

Assessment of Dental Status and Oral Health Impact in HIV Romanian Young Adults

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Numerous problems are seen in the general lifestyle and health of young adults with nosocomially acquired HIV between 1987-1990, a peculiarity of the HIV infection in Romania. One of these problems is immunity alteration as reflected in the oral pathology of these patients. This study evaluates the impact that the HIV infection has on the oral health of infected young adults. The current observational, case-control study compares the caries experience and the impact on oral health quality in 114 HIV positive young adults versus a control group, using the Decay-Missing-Filled (DMF) Index and the oral health profile, obtained using by OHIP-14 questionnaire method.

Keywords: HIV, Decay-Missing-Filled Index, OHIP-14 Score, Oral Health

The epidemic caused by the human immunodeficiency virus (HIV) is a major public health issue worldwide, but has certain regional peculiarities regarding incidence, prevalence and transmission routes. In Romania, the peculiarity is the large number of young adults born between 1987 and 1990, who were nosocomially infected during infancy and survived until young adulthood. The human immunodeficiency virus determines a chronic progressive infection, during which human CD4 type lymphocytes are progressively destroyed and the immunity defense capacity is altered. The CD4 lymphocyte count is an immunity function marker and a value of less than 200/mm³ corresponds to severe lymphocyte dysfunction and the diagnosis of AIDS. HIV replication occurs continuously and rapidly. The viral load measures the plasma HIV-RNA quantity, which is proportional with infection severity.

Current HIV antiretroviral treatment allows long-term survival, transforming the infection into a chronic disease. The only downside is that, as in all chronic diseases, the wellbeing of the patient depends on the meticulousness of therapy administration for the rest of his/her life.

Dental services contribute to the management of the HIV infection, playing an important role in the prevention of HIV transmission. Preventive measures can be taken through the diagnosis of HIV infections based on indicator oral lesions and through prophylactic and therapeutic interventions on oro-dental lesions in monitored HIV patients [1]. The types and incidence of HIV associated oral manifestations vary according to immunity. The characteristics of these oral manifestations change efficiently after the introduction of antiretroviral therapy [2]. Xerostomia is one of the most important HIV associated oral symptoms and is caused by parotid afflictions secondary to HIV immune dysfunction or as a side effect of some antiretroviral drugs [3]. Because HIV causes local and general immune suppression, it is believed that HIV patients have an elevated susceptibility to decreased saliva secretion and, subsequently, to the development of caries. This theory is unsupported by studies that identify no significant differences between HIV patients and the general population regarding caries prevalence [4]. The impact on the quality of life and oral health is influenced by

the HIV infection, but also by psycho-social, demographic and educational factors [5-8]

Interventions aimed at improving oral health contribute to the improvement of the quality of life of HIV positive patients through maintenance and restoration of tooth and gum integrity, preservation of nutrition and hydration quality, as well as prevention or treatment of oral infections, pain and cosmetic alterations [9].

Experimental part

Materials and methods

The research relies on a hospital-based case-control study performed in the Infectious Diseases Clinic from Galati (Romania), between January and March 2014. The study included 114 cases (patients with confirmed HIV infection by two positive ELISA tests and one positive Western Blot test) and 157 controls (HIV negative). The selection of cases was based on the reference to the hospital of eligible cases. The inclusion criteria was: age between 20 and 29, positive case of HIV (diagnosed for at least one year), antiretroviral treatment, no drug use history, and acceptance to take part in the study by signing a written informed consent form. The selection of controls was made from admitted patients to the clinic for other health problems and from accompanying persons of the HIV positive patients. The individual matching method was used to ensure the compatibility between the case group and the control group. Thus, for each HIV positive patient included in the case group there were 1-2 HIV negative patients included in the control group, with the HIV testing taking place before inclusion in the study. Age and gender were used to match cases and controls and the study took place with the permission of the local ethics committee. Cases and controls accepted to take part in the study by signing an informed consent before the inclusion in the study. Data was anonymously collected, respecting confidentiality, from clinical files completed by medical doctors and from questionnaires completed by each patient.

The clinical oro-dental examination was performed by a dentist using a dental mirror and a portable light source, who wrote down the identified pathological alterations of

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the oral mucosa and the odontogram, marking caries, missing teeth and fillings. Wisdom molars were not considered. DMF Index score was calculated for each patient by adding the number of teeth with cavities, filled and missing. In the case of filled teeth with secondary caries only the caries were counted [10].

The first part of the questionnaire filled in by the patients was composed of items regarding demographic data (age, sex, living area, education), behavioral data (smoking, alcohol consumption, drug consumption), data on oral hygiene habits (number of daily dental brushings) and data on the main oral symptoms experiences in the last month. The second part of the questionnaire was made of the 14 items pertaining to the OHIP-14 questionnaire, which was translated into Romanian and validated. The 14 questions were grouped in seven functional domains: limitations, physical pain, psychological discomfort, physical disabilities, psychological disabilities, social disabilities and handicaps and were analyzed for each domain [12, 13]. The answer options for each item were: *hardly ever, very often, fairly often, sometimes and never/do not know* and were coded as 4,3,2,1 and 0. We considered that the answers coded 4, 3 and 2 had a negative impact on oral health. All statistical calculations were performed using SPSS 17.0. Chi-square was used to assess differences between groups. All P-values were two-tailed and a value of <0.05 was considered significant.

