLE patients and its relation to demographic features, general disease activity, and extra-articular manifestation.

Patients and methods: Total 80 patients with SLE were included in this cross-sectional study. Patients were allocated into two groups, 40 patients in each group, according to SLE disease control with immunosuppressive medications: group A included patients who had controlled SLE and receiving immunosuppressive medications, and group B included newly diagnosed SLE patients with uncontrolled disease activity and not receiving immunosuppressive medications. SLE disease activity was measured by systemic lupus erythematosus disease activity index (SELDAI). The oral and dental examination included: the height of the gingival recession, clinical attachment level, probing pocket depth measurement, gingival index (GI), mobility index (MI), the Plaque index system, the decay missing filled (DMF) index, bleeding on probing, oral ulcer, candida infection, angular cheilitis.

Result: Comparing group B to group A, dental parameters and oral ulcers were statistically significantly higher in group B except for candida infection and angular cheilitis which were higher in group A. All oral and dental parameters correlated positively with age and SELDAI.

Conclusion: Our study revealed higher dental and oral ulcers in patients not receiving immunosuppressive, except candida infection and angular cheilitis were lower. Dental and oral manifestations correlated positively with age, SELDAI, and various extra-articular manifestations.

Keywords: Dental, Mucosal, Oral, Periodontitis, Systemic lupus erythematosus

1. Introduction

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease in which the self-reactive B and T cells are improperly activated leading to the production of immune complexes and autoantibodies that irreversibly damages different organs [1]. SLE predominantly affects young females. Ethnicity influences its prevalence, clinical presentation, and complexity of the disease. African Americans and Hispanics have a higher prevalence [2].

Heterogenous systemic involvement and clinical presentation characterize SLE [3]. The skin, joints, lungs, kidneys, cardiovascular system, nervous system, and blood are the most commonly affected systems [2].

About 70% of patients with SLE experience skin manifestation that lies in three main categories: chronic cutaneous discoid lupus, subacute cutaneous lupus, and acute cutaneous lupus [4].
A study by [5] showed that 72% of patients with SLE reported mucocutaneous manifestation. The most common oral manifestations of SLE are plaques, honeycomb, and keratotic, which can lead to either scaly or marginal gingivitis [6], nonspecific erythema, petechiae, purpura, and cheilitis [7].

Hyposalivation and xerostomia are frequently reported in patients with SLE as a side effect of medications like corticosteroids, nonsteroidal anti-inflammatory drugs, and immunosuppressants [8], which can lead to dental caries, oral ulcerations, and recurrent noninfectious pharyngitis [9], along with dysphagia and dysgeusia [10]. Corticosteroids can also lead to candidiasis and other oral infections [9].

Recurrence of painful aphthous ulcers occur in the oral mucosa, gingiva, tongue, and palate and are commonly associated with SLE [11], they can be seen in the earlier stages of SLE and they are a sign of early diagnosis [12].

Periodontal disease and bleeding from gums are common oral manifestations of SLE. Periodontal disease is related to SLE activity [13]. Furthermore, periodontal disease progression can be increased by SLE, and the greater depth of periodontal pockets can lead to greater tooth loss [14]. The treatment of periodontal disease was found to reduce SLE symptoms [13].

Hormonal, environmental factors and genetic factors play an important role in the etiology of SLE. Bacterial infection particularly can promote the development of SLE in a genetically susceptible person as it induces inflammatory responses and autoantibodies formation [15].

Periodontitis is an infectious inflammatory disease in which there is persistent inflammation due to dental plaque bacteria. Periodontitis can lead to tooth loss and may also increase the risk of systemic disorders like rheumatoid arthritis, SLE, cardiovascular, gastrointestinal cancer, and diabetes [15].

Both SLE and periodontal disorders share some immunopathological characteristics and potential mechanisms that contribute to their onset and progression. Dysregulation of the immune system that includes neutrophils and phagocytic cells [15], the association of polymorphisms in interleukin-10, IgG Fc receptor, and tumor necrosis factor [16], high serum level of proinflammatory cytokine and beta 2-glycoprotein I-dependent anticardiolipin have been identified and contributed to tissue damage in both SLE and periodontal disease [15].

Several studies concluded inconsistent results regarding the prevalence of periodontal disease in patients with SLE. Many studies reported increased prevalence [15,17–19] whereas others showed a low incidence of periodontal disorder in patients with SLE [14,15,20]. Moreover, there is also a controversy about the status of periodontitis in SLE some reported mild form [14] whereas others reported severe forms of periodontitis [17].

2. Aim

To detect oral mucosal and dental disease in SLE patients and its relationship to demographic features, general disease activity, and the extra-articular manifestation. Also, we aimed to detect the effect of SLE disease activity on the periodontium and the oral cavity.

