Periodontal status and treatment needs in HIV-infected patients

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Abstract

Purpose: **The aim of this study is evaluation of periodontal status and definition of periodontal treatment needs in HIV infected patients.**

Material and methods: **We examined 49 HIV-infected subjects (19-52 years of age) and 49 non-infected patients as the control group. Periodontal status and treatment needs were evaluated by using CPITN – Community Periodontal Index and Treatment Needs. Aquired data were analyzed in examined populations regarding infection's duration time and in dependance on absolute number of CD4 lymphocytes in μl of plasma, dividing patients according to criterion of HIV infection classification after CDC (Centers for Diseases Control and Prevention).**

Results: **More advanced changes in the paradontium were observed mostly in examined HIV infected subjets. As HIV infection time proceeds, the periodontal status of examined patients impairs, what is manifested by the decrease of the number of sextants with the intact paradontium and the increase of the number of sextants excluded from the research. There was no significant relation found between periodontal status evaluated with CPITN and the immunity status of examined subjects. 26.5% of HIV infected subjects needed the complex therapy. As the immunity decreased, the number of patients qualified to the complex treatment increased, and the number of HIV(+) patients with no need of therapy decreased.**

Conclussions:

1. As the infection duration time proceeds, the periodontal status in HIV-infected patients impairs.

2. Deterioration of health status, expreesed with decrease of absolute number of CD4 lymphocytes is accompanied by intensification of pathological periodontal changes.

3. HIV infected persons are group with high periodontal needs and require intensive periodontal care.

Key words: HIV infection, CPITN, periodontal status, periodontal needs.

Introduction

A cell which is sensitive to infection with Human Immunodeficiency virus is called permisive, which means a target cell [1]. A kind of infected cell is a fundamental issue in virus infection. Presence of an adequate receptor on cytomembrane's surface is a condidtion allowing virus to penetrate a cell. The best known receptor for HIV is a CD4 particle. It is a phenotype feature of mature T lymphocyte, which is part of subpopulation of helper T4 lymphocytes or CD4 cells [1,2]. Although infection and replication of HIV concerns many types of cells, it is organism pule of macrophages and monocytes which seems to be particulary important reservoir of virus, regarding to migtation abilities, positioning in the organism and large sumaric mass. Local tissue damage in HIV infection process is conneted to macrophages tissue population [3] and disability of T lymphocytes' funtions [1]. Damage of T lymphocytes population influences the process of production of specific antibodies by B lymphocytes, it also influences cytokines secrete which activate cell immunity [4]. Local immunity distortion of this type in HIV infected patients can lead to inflamation changes in parodontium.

Periodontal problems are frequent and mostly first symptoms of retroviral infection in HIV infected subjects [5]. Systematizing of periodontal diseases in HIV infection turned out to be difficult because of differences in personal immunity for viral infection. Attempt of systematics unification of periodontal diseases in HIV infected persons was undertaken by Holmstrup

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Received 03.03.2006 Accepted 13.03.2006

Table 1. **Periodontical status since infection**

Absolute lymphocyte CD_4/μl number	Number of subjects	CPI-0 x	CPI-1 x	CPI-2 x	CPI-3 x	CPI-4 x	CPI-X x
Infected <4 years (I)	30	1.03	2.63	1.17	0.27	0.00	0.90
Infected >4 years (II)	19	0.74	1.95	1.05	0.68	0.05	1.53
Infected in total (A)	49	0.88	2.29	1.20	0.45	0.04	1.14
Non-infected (B)	49	2.92	2.06	0.78	0.00	0.00	0.24
Statistical analysis: p<0.05 for groups		A and B	-	A and B	A and B	-	A and B

Table 2. **CPITN acording to CD_4 cells count**

Absolute lymphocyte CD_4/μl number	Number of subjects	CPI-0 x	CPI-1 x	CPI-2 X	CPI-3 x	CPI-4 x	CPI-X x
>500/μl (1)	8	1.50	2.75	1.25	0.50	0.00	0.00
200-499/μl (2)	27	0.96	2.48	1.07	0.48	0.00	1.00
<200/μl (3)	14	0.50	1.64	1.21	0.29	0.14	2.21
Statistical analysis: p<0.05 for groups		-	-	-	-	-	1 and 2 2 and 3 1 and 3

i Westergaard [5], who suggest, basing on Riley et al. research [cite after 5], that in HIV-infected persons, besides inflamations typical for HIV infection, also typical forms of gingivitis and periodontitis occur. According to data from references, HIV(+) persons in contrary to non-infected subjects often suffer from linear gingivitis and/or linear gingival erythema and necrotizing ulcerative periodontitis [6,7].

