Recent studies have related herpesvirus species to human periodontal disease. Cytomegalovirus (HCMV), Epstein-Barr virus type 1 (EBV-1) and, in particular, HCMV/EBV-1 dual infection are strongly associated with severe types of periodontal disease, including actively progressing early-onset periodontitis, localized juvenile periodontitis, generalized juvenile periodontitis, Papillon Lefèvre syndrome periodontitis, Fanconi's anemia periodontitis and acute necrotizing ulcerative gingivitis. HCMV infects periodontal monocytes/macrophages and T-lymphocytes, and EBV-1 infects periodontal B-lymphocytes. Reactivation of HCMV in periodontitis lesions seems closely related to progressing periodontal disease. Herpesvirus-infected periodontitis lesions harbor elevated levels of periodontopathic bacteria, including Actinobacillus actinomycetemcomitans, Porphyromonas gingivalis, Dialister pneumosintes, Bacteroides forsythus, Prevotella intermedia, Prevotella nigrescens and Treponema denticola. Conceivably, active periodontal herpesvirus infection impairs periodontal defenses, thereby permitting subgingival overgrowth of periodontopathic bacteria. This review describes an infectious disease model for destructive periodontal diseases in which herpesviruses-bacterial interactions assume a major etiopathogenetic role. Understanding the significance of herpesviruses in human periodontitis may allow for improved diagnosis, more specific therapy and, ultimately, disease prevention.