

Effects of Viral and Bacterial Infections on Marginal Periodontium

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ABSTRACT

Background: There are several risk factors, general and local, which favor the onset of periodontal destruction, and their knowledge is essential to their correct identification and for the adoption of a suitable therapeutic management. The aim of the study was to assess periodontal health status of patients suffering from viral and bacterial infections and to determine the eventual relationship between periodontal diseases and infectious diseases. **Material and methods:** Twenty-five patients with a mean age of 25 years (range 23–27 years) admitted to the Clinic of Infectious Diseases of Tîrgu Mureș between December 1, 2013 – May 31, 2014 and diagnosed with bacterial and viral infections were included in the study (17 women, 8 men). Eight were infected with bacteria, and 17 with human immunodeficiency virus (HIV). Patients were examined in the clinic using Williams periodontal probe, dental mirror, and lip retractor, and different periodontal parameters were recorded: the Silness Løe plaque index, papilla bleeding index, Community Periodontal Index in Treatment Needs (CPITN), periodontal pocket depth, gingival retraction. **Results:** Values were significantly higher in patients infected with HIV in the following cases: among women in the Full Mouth Plaque Score (FMPS, $p = 0.0312$), among men in the depth of periodontal pockets ($p = 0.0126$), among men in the FMPS ($p = 0.0282$). **Conclusions:** The FMPS showed a high value both in women and men infected with HIV. More and deeper pockets were found in men infected with HIV. The gingival retraction and the papillary bleeding index calculated for the entire oral cavity were not influenced by the type of infection. A periodic inspection and maintenance of oral hygiene instructions could play a significant role in preventing periodontal disease in these vulnerable groups.

Keywords: bacterial infections, HIV infections, periodontal status, CPITN

INTRODUCTION

Systemic factors, conditions affecting the general health status of the body, can have adverse effects on periodontal tissues. Periodontal manifestations of general diseases vary depending on the specific disorder, individual response, and existing local factors. It is accepted that systemic factors by themselves cannot cause an inflammatory response of the gingiva. However, these factors may play

an essential role in the etiology of periodontal disease by lowering the resistance of periodontal tissues or by inducing certain tissue phenomena that make them more vulnerable to the effects of local factors.¹

Infection means: the process through which the pathogen enters the body and multiplies in the host tissues. Infectious disease defines the presence of microorganisms and the induced changes by these agents as response to the aggression, with or without clinical manifestations.²

The purpose of the study was to assess periodontal health status of patients suffering from viral infections — especially infections with human immunodeficiency virus — and bacterial infections. Further aim was to determine the eventual relationship between infectious and periodontal diseases.

MATERIAL AND METHODS

Twenty-five patients with a mean age of 25 years (range 23–27 years) admitted to the Clinic of Infectious Diseases of Tîrgu Mureş between December 1, 2013 and May 31, 2014 and diagnosed with bacterial and viral infections were included in the study (17 women, 8 men). Eight patients were infected with bacteria, and 17 with human immunodeficiency virus.

The participants in the study received a brief explanation about the steps of the examination and a written informed consent was obtained from the subjects, who included their permission to take pictures respecting their confidentiality.

Patients were examined in the clinic by inspection and palpation with specialized tools: Williams periodontal probe, dental mirror, and lip retractor, in natural and artificial light. The results of the examination were recorded on the dental formula and periodontal sheet.

The examination of the patients consisted of the determination of various periodontal indices:

1. Silness Løe plaque index: indicates the thickness of dental plaque deposit along the gingival margin.^{3,4} This index was determined by staining the plaque using a plaque revealer tablet. The results were read knowing the grades (0–3) of the plaque's thickness:

- 0 – absence of plaque;
- 1 – the plaque layer covers not more than a third of the examined tooth surface;
- 2 – the plaque layer covers more than a third, but not more than two thirds of the examined tooth surface;

- 3 – heavy plaque deposit, covering more than two thirds of the examined tooth surface, close to the occlusal surface.

2. Papilla bleeding index: shows the degree of the inflammation of the gingiva in the specific moment of the examination. It is determined using a periodontal probe, which is useful in probing the gingival sulcus, including the papillary region of the teeth as well. The intensity of the resulting bleeding is referred to as 0–4:

- 0 – absence of gum bleeding;
- 1 – gingival bleeding in a single, isolated point after 20–30 seconds;
- 2 – gingival bleeding in multiple points or in a small area after 20–30 seconds;
- 3 – gingival bleeding that fills the interdental space right after the probing;
- 4 – blood drop which exceeds the gingival margin right after the probing.^{5,6}