The aim of this study is evaluation of periodontal status and definition of periodontal treatment needs in HIV-infected patients.

Material and methods

49 HIV-infected subjects were examined. They were patients of Department of Observation and Infection Medical University of Białystok, including 12 females and 37 males, 19-52 years of age (the average age – 30.65). The control group consisted of equal number of non-infected subjects, who were the same age and sex as the HIV(+) population. Oral examination was conducted at artificial light using basic dental equipment according to WHO criteria from "Oral Health Surveys Basic Methods" [8].

Periodontal status and treatment needs were evaluated by using CPITN – Community Periodontal Index and Treatment Needs [8,9]. Aquired data were analyzed in examined populations regarding infection's duration time. The time, from diagnosing the infection to examination time was considered as the infection's duration time. Subjects were divided into two groups according to infection's duration time:

- I group – subjects, whose infection's duration time was shorter than 4 years – 30 subjects
- II group – subjects infected for more than 4 years – 19 subjects.

Results were considered in dependance on absolute number of CD4 lymphocytes in μl of plasma, dividing patients according to criterion of HIV infection classification after CDC (Centers for Diseases Control and Prevention). Three ranges of laboratory values were considered [10]:

- number of CD4 cells over 500/μl (8 subjects),
- number of CD4 cells from 200/μl do 499/μl (27 subjects),
- number of CD4 cells under 200/μl (14 subjects).

The results were analyzed statistically using Statistica 5.0 software. The differences, for which values of "significance" p are lower or equal to 0.05 ($p \leq 0.05$), were considered significant.

Results

The analysis of the periodontal status in examined populations was conducted basing on community periodontal index and treatment needs (*Tab. 1*). Most of all healthy sextants qualified as CPI-0 were found in the non-infected group (2.92). Significantly less, 0.88 of healthy sextant was found in the HIV--infected group. In both populations the number of sextants with the gingivorrhoea was similar (group A – 2.29, group B – 2.06). The average number of sextants with the code CPI-2, showing on the presence of the dental calculus, amounted, in infected subjects – 1.20, while in non-infected subjects – 0.78, this difference was statistically significant. More advanced changes, manifesting themselfs with the presence of periodontal pockets with the depth exceeding 4 millimetres (CPI-3 and CPI-4) were ascertained only in the examined HIV(+) group. When conducting the CPITN evaluation, average 0.24 of sextant in non-infected subjects and 1.14 in infected subjects were excluded

Table 3. **Periodontal treatment needs of the examined populations with time factor taken under consideration**

Infection duration time	Number of subjects	Periodontal treatment needs TN							
		Code 0		Code 1		Code 2		Code 3	
		n	%	n	%	n	%	n	%
Infected <4 years (I)	30	1	3.33	9	30.00	15	50.00	5	16.67
Infected >4 years (II)	19	2	10.5	2	10.5	7	36.8	8	42.1
Infected in total (A)	49	3	6.1	11	22.5	22	44.9	13	26.5
Non-infected (B)	49	9	18.4	19	38.8	23	46.9	0	0
Statistical analysis: p<0.05 for groups		A and B		A and B		-		A and B	

Table 4. **Periodontal treatment needs and a CD_4 cell count**

Absolute lymphocyte CD_4/µl number		Number of subjects	Periodontal treatment needs TN							
			Code 0		Code 1		Code 2		Code 3	
			n	%	n	%	n	%	N	%
Infected	CD_4 >500/µl (1)	8	21	12.5	3	37.5	2	25	2	25
	CD_4 200-499/µl (2)	27	2	7.7	5	19.2	14	53.8	5	19.2
	CD_4 <200/µl (3)	14	0	0	2	15.4	6	46.2	5	38.5
Statistical analysis: p<0.05 for groups			-		-		-		-	

from the study, because of loss of indexed teeth. The infection's duration time did not influence significantly on the periodontal state. Although, as the infection's duration time proceeded, the decrease of the average number of sextants with low numbered codes i.e. with the healthy paradontium, with the gingivorrhoea and the dental calculus and the increase of the number of sextants with deep periodontal pockets and the number of sextants excluded from the study were observed, observed changes were statistically insignificant.

There was no significant relation found between periodontal status evaluated with CPITN and the immunological status of examined infected subjects. Instead, the negative correlation between advance of the disease and the average number of sextants (CPI-X) excluded from the study, was observed. Patients with the high immunity had no sextants excluded from the research. In infected subjects with the number of CD4 cells amounted 200-499/µl, an average 1.00 of sextant was excluded, and in subjects with the lower number of CD4 cells 2,21 of sextants were excluded. Statistically significant differences were observed between groups 1 and 3, 1 and 2, 2 and 3 (*Tab. 2*).

