Review Article

JOMP
Journal of Oral Medicine and Pain

pISSN 2288-9272 eISSN 2383-8493
J Oral Med Pain 2015;40(4):135-139
http://dx.doi.org/10.14476/jomp.2015.40.4.135

The Correlation between Desquamative Gingivitis Associated-Diseases and Plaque-Induced Periodontal Disease

Hyun-Dae Lim[1,3], Jin-Kyu Kang[2,3], You-Mee Lee[1,3], Young-Joo Shim[2,3]

[1]Department of Oral Medicine, School of Dentistry, Wonkwang University, Iksan, Korea
[2]Department of Orofacial Pain and Oral Medicine, Wonkwang University Daejeon Dental Hospital, Daejeon, Korea
[3]Wonkwang Dental Research Institute, Wonkwang University, Iksan, Korea

Received November 19, 2015
Revised December 1, 2015
Accepted December 2, 2015

Correspondence to:
Young-Joo Shim
Department of Orofacial Pain and Oral Medicine, Wonkwang University Daejeon Dental Hospital, 77 Dunsan-ro, Seo-gu, Daejeon 35233, Korea
Tel: +82-42-366-1128
Fax: +82-42-366-1115
E-mail: gc21@wku.ac.kr

This study was supported by research fund from Wonkwang University, 2015.

Desquamative gingivitis (DG) is a gingival manifestation of systemic mucocutaneous disorders such as mucous membrane pemphigoid, oral lichen planus, and pemphigus vulgaris. The lesion is very painful, so affects the patient's ability to do proper oral hygiene practices. This may be a potential risk factor for long-term periodontal health. However, there is some controversy about the relationship between the existence of DG and periodontal status. Although the correlation between DG-associated diseases and periodontal status is not to be certain, early diagnosis and appropriate treatment including adequate plaque control and removal of local factors is very important for preventing the progression of diseases and destruction of periodontal tissues.

Key Words: Desquamative gingivitis; Lichen planus, oral; Mucous membrane pemphigoid; Periodontal diseases; Plaque

INTRODUCTION

Desquamative gingivitis (DG), the presence of erythema, desquamation, erosion, and blistering of the marginal and attached gingiva, is gingival manifestation of several mucocutaneous disorders and systemic conditions. The DG lesions may indirectly increase the long-term risk of plaque-induced periodontal disease via plaque accumulation when pain associated with DG lesions hinder proper oral hygiene practices. As a result, DG is usually misdiagnosed as plaque-induced periodontal disease and combined with plaque-induced gingivitis or periodontitis. However, there is some controversy about the relationship between the existence of DG and periodontal status. Little is known of whether or not DG could influence the onset or progression of plaque-induced periodontal disease, or vice versa and there is no evidence that DG per se can cause loss of attachment and alveolar bone destruction. The present review intends to reflect on the most recent and relevant data concerning the correlation between DG-associated mucocutaneous systemic disorders and plaque-induced periodontal disease.

DESQUAMATIVE GINGIVITIS

The gingival diseases are classified into plaque-induced gingival diseases and non plaque-induced gingival diseases in the classification system for periodontal diseases and conditions.[1)] Among the non plaque-induced gingival disorder, gingival manifestation of systemic conditions includes mucocutaneous diseases, e.g., oral lichen planus (OLP), mucous membrane pemphigoid, pemphigus vulgaris (PV), erythema multiforme (EM), lupus erythematosus (LE), drug-induced lesion, and so on. These diseases are immune-mediated and have common clinical features, so-called

desquamative gingivitis (DG). DG is not a definitive diagnosis but a descriptive term, first introduced by Prinz[2] in 1932. Main clinical features are erythema, desquamation, erosion of the gingiva, and blistering of the marginal and attached gingiva. In many cases, gingival lesions represent the onset of the disorder or appear very early during its course, mainly in mucous membrane pemphigoid, PV, EM, and graft-versus-host disease (GVHD).[3] And in many case of mucous membrane pemphigoid, DG is the only clinical feature.