3. Community Periodontal Index in Treatment Needs (CPITN): the index quickly identifies periodontal disease and its severity (Figure 1), and the ideal treatment to be performed. Teeth are divided into six quadrants (sextants). For each examined sextant, the encoded values are:

- 0 – absence of any symptoms, healthy gingiva;
- 1 – gingival bleeding induced by probing, though gum is apparently healthy, the colored portion of the probe remains completely visible outside the gingival sulcus;
- 2 – the colored portion of the probe remains completely visible outside the gingival sulcus, the presence of sub-gingival calculus or chronic irritation factors (cavities, overflowing fillings, inappropriate dentures, root remnants etc.);
- 3 – the colored portion of the probe is partially visible, indicating pockets of 4–5 mm;
- 4 – the colored portion of the probe disappears completely in the periodontal pocket, indicating pockets larger than 6 mm.

Based on the recorded values, the examined subjects fall into one of the following classes of periodontal therapy:



FIGURE 1. The oral cavity of a patient infected with HIV (own casuistry)



FIGURE 2. Gingival retraction determination in a patient with bacterial infection (own casuistry)

- 0 – no need of periodontal treatment;
- 1 – instruction or improvement of oral hygiene;
- 2 – oral hygiene, scaling;
- 3 – oral hygiene, scaling, complex antimicrobial therapy;
- 4 – oral hygiene, scaling, complex antimicrobial therapy and periodontal surgical treatment, rebalancing functional occlusion, local and general bio-stimulation.⁵

5. Periodontal pocket depth: the distance between the free gingival margin and the base of the gingival sulcus, and the base of the periodontal pocket, respectively.⁴ The depth of periodontal pocket was measured with periodontal probe, given in mm, in 6 points around each tooth: mesio-vestibular, vestibular, disto-vestibular, mesio-oral, oral, and disto-oral.

6. Gingival retraction: refers to the denudation of the root surface due to loss of periodontal structures. Alveolar bone loss occurs in pace with gingival loss.⁶ Gingival recessions were measured with the Williams periodontal probe (Figure 2) between the cement-enamel junction and the free gingival margin, in six points around each tooth.

RESULTS

Very little difference was found in the values of the papilla bleeding index (Figure 3) between the two groups. The values were almost identical within the group for both men and women.

The highest values for the plaque index (Figure 3) were recorded in patients with viral infections; the values were

similar between women and men. Patients with bacterial infections showed lower values.

Regarding the gingival retractions (Figure 4), the values were nearly the same among the two groups.

The CPITN index (Figure 5) showed the highest average value in men with viral infections (1.38), followed by women (1.00) with the same infection. The lowest values were recorded for bacterial infections (women – 0.66, men – 0.72). The highest peak of periodontal pocket depth was present in HIV-infected males (Figure 5).

Based on medical history, the type of infection of the patients was established. Thus, they related: AIDS, pneumonia, pharyngitis, tonsillitis with or without other infections. Sixteen percent of patients showed drug intolerance without being able to specify the substance; 28% of the subjects were tobacco consumers and 16% alcohol consumers.

Seventy-two percent of patients experienced bleeding gums, of which 62% experienced provoked bleeding by

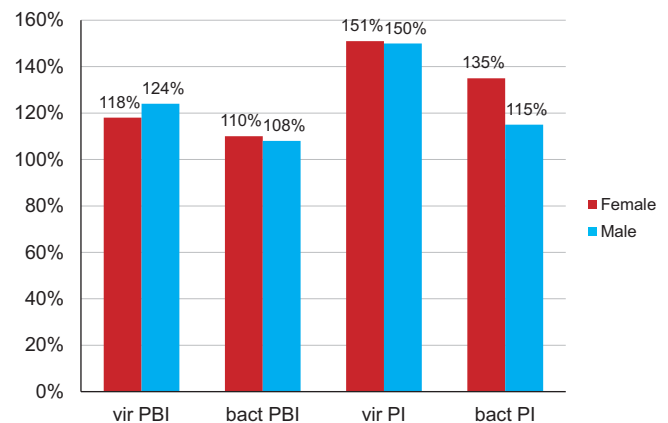


FIGURE 3. Comparison of different periodontal parameters between genders (vir – viral infection, bact – bacterial infection, PBI – Papilla Bleeding Index, PI – Plaque Index)