Results and discussions

The demographic and behavioral characteristics of HIV infected patients were compared to those of the control group (table 1). General risk-behavior, smoking and alcohol consumption were not influenced by HIV status. Preoccupation with dental care was smaller in the HIV positive group, only 48% stating at least two dental brushings a day, in comparison with 73% in the control group. In the last year, 27% of the HIV positive patients paid a visit to the dentist's, in comparison with 45.9% in the control group.

The HIV infection was diagnosed between 2 and 25 years before the inclusion in the study. The average diagnosis age was 11 years old, the patients belonging to the pediatric HIV infected cohort in Romania. Severe immunodeficiency with LCD4 nadir <200/mm³ was observed in 69% of the HIV patients, although all the patients received at least one antiretroviral treatment scheme. Current status of the patients at the time of the study indicated LCD4 immunity > 500/mm³ in 53.5% of patients and undetectable HIV viral load in 48.2%.

Both groups experienced the following oral symptoms: dry mouth, unpleasant taste, gums bleeding, halitosis. The HIV positive patients experienced the symptoms more often, with statistical significant differences in the areas of oral mucosa dryness and unpleasant taste (fig. 1).

The DMF score of the HIV group was close to the score of the control group (10.05 vs 9.47; p=0.049). The analysis of the partial scores highlighted a larger number of decayed

	HIV N=114 % (n)	Control N=157 % (n)	P value
Sex			0.72
Male	54.4 (62)	52.3 (82)	
Female	45.6 (52)	47.7 (75)	
Living area			< 0.001
Urban	49.1 (56)	79.0 (124)	
Rural	50.9 (58)	21.0 (33)	
General risk behavior			
Smoking	35.1 (40)	39.5 (62)	0.46
Alcohol use	14.0 (16)	13.4 (21)	0.88
Dental preventive behavior			
Dentistry annual visit	27.2 (31)	45.9 (85)	0.002
Tooth brushing >2	9.6 (11)	10.2 (16)	< 0.001
2	38.6 (44)	63.1 (99)	
1	28.9 (33)	24.8 (39)	
Sometimes/never	22.9 (26)	1.9 (3)	

Table 1
DEMOGRAPHIC AND BEHAVIORAL
CHARACTERISTICS OF HIV AND
COMPARATOR GROUPS

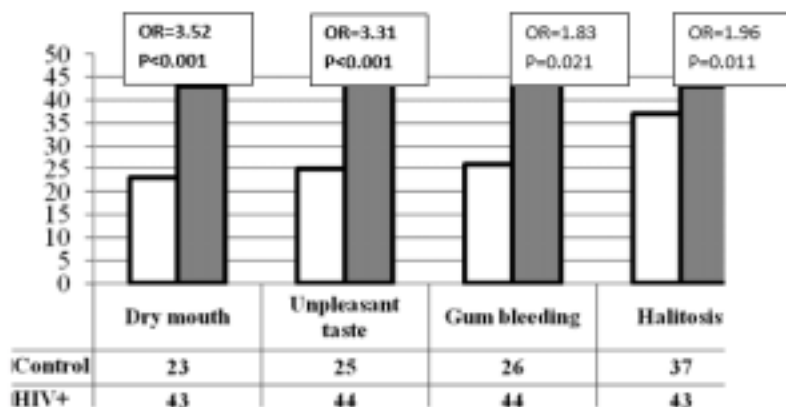


Fig. 1. Comparative frequency of the oral symptoms in HIV (grey) and control group (white)

	HIV+			P	Control		
	Average	SD	Median		Average	SD	Median
Decay	7.16	5.89	6	0.014	5.57	3.95	5
Missing	1.44	2.26	1	0,005	0.80	1.05	1
Fill	1.43	3.67	0	<0.001	3.08	3.03	3
Total DMF	10,05	6,54	9	0.049	9.47	4.39	9