Mucous membrane pemphigoid, OLP, and PV are the most common cause of DG.[4] The pathogenesis of DG-associated diseases are cell-mediated (OLP, GVHD, and LE) and autoantibody-mediated (mucous membrane pemphigoid and PV). Cell-mediated diseases generally express modifications of epithelial thickness—atrophic-erosive form or hyperkeratosis. Autoantibody-mediated diseases generally express blister formation. Mucous membrane pemphigoid which is the most common cause of DG is autoantibody-mediated vesiculobullous lesions that typically involve gingiva. Autoantigens to the hemidesmosomal molecules or component of the lamina lucida have been identified and result in subepithelial split.[5] OLP is a T cell-mediated responses that triggers apoptosis of oral epithelial keratinocyte via tumor necrosis factor-alpha (TNF-α). Seven to ten percentage of OLP patients have lesions confined to gingiva. PV is autoantibody-mediated disease typically expressing acantholysis. It represents intraepithelial split because of desmosomal damage. Involvement of the oral mucosa, including the gingiva, is observed in the early phases of PV in up to 70% of patients.[6] PV initially affects the mouth and eventually affects the cutaneous lesion causing fluid loss, electrolyte imbalance, and septicemia. PV may be life-threatening if untreated. Because DG can be a feature of systemic diseases, early accurate clinical and histopathological diagnosis is required to differentiate these DG-associated disorders, manage properly, and prevent the progression of the diseases.

EFFECTS OF DESQUAMATIVE GINGIVITIS ON PERIODONTAL STATUS

The painful gingival and oral lesions can hinder proper oral hygiene practices, and increase the possibility of accumulation of dental plaque. Consequent plaque accumulation may be a long-term risk factor for periodontal disease.

We reviewed studies that evaluated the periodontal status of mucocutaneous diseases confined to most common cause of DG—mucous membrane pemphigoid, OLP and PV. First of all, we reviewed studies that evaluated the periodontal status between affected patients and healthy controls regardless of types and extent of lesions.[7-12] The results were not consistent even considering the methodological differences. Some reported the clinical periodontal status were significantly worse than in the healthy control group.[7-9] Akman et al.[7] evaluated the periodontal status of PV patients and compared it with that of healthy controls. The results showed that the Community Periodontal Index of Treatment Needs (CPITN) is higher in PV patients. Lóperz-Jornet and Camacho-Alonso[8] showed that the gingival index (GI), plaque index (PI), and CPITN is higher in OLP patients than healthy controls.

Others were reported there were no significant differences between patients and healthy controls.[10-12] Ertugrul et al.[10] compared OLP gingivitis or periodontitis patients with non-OLP gingivitis or periodontitis patients. It demonstrated that clinical periodontal parameters—PI, GI, probing depth (PD) and clinical attachment loss (CAL)—were slightly higher in the OLP gingivitis or periodontitis patients than in the non-OLP gingivitis or periodontitis patients, but did not show statistically significant. Ramón-Fluixá et al.[11] revealed no statistically significant differences between OLP patients and healthy controls in relation to clinical periodontal parameters—PI, simplified calculus index (SCI), and loss of attachment component of the periodontal disease index (PDI). But in the case of gingival involvement, the PI and SCI are significantly higher in DG-positive OLP group than DG-negative OLP group. But the PDI was not significantly different between the groups. Furthermore, in the severity of symptoms, the more aggressive and extensive presentations of OLP, the higher plaque and calculus deposits were exhibited. Tricamo et al.[12] also showed that the gingival mucous membrane pemphigoid patients exhibited higher GI score than a control group, but PI and CAL were not significantly different. It seems that the patients showed more gingival inflammation, but not periodontitis.

Next, there were several studies which compared the periodontal status between the DG-positive sites and DG-negative sites in OLP or mucous membrane pemphigoid patients.[13,14] Lo Russo et al.[13] have compared with DG-negative sites in the same patient who never treated for DG lesions or plaque-induced periodontitis. PD, CAL, full mouth plaque score (FMPS) and full mouth bleeding score (FMBS) were evaluated. They revealed that median PD and CAL, FMPS, and FMBS were not significantly different between the groups. In other study of Lo Russo et al.,[14] DG-positive sites only have higher FMPS compared to DG-negative sites. Correlations between the presence of DG lesions and clinical periodontal parameters—CAL and PD—were not significant. And no significant difference was found between DG-positive and DG-negative sites as regards the relative percentage of the investigated species on the total bacterial load.