3. Patients and methods

This cross-sectional study included 80 patients diagnosed with SLE according to the European League Against Rheumatism/American College of Rheumatology Classification criteria for SLE [21]. Patients were allocated into two groups, 40 patients in each group according to SLE disease activity and the medications. Group A included patients who had controlled SLE and were receiving immunosuppressive drugs, while group B included newly diagnosed SLE patients with uncontrolled disease activity who had not yet started immunosuppressive drugs. Patients were recruited from the outpatient clinic, department of Oral Medicine and Periodontology, and Department of Rheumatology, Banha Teaching Hospital, Banha, Egypt. To be included in this study patients had to be above the age of 18, have had SLE for at least a year prior to participation, be able to and willing to tolerate oral and dental examination procedures, and be able to and willing to provide written informed consent. Patients with the following conditions were excluded from our study: sepsis, diabetes, chronic renal and hepatic disorders, overlap syndrome diagnosis, pregnancy or nursing, patients with congenital dental abnormalities, poor oral hygiene, and heavy smokers. Each participant provided written informed consent after being informed about the study. The study was approved by the Ethics Committee of Scientific Research, Banha Teaching Hospital.

3.1. Methods

The patients were subjected to the following assessment:

(1) Full history taking including drug history, and full general and musculoskeletal examination.

(2) Assessment of disease activity using systemic lupus erythematosus disease activity index
(SLEDAI) [22]. The controlled disease was defined as no or mild disease activity (SLEDAI = 0, SLEDAI 1–5, respectively). The uncontrolled disease is defined as moderate or high disease activity (SLEDAI 6–10, SLEDAI >10, respectively) [23].

(3) An oral and dental examination was carried out by two experienced dentists who were masked to the patient's diagnosis. The oral mucosa was examined for ulcers, angular cheilitis, and candida infection.

3.2. Dental examinations included the following parameters

3.2.1. Probing pocket depth (PPD)

On the mesial, buccal, distal, and lingual surfaces of each tooth in the arch, the probing pocket depth was measured from the free gingival edge to the end of the pocket. With a force of around 25 g, the typical William's graduated periodontal probe was employed with the long axis parallel to the tooth under examination [24].

3.2.2. Clinical attachment level (CAL)

The standard William's graduated periodontal probe and the same principles of detection probing the attachment level were used to measure the attachment level from the cementoenamel junction to the base of the sulcus.

3.2.3. Gingival recession height measurement (RH)

By measuring the millimeters between the gingival edge and the cementoenamel junction (CEJ). Using Miller's categorization method 1985, the gingival recession defect was graded into classes 1–4:

(1) Class I: there is no periodontal loss (of bone or soft tissue) in the interdental space, and 100% root coverage is expected. Marginal tissue recession does not reach the mucogingival junction (MGJ).
(2) Class II: there is no periodontal loss in the interdental area, marginal tissue recession extension to or beyond the MGJ, and it is possible to expect 100% root coverage.
(3) Class III: the MGJ or beyond is reached by the marginal tissue recession. There is bone or soft tissue loss in the interdental area or there is a mispositioning of the teeth, which prevents the attempt of 100% of root coverage. Partial root coverage can be anticipated. A periodontal probe can be used to estimate root coverage prior to surgery.
(4) Class IV: the MGJ or beyond is reached by the marginal tissue recession. Since the interdental bone or soft tissue loss and/or tooth misalignment are so significant, root coverage cannot be anticipated.

3.2.4. Gingival index (GI)

On a scale from 0 to 3, the gingival index (GI) created by [25] was used to determine the degree of gingival inflammation:

0 is normal gingival.
1 represents mild inflammation, slight edema, and slight change in color but there is no bleeding on probing.
2 there is moderated inflammation, edema, glazing, redness, and bleeding on probing is present.
3 there is marked inflammation, edema, redness, laceration, and propensity toward spontaneous bleeding.

3.2.5. Mobility index [26]

Grade 0: there is obvious movement.
Grade 1: visible movement in the buccolingual direction of less than 1 mm.
Grade 2: more than 1 mm but less than 2 mm mobility.
Grade 3: more than 2 mm or repressibility in the socket.

3.2.6. The plaque index [27]

0: there is no plaque.
1: a film of plaque clinging to the free gingival margin as well as the tooth's surrounding area. Only after applying the disclosing solution or by using the probe on the tooth surface can the plaque be seen in situ.
2: moderate buildup of soft deposits that are visible to the naked eye in the gingival pocket, on the tooth, or along the gingival margin.
3: the presence of a lot of soft matter in the gingival pocket, and or on the tooth as well as the gingival edge.

