

Role of Herpes Viruses in Chronic Periodontitis – A Short Review

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Abstract

Periodontal disease is an inflammatory condition of the supporting tissues of the teeth. It is a multi-factorial and multi-etiological infectious disease process. The most commonly reported etiological agents from this condition are anaerobes. Bacterial etiology alone cannot explain the clinic-pathological features observed in the disease. Thus, efforts to find out additional etiological agents for chronic periodontitis are necessary. Recent evidences show that human herpes viruses could be putative pathogens. According to this concept various studies have been conducted concerning the contribution of herpesviruses in etiopathogenesis of the chronic periodontitis. Thus, this short review gives an insight of the role of Herpes viruses especially; Herpes simplex viruses (HSV-1 and 2), Epstein-Barr virus (EBV) and Human cytomegalovirus (HCMV) in patients with chronic periodontitis.

Keywords: Periodontal disease; Gingival inflammation; Herpes viruses

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Introduction

Periodontal disease is one of the major oral disease that affect human populations worldwide at high prevalence rates [1]. The prevalence of the disease might be different at different geographical areas and population. Many national surveys were done to know the prevalence of periodontitis in many countries as a part of WHO global surveys. These surveys showed various rates of prevalence in different countries in different population [2].

Prevalence of periodontitis is also shown significantly higher in males and increasing in increasing age groups. Periodontal disease affects the majority of Indian population more commonly than the western population. One of the major reasons is related to the poor oral hygiene which is often neglected in developing countries like India. Periodontal disease is one of the major oral disease that affect human populations worldwide at high prevalence rates. The prevalence estimated on the basis of representative sampling which may not be true as the studied population and case definitions used were different at different geographical areas. It might be different at different geographical areas and population[3].

Herpes viruses are generally involved in mild or asymptomatic infections and may lead to clinical diseases because of activation of latent phase in asymptomatic patient. This reactivation of herpes viruses is triggered by number of immuno-suppressing

factors. Some of these factors are also involved as risk indicators in periodontitis [4]. Amongst Herpes viruses, Herpes Simplex Virus type 1 & 2 (HSV-1 &2), Human Cytomegalovirus (HCMV), Epstein Barr Virus (EBV) predominantly has been showed in the causation of chronic periodontitis [5].

Primarily, gingival inflammation is persuaded by bacteria present in the dental plaque which causes herpes virus-infected inflammatory cells to enter the periodontium. Following herpes virus reactivation in the gingival tissue may then aggravate the disease. Herpes virus infections initiate or accelerate periodontal breakdown through their ability to stimulate cytokine release from host cells, or impair host defense mechanisms, resulting in heightened virulence of resident periodontopathic bacteria [6]. Herpes virus reactivation may occur spontaneously or as a consequence of various types of damage in the host immune defense. This may be due to the pregnancy, hormonal changes, psychosocial and physical stress and HIV infection [7]. Active presence of herpes viruses leads to secretion of pro-inflammatory cytokines which in turn activates Matrix Metalloproteinases and osteoclasts thereby impairment in the antibacterial host immune response. This results in increase in periodontopathic bacteria

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like *P. gingivalis*, *T. forsythia* and *A. actinomycetemcomitans*. Upsurge in these factors results in periodontal inflammation, collagen degradation and bone resorption and lastly in destructive periodontal disease. Symbiotic association between herpes viruses and bacteria plays an important role in onset and progression of periodontitis [8].

The association of Herpes viruses in chronic periodontitis is based upon the presence of millions of copies of viral genome in an active periodontal disease site and absent in healthy gingiva. Though, a cause-effect association is yet to be established. There are several studies showing the evidence of Herpesviruses and chronic periodontitis on the basis of their presence in the diseased sites and absence in the healthy controls.

Ling demonstrated that the Herpes Simplex Virus is related to the severity of periodontal disease in terms of clinical attachment loss in their study carried out in Taipei Veterans General hospital. While, in another study conducted by Parra and Slots, reported high presence of HCMV, EBV, HSV, HPV and HIV in the gingival crevicular fluid from patients with advanced periodontitis and gingivitis. Saygun studied the occurrence of HCMV, EBV-1 and HSV in patients with chronic periodontitis and found that these

viruses were frequently detected from the cases of chronic periodontitis. The prevalence of HSV-1, HCMV and EBV was found to be more in the chronic periodontitis compared to the healthy groups. Another study showed that the prevalence of EBV-1 was higher in chronic periodontitis compared to the healthy controls [9-13].

Over the years, supporting different literature studies; it has been noted that Chronic periodontitis is multifactorial polymicrobial oral disease. Combination of bacteria and viruses or combination of multiple Herpes viruses plays a role in increasing the severity of the disease. This association between multiple Herpes viruses and increasing severity is a causal association and thus plays a significant role in etiology of the disease. It is likely that the Herpes virus infections may lower the local immune response in the periodontal pocket which in turn helps sub gingival micro biota to overgrow resulting in the severity of the disease and ultimately in the loss of tooth.

Furthermore; identification of these etiological agents and their appropriate prevention and/or control in the development of chronic periodontitis; holds a key feature for dental health professionals.

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