Taken all together, first, it seems that gingival OLP and mucous membrane pemphigoid per se may not be able to cause or increase attachment loss. We speculate that the important factor which has influences on periodontal status is host, i.e., whether she or he has the disease or not, and severity and duration of the diseases which can affect the patient's oral hygiene practices.

Second, pain is important factor which can affect the patient's oral hygiene practices and quality of life. But, it was not stated whether the included patients as study group had subjective pain or not in the aforementioned references. Some patients may have severe pain, others may not. The patients with painful symptoms may have impaired oral hygiene and result in plaque accumulation and increase prevalence of gingivitis. This will possibly lead to periodontal disease and CAL in the long-term aspects, but there was no study that demonstrated this. Therefore, it needs to be further investigated of 1) correlations between the presence or absence of DG-associated pain and clinical periodontal parameters; and 2) long-term follow-up evaluation under the control of variables such as management protocol and medication.

Meanwhile, Ertugrul et al.[10] demonstrated the effect of OLP on periodontal tissue by evaluation of matrix metalloproteinase (MMP) level. MMP, produced by fibroblast, is a zinc-containing proteolytic enzyme that responsible for degradation of collagen, a component of the extracellular matrix in periodontal tissue. The balance between MMPs and MMP inhibitor (tissue inhibitor of metalloproteinases, TIMP) activity is important in the maintenance of many biologic processes, such as bone formation, wound healing, angiogenesis, apoptosis, immune response, and hair follicle cycles. If the level of MMPs is higher than TIMPs, it will cause the extracellular matrix to degrade uncontrollably, which lead to pathologic lesions. Kubota et al.[15] demonstrated that increased MMP expression in inflamed gingival tissue from systemically healthy patients with chronic periodontitis. One of the MMPs, MMP-1 is a key regulator of connective tissue remodeling and exists in high concentrations in inflamed gingiva. Up-regulation of MMP-1 is effective in the increase of apoptosis of the epithelium.[16] Another one of the MMPs, MMP-9 may play a key role in degradation of basal membrane. Zhou et al.[17] reported that T-cell derived MMP-9 may be involved in the pathogenesis of OLP. The disrupted basal membrane can no longer provide a signal to maintain keratinocyte, which may trigger keratinocyte apoptosis.[3] Ertugrul et al.[10] evaluated the MMP-1, MMP-9, and TIMP-1 levels in the gingival crevicular fluid and gingival samples with or without DG sites (among the enrolled OLP patients, nine patients showed DG) between OLP gingivitis or periodontitis patients and non-OLP gingivitis or periodontitis. They reported that the mean level of MMP-1 and MMP-9 is higher and the MMP inhibitor (TIMP)-1 is lower in OLP gingivitis or periodontitis patient than non-OLP gingivitis or periodontitis, although the clinical periodontal parameters—PI, GI, PD, and CAL—did not show differences. This suggests that OLP may affect periodontal status by change of enzyme levels and more breakdown of periodontal tissue could be occurring in OLP patients in the long-term course of diseases. Therefore, early diagnosis and appropriate treatment of OLP is very important for preventing the progression of OLP and destruction of periodontal tissues.

EFFECTS OF PERIODONTAL STATUS ON DESQUAMATIVE GINGIVITIS

The dental plaque can act as an irritating factor, worsening the DG lesions and contributing to prolong the presence of OLP lesions. Damaged oral mucosa in severe periodontal

disease might enhance presenting antigenic determinants to stimulate the autoimmune response. Periodontitis-induced inflammatory mediators and acute-phase proteins may play a major role in the development of a variety systemic diseases and conditions such as Behcet disease, diabetes mellitus and atherosclerosis.[18-20] But there was no study which concludes definitely that periodontal disease is a significant risk factor for the development of DG-associated diseases such as OLP, mucous membrane pemphigoid, and PV.

