

# Dental health in patients infected by human immunodeficiency virus (HIV). A study of 94 cases

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## SUMMARY

The dental health of 94 HIV-positive patients was investigated by the sum of carious, missing and filling teeth (DMF index), plaque (Silness and Loe) and bleeding point indices (Lenox and Kopczyk). Blood parameters were evaluated, including total lymphocytes, CD4+ lymphocytes, beta-2-microglobulin, platelets, the Quick index, and immunoglobulins (IgG, IgM and IgA). Patient oral parameters were contrasted with risk group (intravenous drug users, homo- and heterosexuals) and controls. An evaluation was also made of differences in dental condition as a function of CD4+ cell number, according to the latest CDC classification (1992). HIV-positive intravenous drug users were found to present poorer DMF, plaque and bleeding point indices than the rest of the patients. No relationship was observed between CD4+ cell numbers in blood and dental condition, thus suggesting that the deteriorated dental health observed is a consequence of factors inherent to the risk groups involved rather than of the altered blood parameters.

## KEY WORDS:

Acquired immunodeficiency syndrome - Dental health.

## RÉSUMÉ

Une étude portant sur l'état de santé dentaire chez 94 patients VIH positifs a été réalisée, en évaluant l'index des dents cariées, manquantes ou plombées (DMF), l'index de plaque (Silness et Loe) et celui de points de saignement (Lenox et Kopczyk). Une évaluation de divers paramètres sanguins a été faite: le total des lymphocytes, les CD4+, la beta 2 microglobuline, la numération plaquettaire, le temps de Quick et les immunoglobulines (IgG, IgM et IgA). Les différents paramètres oraux ont été comparés entre les patients appartenant à un groupe à risque (utilisateurs de drogues par voie veineuse, homo et hétérosexuels) et les patients d'un groupe de référence. Les différences dans l'état dentaire en fonction du nombre de cellules CD4+, en accord avec la dernière classification de la CDC (1992), ont aussi été évaluées. Les patients VIH positifs utilisateurs de drogues par voie veineuse avaient un DMF, un index de plaque et de points de saignement plus faibles que ceux des autres patients. Aucune relation n'a été observée entre le nombre de cellules CD4+ présentes dans le sérum sanguin et l'état dentaire, ce qui suggère que la détérioration de l'état dentaire observée serait la conséquence de facteurs inhérents à chaque groupe à risque plutôt que d'une altération des paramètres sanguins.

## MOTS CLÉS:

Syndrome d'immunodéficience acquise - Etat de santé dentaire - Virus de l'immunodéficience humaine.

**INTRODUCTION**

Oral manifestations, particularly in the form of candidiasis and hairy leukoplakia, are very common in patients with human immunodeficiency virus (HIV) infection. Indeed, such manifestations may be the first clue to the diagnosis of HIV infection, and constitute prognostic and predictive markers of disease progression to acquired immunodeficiency syndrome (AIDS) (Axell *et al.* 1991, Itin *et al.* 1993).

Patients with HIV infection have been described to present particular periodontal alterations (Winkler, Robertson 1992, Barr *et al.* 1992). However, this observation seems to have lost acceptance among specialists in recent years (Friedman *et al.* 1991, Lamster *et al.* 1994), since periodontal condition is presently considered to be more a result of the risk group to which the patient belongs than to the actual stage of infection.

The aim of the present study was to investigate the existence of differences in dental condition among HIV-positive patients in terms of risk group, and to determine possible relationships between dental decay and CD4+ lymphocyte numbers in blood.

**MATERIAL AND METHODS**

Ninety-four HIV-positive patients were studied (79 intravenous drug users – IVDU, 8 heterosexuals, and 7 homosexuals), together with 25 HIV-negative and age-matched controls ( $p > 0.05$ ).

In each case we determined the sum of carious, missing and filling teeth (DMF index) divided by the total number of teeth present – with the exception of the third molars – and expressed as a percentage),

the Silness and Løe plaque index, and the bleeding point index (Lenox and Kopczyk).