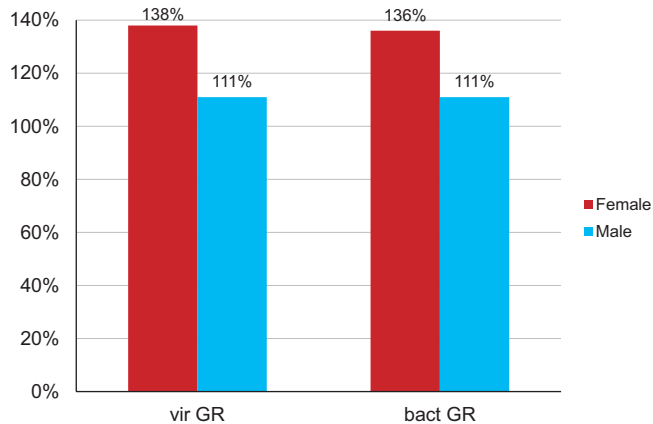


FIGURE 4. Comparison of the gingival retraction values between gender (vir – viral infection, bact – bacterial infection, GR – gingival retraction)

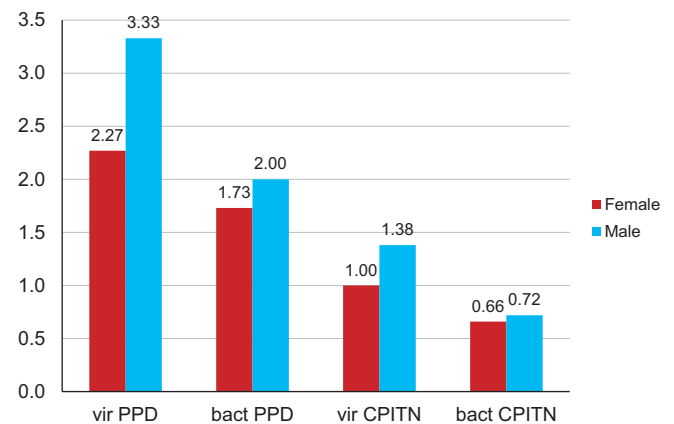


FIGURE 5. Comparison of two periodontal indices between gender (vir – viral infection, bact – bacterial infection, PPD – periodontal pocket depth, CPITN – Community Periodontal Index in Treatment Needs)

brushing and 10% showed spontaneous bleeding, while 12% of the patients presented teeth with moderate or advanced mobility. Most patients (48%) brush their teeth daily, 36% weekly and 16% monthly.

Comparing the values of various periodontal indices of patients with viral (HIV) and bacterial infections, statistically significant differences were found in the following cases:

- among women in the Full Mouth Plaque Score (FMPS, plaque score calculated for the entire oral cavity) – $p = 0.0312$, 95% CI: 1.848–33.586 (Figure 3);
- among men, in the depth of periodontal pockets – $p = 0.0126$, 95% CI: 0.5396–2.794 (Figure 5);
- among men in the FMPS – $p = 0.0282$, 95% CI: 4.901–56.699 (Figure 3).

Values were significantly higher in patients infected with HIV. When comparing the periodontal parameter values between HIV-infected subjects and those with bacterial infections, there were no statistically significant differences regarding gingival retractions ($p = 0.0903$ for women and $p = 0.0526$ for men) and the Full Mouth Bleeding Score (FMBS, score of gingival bleeding calculated for the entire oral cavity) ($p = 0.2798$ for women and $p = 0.0694$ for men) (Figures 4 and 5).

DISCUSSIONS

For a long time, periodontal disease has been associated with systematic diseases. Numerous references exist regarding periodontal disease in the HIV-related literature,

which, although poorly motivated, determined that periodontal diseases are part of the range of HIV-associated conditions.⁷

The present study was designed not only to determine the periodontal status of patients with viral infections, but also to compare them with the bacterial ones.

HIV attacks the body's immune system, specifically the CD4 cells (T cells), which help the immune system fight off infections. If left untreated, HIV reduces the number of CD4 cells, making the person more likely to acquire infections or infection-related cancers. Over time, HIV can destroy so many of these cells that the body can't fight off infections and diseases. These opportunistic infections or cancers take advantage of a very weak immune system and signal that the person has AIDS, the last state of HIV infection.⁸

The recurrent infections and the weak immune system are the reason why there was a significant difference between the HIV infected patients and those with bacterial infections. Many studies were conducted regarding the HIV infections^{9–11} or different bacterial infections in HIV-positive subjects,¹² but very few studies compare these two infection types face to face. This is the strength of the present study.

CONCLUSIONS

The FMPS was significantly influenced by the type of infection: it showed a high value both in women and men infected with HIV. More and deeper pockets were found in men infected with HIV. The gingival retraction and the papillary bleeding index calculated for the entire oral cav-

ity were not influenced by the type of infection, showing no significant differences between the two groups. The highest CPITN index was found in men with viral infections, followed by women in the same group. A periodic inspection and maintenance of oral hygiene instructions could play a significant role in preventing periodontal disease in these vulnerable groups.

CONFLICT OF INTEREST

Nothing to declare.

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