Periodontal tissue status may affect the progression of OLP. Salgado et al.[21] evaluated the isolated effect of plaque control on the improvement of painful symptoms of OLP with gingival involvement. It was demonstrated that plaque control was effective in improving the clinical features and painful symptoms of OLP with gingival involvement. Other studies also reported the effect of plaque control on the improvement of OLP gingival lesions.[22-24] Plaque control should be an important procedure in the management of OLP gingival lesion.

However, periodontal treatment failed to completely resolve the DG process, demonstrating that dental plaque is not the prevalent etiologic factor. As for OLP, the etiology of OLP is exactly unknown to date, but it is thought that intrinsic or extrinsic antigens that trigger an inflammatory process leading to accumulation of T lymphocytes in the superficial lamina propria, liquefaction degeneration, and keratinocyte apoptosis of in the basal layer.[25] In fact, the pathogenesis of plaque-induced periodontal disease involves a local inflammatory reaction and the activation of the immune system stimulated by bacterial factors.[26] Immune-mediated inflammatory mechanisms are also critical for the pathogenesis of OLP.[4] Both mechanisms involves common molecules like MMP-1, MMP-9, and TIMP-1[10] and cytokines like interleukin-1 and TNF-α.[27,28] Although the MMP-1, MMP-9, and TIMP-1 may be involved in pathogenesis of OLP, the OLP is not definitely triggering by this mechanism. Further studies are required to understand the interaction between periodontal disease and OLP, mucous membrane pemphigoid, and PV.

CLINICAL CONSIDERATIONS

Non-plaque induced gingival disorders is a gingival manifestation of systemic conditions and it may be an early sign of systemic conditions. Dentists should be aware of signs of DG, the typical clinical features of gingival lesions. But it is almost impossible to differentiate between the diseases and disorders causing DG based only on the clinical features. Histopathological examination including direct immunofluorescence testing is essential to found a definitive diagnosis. The painful gingival and oral lesions make the patients hard to do proper oral hygiene practices and increase the possibility of accumulation of dental plaque. Poor oral hygiene may lead to complications in the periodontal health and periodontal tissue status may affect the progression of diseases. It is very important to achieve adequate plaque control and remove other local factors to maintain the gingival health and improve painful symptoms and severity of DG. Previously mentioned, OLP may change the enzyme levels such as MMP-1 and MMP-9 which may play a role in breakdown of periodontal tissue. Therefore, early diagnosis and appropriate treatment including proper plaque control should be valued above everything else for preventing the progression of diseases and destruction of periodontal tissues. And patients must be informed about the potential risk of periodontal diseases and should be encouraged to maintain long-term periodontal follow-up to prevent disease progression.

CONCLUSION

From this review, we are not able to conclude the correlation between DG-associated diseases and periodontal status definitely because it is not certain whether the differences of clinical parameters between patients and healthy controls are caused by direct effect of the diseases itself or indirect effect of plaque accumulation. Although the correlation between DG-associated diseases and periodontal status is not to be certain, early diagnosis and appropriate treatment including adequate plaque control and removal local factors is very important for preventing the progression of diseases and destruction of periodontal tissues.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article

was reported.