In the 7 days before the exploration, we were able to determine total lymphocytes, CD4+ lymphocytes, beta-2-microglobulin, platelet number, the Quick index and immunoglobulins (IgG, IgM, IgA) in 63 HIV-positive subjects. These patients were grouped according to the latest CDC classification (1992) as follows: Group 1 (<200 CD4+ cells/mm<sup>3</sup>), Group 2 (200-499 CD4+ cells/mm<sup>3</sup>) or Group 3 (>500 CD4+ cells/mm<sup>3</sup>). Thus, there were 19, 33 and 13 patients in Groups 1, 2 and 3, respectively, with corresponding mean CD4+ cell counts of 79.6, 344.3 and 639.1. The mean blood parameter values of the patients are shown in Table I.

The statistical evaluation of the results was based on Kruskal Wallis test and simple regression. Statistical significance was considered for  $p < 0.05$ .

**RESULTS**

*Comparisons between risk groups (Table II)*

The mean DMF index was significantly higher in the group of intravenous drug users than in either the heterosexual HIV-positive patients or controls (54.03 versus 31 and 29.68, respectively) ( $p < 0.05$ ).

The plaque index was likewise significantly greater among IVDU than in the homo- and heterosexual patients, and controls ( $1.9 \pm 0.4$ ;  $1.2 \pm 0.7$ ;  $1.2 \pm 0.7$  and  $1.6 \pm 0.6$ , respectively) ( $p < 0.05$ ).

Finally, the bleeding point index was significantly higher in the intravenous drug users than in either the homo- or heterosexuals (36.7 versus 14.2 and 16.7, respectively) ( $p < 0.05$ ).

TABLE I: Analytical values as means in the three patient groups (1992 CDC classification).  
TABLEAU I: Valeurs moyennes dans les trois groupes de patients (classification CDC 1992).

	CD4/mm <sup>3</sup>	B-2 m. (*)	Leukocytes	Platelets	Quick	IgM	IgG	IgA
Group 1	79.63	3.38	3766	162947	92.2	191.7	1818	468.1
Group 2	344.39	3.15	5076	154531	96.2	225	2113.5	287.2
Group 3	639.15	3.04	5266	183230	93.8	222	2554.2	261.5

Group 1: HIV-positive (<200 CD4/mm<sup>3</sup>)  
Group 2: HIV-positive (200-499 CD4/mm<sup>3</sup>)  
Group 3: HIV-positive (>500 CD4/mm<sup>3</sup>)  
(\*) beta-2-microglobulin

Groupe 1: VIH+ (<200 CD4/mm<sup>3</sup>)  
Groupe 2: VIH+ (200-499 CD4/mm<sup>3</sup>)  
Groupe 3: VIH+ (>500 CD4/mm<sup>3</sup>)  
(\*) beta 2 microglobuline

TABLE II: Mean dental indices in the different risk groups and in the controls.

TABLEAU II: Indices dentaires moyens dans les différents groupes à risque et chez les contrôles.

	DMF index	Plaque index	Bleeding point index
IVDU	54.03	1.9	36.7
Homosexuals (HO)	38.4	1.2	14.2
Heterosexuals (HE)	31	1.2	16.7
Controls	29.6	1.6	27.8

Significant differences between groups ( $p < 0.05$ )

- DMF index: IVDU and controls. IVDU and HE.
- Plaque index: IVDU and HO. IVDU and HE. IVDU and controls.
- Bleeding point index: IVDU and HO.

Différences significatives entre les groupes ( $p < 0.05$ )

- index DMF: IVDU et contrôles. IVDU et HE.
- index plaque: IVDU et HO. IVDU et HE. IVDU et contrôles.
- index point de saignement: IVDU et HO.

Comparisons between groups as a function of CD4+ cell count (Table III)

Interestingly, no significant differences were observed among the three CDC groups in terms of any of the oral pathology indices studied. Likewise, no statistical correlation was found between CD4+ count and any of the three oral indices. The relationships between beta-2-microglobulin, CD4/CD8, total leukocytes, platelet number and the Quick index are shown in Table IV. Again, no correlations were observed.