Periodontal treatment needs of examined populations with the infection duration time taken under consideration were presented in *Tab. 3*. The treatment of the paradontium (code 0) was not needed by 17.6% of subjects from the control group and by 6.1% of examined infected patients. Instruction of the oral hygiene (code 1) was needed by 16.9% more of subjects from the B group than from the A group, what was statistically significant. The similar number of subjects from both examined populations demanded the instruction of the oral hygiene, scaling and removal of overhangs of fillings (A group – 46.9%, B group – 45.1%). The complex periodontal treatment (code 3) was needed only by infected patients. The HIV infection duration time did not influence periodontal treatment needs. As the infection duration time proceeded, the percentage of subjets who did need treatment increased about 8.5%, and the percentage of those in need of oral hygiene instruction decreased about 24.1%. Needs with code 2 were similar in both groups: shorter infected (50%) and longer infected (47.1%). The complex treatment was needed by 16.7% of patients with shorter infection time and about 18.6% more of those with longer infection time.

The *Tab. 4* presents periodontal treatment needs in depence on the immunity status of examined subjects. Although there were no statistical relations, it was observed that the decrease of the CD4 lymphocytes count in one microlitre of plasma was accompanied by the percentage of patients who did not need periodontal treatment (from 12.5% in the group with the high CD4 cell level to 0% in subjets with low values of CD4 lymphocytes). The similar correlation was observed in the case of treatment needs with code 1 (oral hygiene instruction). Most of patients in need of oral hygiene instruction, scalling and the removal of fillings overhangs and complex periodontal treatment was in the group with the number of lymphocytes CD4 200-499/µl.

Results and discussion

Conclusions from our study are the number of sextants with the healthy paradontium in the examined HIV infected group was over three times lower, and the number of sextants excluded from the research about five times higher than in the control group. Similar results were obtained by Stangiewicz [11], who ascertained that in HIV infected subjects examined by her there was average one sextant with code 0, which was the proof of the lack of changes in the paradontium. A repeating manifestation in all examined subjects was bleeding caused by probing, which in our research referred to 2.29 of sextants in HIV(+) patients and 2.06 of sextants in healthy subjects. More advanced changes

in the paradontium were observed mostly in examined HIV infected subjets. The presence of the dental calculus or other retention-traumatic factors was observed twice more often in infected group, where as periodontal pockets with depth exceeding 4 mm's were observed only in examined HIV infected group. Comparable relations were showed by Stangiewicz [11], however, her results indicate the higher number of sextants with the dental calculus and both shallow and deep periodontal pockets.

As HIV infection time proceeds, the periodontal status of examined patients impairs, what is manifested by the decrease of the number of sextants with the intact paradontium and the increase of the number of sextants excluded from the research. It is the evidence, that also the the number of sextants with the presence of moderate and deep periodontal pockets increases.

There are also very few infomation about the connection between the immunity status of examined subjects and the state of their paradontium. In the available literature, this problem was examined only by Barr et al. [12]. Results of their research prove the slight influence of the immunity status on the advance of periodontal changes. The data obtained by us confirmed these relations, because there was no significant relation found between periodontal status evaluated with CPITN and the immunity status of examined subjects.

HIV infected patients are the group that needs special periodontal care. Many authors perceive periodontal diseases as the oral cavity changes, which most often accompany the HIV infection [12,13]. The periodontal treatment was not needed only by 6.1% of examined infected subjects, and 26.5% of them needed the complex therapy. As the immunity decreased, the number of patients qualified to the complex treatment increased, and the number of HIV(+) patients with no need of therapy decreased.

Taking the fact that the most HIV infected patients are drug addicts, under considetation, it can be accepted that the intensification of disease processes within the oral cavity is the result of the social and psychical disintegration and the discontinuation of the oral hygiene [14,15]. In the course of using opiates, the hierarchy of needs and values in those examined patients changes. Both fear of dental procedures and fear of lack of acceptation from the doctor are dominating feelings of drug users who ceased using narcotics. It causes the postponement of visits, what leads to further, considerable destruction of the dentition and in consequence, to the loss of teeth.

Conclusions

1. As the infection duration time proceeds, the periodontal status in HIV infected patients impairs.
2. Deterioration of health status, expreesed with decrease of absolute number of CD4 lymphocytes is accompanied by intensification of pathological periodontal changes.
3. HIV infected persons are group with high periodontal needs and require intensive periodontal care.

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