REFERENCES

1. Armitage GC. Development of a classification system for periodontal diseases and conditions. Ann Periodontol 1999;4:1-6.
2. Prinz H. Chronic diffuse desquamative gingivitis. Dental Cosmos 1932;74:332-333.
3. Scully C, Laskaris G. Mucocutaneous disorders. Periodontol 2000 1998;18:81-94.
4. Lo Russo L, Fedele S, Guiglia R, et al. Diagnostic pathways and clinical significance of desquamative gingivitis. J Periodontol 2008;79:4-24.
5. Bagan J, Lo Muzio L, Scully C. Mucosal disease series. Number III. Mucous membrane pemphigoid. Oral Dis 2005;11:197-218.
6. Sirois D, Leigh JE, Sollecito TP. Oral pemphigus vulgaris preceding cutaneous lesions: recognition and diagnosis. J Am Dent Assoc 2000;131:1156-1160.
7. Akman A, Kacaroglu H, Yilmaz E, Alpsoy E. Periodontal status in patients with pemphigus vulgaris. Oral Dis 2008;14:640-643.
8. López-Jornet P, Camacho-Alonso F. Periodontal conditions in patients with oral lichen planus: a pilot study. Quintessence Int 2012;43:147-152.
9. Thorat MS, Raju A, Pradeep AR. Pemphigus vulgaris: effects on periodontal health. J Oral Sci 2010;52:449-454.
10. Ertugrul AS, Dursun R, Dundar N, Avunduk MC, Hakki SS. MMP-1, MMP-9, and TIMP-1 levels in oral lichen planus patients with gingivitis or periodontitis. Arch Oral Biol 2013;58:843-852.
11. Ramón-Fluixá C, Bagán-Sebastián J, Milián-Masanet M, Scully C. Periodontal status in patients with oral lichen planus: a study of 90 cases. Oral Dis 1999;5:303-306.
12. Tricamo MB, Rees TD, Hallmon WW, Wright JM, Cueva MA, Plemons JM. Periodontal status in patients with gingival mucous membrane pemphigoid. J Periodontol 2006;77:398-405.
13. Lo Russo L, Guiglia R, Pizzo G, et al. Effect of desquamative gingivitis on periodontal status: a pilot study. Oral Dis 2010;16:102-107.
14. Lo Russo L, Gallo C, Pellegrino G, et al. Periodontal clinical and microbiological data in desquamative gingivitis patients. Clin Oral Investig 2014;18:917-925.
15. Kubota T, Itagaki M, Hoshino C, et al. Altered gene expression levels of matrix metalloproteinases and their inhibitors in periodontitis-affected gingival tissue. J Periodontol 2008;79:166-173.
16. Kim SG, Chae CH, Cho BO, et al. Apoptosis of oral epithelial cells in oral lichen planus caused by upregulation of BMP-4. J Oral Pathol Med 2006;35:37-45.
17. Zhou XJ, Sugerman PB, Savage NW, Walsh LJ. Matrix metalloproteinases and their inhibitors in oral lichen planus. J Cutan Pathol 2001;28:72-82.
18. Desvarieux M, Demmer RT, Rundek T, et al; Oral Infections and Vascular Disease Epidemiology Study (INVEST). Relationship between periodontal disease, tooth loss, and carotid artery plaque: the Oral Infections and Vascular Disease Epidemiology Study (INVEST). Stroke 2003;34:2120-2125.
19. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. Ann Periodontol 1998;3:51-61.
20. Akman A, Kacaroglu H, Donmez L, Bacanli A, Alpsoy E. Relationship between periodontal findings and Behçet's disease: a controlled study. J Clin Periodontol 2007;34:485-491.
21. Salgado DS, Jeremias F, Capela MV, Onofre MA, Massucato EM, Orrico SR. Plaque control improves the painful symptoms of oral lichen planus gingival lesions. A short-term study. J Oral Pathol Med 2013;42:728-732.
22. Holmstrup P, Schiøtz AW, Westergaard J. Effect of dental plaque control on gingival lichen planus. Oral Surg Oral Med Oral Pathol 1990;69:585-590.
23. Guiglia R, Di Liberto C, Pizzo G, et al. A combined treatment regimen for desquamative gingivitis in patients with oral lichen planus. J Oral Pathol Med 2007;36:110-116.
24. López-Jornet P, Camacho-Alonso F. Application of a motivation-behavioral skills protocol in gingival lichen planus: a short-term study. J Periodontol 2010;81:1449-1454.
25. Scully C, Carrozzo M. Oral mucosal disease: Lichen planus. Br J Oral Maxillofac Surg 2008;46:15-21.
26. Kornman KS. Mapping the pathogenesis of periodontitis: a new look. J Periodontol 2008;79(8 Suppl):1560-1568.
27. Cochran DL. Inflammation and bone loss in periodontal disease. J Periodontol 2008;79(8 Suppl):1569-1576.
28. Roopashree MR, Gondhalekar RV, Shashikanth MC, George J, Thippeswamy SH, Shukla A. Pathogenesis of oral lichen planus: a review. J Oral Pathol Med 2010;39:729-734.