3.2.7. The DMF index

The total number of teeth or surfaces that are decayed (D), missing (M), and filled (F) for a particular person is stated as DMF [28].
3.2.8. Bleeding on probing [29]

0: there is no bleeding.
1: there is only one visible bleeding spot.
2: multiple discrete bleeding points or tiny blood spots develop.
3: immediately following probing, the interdental triangle was filled with blood.
4: when probing, there is profuse bleeding that travels to the gingiva’s margin.

Table 1. Demographic and disease characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Group A No. (%)</th>
<th>Group B No. (%)</th>
<th>t/χ²</th>
<th>P</th>
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<tr>
<td>Sex (No, %)</td>
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</tr>
<tr>
<td>Female</td>
<td>32 (80 %)</td>
<td>34 (85 %)</td>
<td>0.346</td>
<td>0.556</td>
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<tr>
<td>Male</td>
<td>8 (20 %)</td>
<td>6 (15 %)</td>
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<td>Age (Years)</td>
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<tr>
<td>Mean ± SD</td>
<td>51.83 ± 1.22</td>
<td>51.70 ± 1.07</td>
<td>0.488</td>
<td>0.627</td>
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<tr>
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<td>50–54</td>
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<tr>
<td>Clinical manifestations</td>
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<tr>
<td>Alopecia</td>
<td>3 (7.5 %)</td>
<td>12 (30 %)</td>
<td>6.646</td>
<td>0.01</td>
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<tr>
<td>Skin rash</td>
<td>2 (5 %)</td>
<td>10 (25 %)</td>
<td>6.196</td>
<td>0.01</td>
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<tr>
<td>Serositis</td>
<td>2 (5 %)</td>
<td>8 (20 %)</td>
<td>4.063</td>
<td>0.04</td>
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<tr>
<td>Nephritis</td>
<td>1 (2.5 %)</td>
<td>6 (15 %)</td>
<td>3.865</td>
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<tr>
<td>Neuropsychiatric</td>
<td>1 (2.5 %)</td>
<td>7 (17.5 %)</td>
<td>5.267</td>
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<td>SELDAI</td>
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<tr>
<td>Range</td>
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<td>7–13</td>
<td>16.543</td>
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<td>Mean ± SD</td>
<td>2.23 ± 0.53</td>
<td>9.38 ± 0.63</td>
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</table>

4. Results

A total of eighty patients with SLE were included in this study, patients were allocated into two groups according to the control of SLE activity and the usage of immunosuppressive drugs. Patients in group A had controlled SLE and were receiving immunosuppressive drugs while patients in group B had uncontrolled SLE and were not on immunosuppressive drugs. Each group included forty patients.

4.1. Demographic and disease characteristics

There were 32 females and 8 males in group A, while in group B there were 34 females and 6 males. In group A the age ranged from 50 to 55, while in group B it ranged from 50 to 54. There was no significant difference between the two groups regarding sex and age, while the extra-articular manifestations and the SELDAI were significantly higher in group B compared with group A Table 1.

4.2. Dental and oral findings

The dental and oral findings were statistically significantly higher in group B compared with group A except for candida infection and angular cheilitis which were significantly higher in group A (Table 2) (Figs. 1–8).

CAL, Clinical attachment level; DMF, decay missing filled index.
P less than 0.05 is statistically significant.
Figures 1–8 show the dental and oral findings:

4.3. Relation between oral and dental findings and demographic, disease activity, and extra-articular manifestations

A correlation study was performed to assess the relationship between different dental and oral parameters and the demographic and disease characteristics. The study showed that there was a positive correlation between the dental and oral parameters with age and SELDAI but there was no correlation between all dental and oral parameters with sex. Regarding the extra-articular manifestations, there was a positive correlation between alopecia and each of propping depth, CAL, gingival recession height, GI, DMF, oral ulcers, angular cheilitis, and candida, but there is no correlation with mobility and plaque index. Skin rash correlated positively with propping depth, DMF, and oral ulcers but not with other parameters. Serositis correlated positively with probing depth and GI but not with other parameters, while was a positive correlation between oral ulcers and CNS manifestations. No correlation was found between nephritis and all dental and oral manifestations (Table 3).
5. Discussion

Total 80 patients with SLE were included in this study. The average age of our patients was higher than that of other studies. In a study by [30] the mean age was 33.32 ± 9.21 and a study by [31] showed that the median age of 3661 Egyptian SLE patients that were included in their study was 30 but the age ranges from 17 to 79 years [32]. Described a subset SLE, late-onset SLE in which SLE was diagnosed in patients over 50 years of age, which could explain the age of our patients. The majority of our patients were female which reflects the epidemiology of the disease.