Table 2
STATISTICAL ANALYSIS OF THE DMF SCORE
IN THE HIV+ AND CONTROL GROUPS

OHIP-14 Domains	HIV (N=114)			p	Control (N=157)		
	No. NIA	% NIA	Average no NIA (+/-SD)		No. LA	% NIA	Average no NIA (+/-SD)
Functional limitation							
• trouble pronouncing words	40	17.5%	0.491 (0.73)	0.001	35	11.1%	0.242 (0.47)
• sense of taste has worsened							
Physical pain							
• painful aching in the mouth	64	28.0%	0.72 (0.82)	0.027	57	18.1%	0.51 (0.70)
• uncomfortable to eat any foods							
Psychological discomfort							
• have been self-conscious	61	26.7%	0.71 (0.87)	0.020	50	15.9%	0.59 (0.67)
• felt tense							
Physical disability							
• had an unsatisfactory diet	35	15.3%	0.42 (0.68)	0.637	65	20.7%	0.45 (0.58)
• had to interrupt meals							
Psychological disability							
• found it difficult to relax	25	10.9%	0.31 (0.64)	0.771	46	14.6%	0.33 (0.56)
• have been embarrassed							
Social disability							
• irritable with other people	31	13.5%	0.36 (0.66)	0.030	70	22.9%	0.54 (0.67)
• difficulty doing usual jobs							
Handicap							
• life general less satisfying	29	12.7%	0.36 +/-0.69	0.345	39	12.4%	0.29 (0.58)
• totally unable to function							

* NIA=negative impact answers

Table 3
COMPARISON OF THE OHIP-14
DOMAINS OF THE HIV+ AND
CONTROL GROUPS

and missing teeth in the HIV group compared to the control group, compensated by the significantly lower partial score of fillings ($p < 0.001$) (table 2).

The oral health profile was evaluated with the help of OHIP-14 questionnaire and identified a higher rate of negative impact answers among young adults with HIV infection in comparison with the control group, especially in the *functional limitation*, *physical pain* and *psychological discomfort* domains, while the control group was more affected in the domain of *social disability* (table 3).

Immunity (LCD4 count) and HIV viral load (HIV-RNA) correlated statistically significant with the DMF score, but not with the OHIP-14 score. HBV co-infection did not have any influence on the DMF score or OHIP-14 score (table 4).

The current study is a unique study on the impact of HIV on oral health in Romania. Our research focuses on HIV positive young adults, while most of the previous reports found in the literature assessed children or older HIV patients.

Average and median DMF scores were similar in the HIV infected patients and control group, but the partial scores exhibited statistically significant differences. The results of our study cannot prove the association between HIV and the rise in cariogenesis in young adults who receive antiretroviral treatment. The large number of missing teeth and the small number of filled teeth can be explained by deficient dental hygiene, as well as by the small number of dental care services offered to the HIV positive patients.

Discrimination regarding access to dental services continues to be a reality that HIV+ patients in Romania have to face [14].

Although no significant differences between DMF scores in the case and control groups were observed, the impact on oral health was different. *Functional limitation*, *physical pain* and *psychological discomfort* domains are more often affected in HIV+ patients due to the larger number of neglected caries and to more frequent oral symptoms. The discomfort caused by oral mucosa dryness and unpleasant taste is frequently accounted to side effects associated with the use of a large number of antiretroviral drugs. The lower score in the *social disability* domain calculated in the HIV infected patients in comparison with the control group can be explained by the lower social exposure of these patients.

Immunodeficiency and HIV viral load influence on cariogenesis is proved by earlier studies [9, 15, 16]. Our study confirms the association between higher DMF scores in the case of patients with therapeutically uncontrolled immunodeficiency and HIV viral load, meaning 12.3% of patients who had LCD4 count above 200 and 25% of patients who had active viral replication had significantly higher DMF scores whilst using antiretroviral drugs (table 4). The impact on the quality of oral health of the HIV group does not appear to be significantly influenced neither by LCD4 count, nor by HIV viral load. Furthermore, no significant differences between the global DMF scores of

	N0	M0	N1	M1	p	CI 95%
DMF						
LCD4<200	14	14.64	100	9.41	0.010	1.41; 9.06
ARN-HIV >400c/ml	40	14.95	74	9.04	0.034	0.22; 5.54
AgHBs	81	9.41	33	11.60	0,09	-4.73; 0.36
OHIP-14						
LCD4<200	100	23.53	14	22	0.437	-2.47; 5.53
ARN-HIV >400c/ml	40	23.78	74	22.52	0.340	-5.36; 1.86
AgHBs	81	23.46	33	23.03	0.821	-3.63; 4.51

0=yes; 1=no; N=number of cases; M=average DMF score

the HIV+ young adults and controls were identified, probably due to the decrease in HIV associated opportunistic diseases associated with the development of more efficient therapeutic drug schemes. Altered dental status and high impact on oral health, not only in the HIV group, but also in the control group, can be the consequences of deficiencies in the preventive and therapeutic dental services domain for young adults in Romania. No national reference data regarding oral health indexes for different age groups is available [17].

Conclusions

In conclusion, the dental status and the impact on oral health represent a public health problem of young adults in Romania. HIV infection represents a barrier for young adults who require dental services. The improvement in antiretroviral treatments, and the subsequent immunity increase, represent an ideal strategy for decreasing the impact of HIV infection on oral health. The implementation of nondiscriminatory preventive and therapeutic educational programs could contribute to the improvement of the oral health of young adults in Romania.

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Table 4
STATISTICAL ANALYSIS OF THE CORRELATIONS
BETWEEN DMF AND OHIP-14 SCORES AND IMMUNITY,
HIV VIRAL LOAD AND HBV CO-INFECTION

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