TABLE III: Differences between the three patient groups (1992 CDC classification).

TABLEAU III: Différences entre les trois groupes de patients (classification CDC 1992).

	DMF index (*)	Plaque index (*)	Bleeding point index (*)
Group 1	44.5	1.7	38.7
Group 2	50.4	1.8	28.02
Group 3	51.9	2.08	32.5

Group 1: HIV-positive ( $< 200$  CD4/mm<sup>3</sup>)Group 2: HIV-positive (200-499 CD4/mm<sup>3</sup>)Group 3: HIV-positive ( $> 500$  CD4/mm<sup>3</sup>)(\*) No significant differences ( $p < 0.05$ ) between groups in terms of the three dental indices.Groupe 1: VIH+ ( $< 200$  CD4/mm<sup>3</sup>)Groupe 2: VIH+ (200-499 CD4/mm<sup>3</sup>)Groupe 3: VIH+ ( $> 500$  CD4/mm<sup>3</sup>)(\*) Pas de différences significatives ( $p < 0.05$ ) entre les groupes en termes des trois index dentaires.

TABLE IV: Relationships between analytical values in HIV-positive patients and the dental indices.

(R values: simple regression).

TABLEAU IV: Relations entre les valeurs chez les patients

VIH+ et les index dentaires.

(valeurs R: régression simple).

	DMF index	Plaque index	Bleeding point index
CD4+ /mm <sup>3</sup>	0.08	0.12	0.115
CD4/CD8	0.012	0.101	0.07
$\beta$ -2 microglobulin	0.182	0.017	0.166
Leukocytes	0.35*	0.27	0.06
Platelets	0.08	0.154	0.162
Quick index	0.09	0.07	0.303*

\* Significant values ( $p < 0.05$ ).\* Valeurs significatives ( $p < 0.05$ ).

## DISCUSSION

Intravenous drug users predominated in our series (84% versus 8.5% and 7% hetero- and homosexuals, respectively). As regards dental decay, it should be noted that the HIV-positive intravenous drug users exhibited significantly higher DMF and plaque indices than the other two risk groups. Finally, there were more numerous bleeding points in the HIV-positive drug users than in the rest of subjects, though significant differences were only observed with respect to the homosexuals – who along with the heterosexuals exhibited better oral hygiene. Lamster *et al.* (1994), in a study of intravenous drug users and homosexuals, observed that regardless of whether the patients were infected by HIV or not, the number of carious teeth were persistently higher among the drug addicts. Likewise, they observed higher incidences of candidiasis, calculus, plaque, caries and periodontal disease in seropositive drug users than in the homosexuals. They concluded that drug users are generally more prone to infections, since opioids are known to diminish cell immunity. Different mycotic and viral infections may thus result, regardless of the CD4+ status of these individuals.

In a previous study (Silvestre *et al.* 1990) of 66 intravenous heroin addicts, we observed a marked dental deterioration as reflected by the DMF index, with respect to a group of controls. This was explained in part by the poor oral hygiene of these subjects.

In terms of CD4+ lymphocyte count, it is interesting to note that dental condition was no different between patients with counts of less than 200 cells/mm<sup>3</sup> (CDC classification of 1992) and those with over 500 CD4+ cells/mm<sup>3</sup>, for example. This was supported by the fact that we encountered no statistically significant correlation (simple regression) between the CD4+ counts and the oral indices. Likewise, no significant relationship was observed with respect to either platelet number or beta-2-microglobulin concentrations. Significant correlations were only found between the DMF index and total lymphocytes, and between the bleeding point and Quick indices.

The results obtained suggest that the altered blood parameters in HIV-positive subjects have no direct bearing upon dental condition. Rather, characteristics inherent to the risk group involved, such as deficient oral hygiene and other potential factors (e.g., saliva) appear to account for the greater or lesser dental deterioration.

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