In this study, we aimed to detect oral mucosal and dental disease in SLE patients and its relationship to demographic features, SLE disease activity, and extra-articular manifestations.

As regards the relationship between oral mucosal and dental disease and the demographic features we found a positive correlation between oral and dental findings with age. This finding is consistent with a 2017 study by Holde and colleagues which showed that periodontitis severity and extent increased with age. The duration and accumulative effects of periodontitis with aging were used to explain this. Whereas this finding disagrees with [33] study which revealed that periodontitis has a higher incidence in younger patients.

As regards sex, there was no correlation between the oral and dental finding with the gender of our patients which contradict [34,35] studies, as they reported that periodontitis is more prevalent in males and was explained that males had more periodontal tissue loss. Also [33], found that periodontitis was less common in females as women are more likely to seek medical advice and help more than men.

The relationship between oral and dental manifestations and SLE disease activity was variable in different studies. In this study, we found a positive correlation between them, and this agrees with [36] study which showed that periodontal disease in Chinese SLE patients had a significant association with disease activity as well as age. Whereas [37,38], studies found no association between periodontal
disease and SLE disease activity. The differences between our study and others could be attributed to genetic and environmental factors.

In the current study, we found a positive correlation between various oral and dental findings and various extra-articular manifestations. There was a positive correlation between alopecia and each propping depth, CAL, gingival recession height, gingival index, DMF, oral ulcers, angular cheilitis, and candida. Skin rash correlated positively with probing depth, DMF, and oral ulcers. Serositis correlated positively with probing depth and GI. Also, there was a positive correlation between oral ulcers and neuropsychiatric manifestations. Few studies examined the relationship between oral and dental diseases and extra-articular manifestations. Our findings may suggest that the response of SLE to treatments decreases due to active periodontal disease or the severity of periodontal disease contributed to the presence of extra-articular manifestations [30,39] explained that chronic inflammation is a common denomination of periodontitis and neuropyschiatric disease, and it could be the link between them. Periodontitis elicits a state of low-grade inflammation through the release of pro-inflammatory cytokines and by the invasion of the bacteria involved in periodontitis e.g., P gingivalis, which may hasten chronic inflammatory disorders along with activation of microglia and immune cells causing neuroinflammation.

In our study, we compared patients with controlled SLE activity and receiving immune-suppressive medication to the newly diagnosed patients with uncontrolled disease activity who were not receiving immune-suppressive medication. Patients who had controlled SLE activity and were receiving immunosuppressive had lower dental findings and oral ulcers which agree with the [40] study which reported a significant relationship between oral ulcers, lesions of the salivary glands, gum lesions, and others with medications used for SLE except for corticosteroids. This may suggest that different immunosuppressant drugs suppress the inflammatory process and have an anti-inflammatory process which is an important factor in the destruction of the periodontal tissue [30,41] reported that oral lesions in patients with SLE had a great response to immunosuppressive medication, topical and systemic steroids as well as anti-malarial medications. On the other hand, immunosuppressive medications and corticosteroids suppress immunity and increase the predisposition to infection, and also mask the clinical characteristics of infection [42] and this may explain our finding of increased prevalence of candida infection and angular cheilitis in patients receiving immunosuppressant medications.

Table 3. A correlation study between dental and oral manifestations and demographic and disease characteristics.

<table>
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<tr>
<th></th>
<th>Propping depth</th>
<th>CAL</th>
<th>Gingival recession</th>
<th>Gingival index</th>
<th>Mobility</th>
<th>Plaque index</th>
<th>DMF</th>
<th>Ulcer</th>
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<tr>
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<td>0.586**</td>
<td>0.598**</td>
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<td>r</td>
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<td>0.824**</td>
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</table>

CAL, Clinical attachment level; DMF, decay missing filled index; SLEDAI, systemic lupus erythematosus disease activity index. 
P less than 0.05 is statistically significant.
Further studies are recommended to detect the
effect of the different immunosuppressive
medications on oral and dental manifestation in
patients with SLE. We also recommend further
research focusing on other parameters such as oral
microbiota microbiological assays and assessment
of the salivary flow rate, to assess the relationship
between oral manifestations and disease activity in
the field of SLE and oral health research. Also, we
recommend using a comparative control group to
demonstrate whether healthy individuals can show
noteworthy variations from SLE patients.

5.1. Conclusion

In this study, there was a positive relationship
between various oral and dental findings and age,
disease activity, and various extra-articular mani-
festations. Patients who had controlled disease ac-
tivity and were receiving immunosuppressive
medications had lower oral ulcers and dental find-
ings but had higher angular cheilitis and candida
infection when compared with those who had un-
controlled disease activity and were not receiving
immunosuppressants.

Conflicts of interest

None declared.

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