Correlation of CD4 cell count with gingival bleeding index in HIV positive individuals

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Abstract

Objectives: To correlate CD4 cell count with gingival bleeding index in HIV positive individuals.
Methods: Fifty-one serologically confirmed HIV positive individuals were included in the study. Plaque index and bleeding index was recorded by a single examiner. CD4 cell count was obtained within 30 days from the day of examination. CD4 cell counts and gingival bleeding index was correlated using Spearman's correlation test. $p < 0.01$ was considered as statistically significant.
Results: Mean plaque score, mean gingival bleeding index score and mean CD4 cell count was 1.40, 0.96 and 249.86 cells/mm^3 respectively. It was noticed that gingival bleeding was enhanced in individuals with increased immunosuppression. However, no significant positive correlation was seen between mean CD4 cell count and gingival bleeding ($p = 0.14$).
Conclusion: Though CD4 cells are an important indicator for clinical aggravation of HIV infection, periodontal disease as measured by bleeding index is not directly associated to the cell count.

Key words: *HIV positive, CD4 cell count, gingival bleeding, periodontal disease.*

Introduction

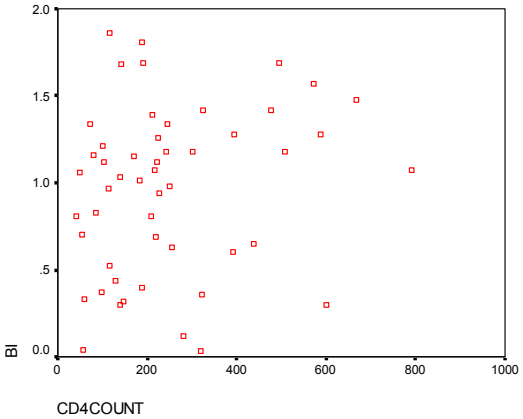
The World Health Report 1996 showed that the world stood on the brink of a global crisis in infectious diseases. At present, infectious diseases have become a social problem with tremendous consequences for the well-being of the individual and the world we live in. The most dramatic example is Human Immunodeficiency Virus (HIV) infection / Acquired Immune Deficiency Syndrome (AIDS). It has evolved from a mysterious illness to a global pandemic, which has infected tens of millions in the past 25 years. Infection with human immunodeficiency virus (HIV) causes a progressive disease in which regulation and function of the immune system are impaired. CD4 is the cell surface receptor for HIV and it is expressed on the T-helper lymphocytes, the cells that become depleted in HIV infection. The CD4 cell count is widely employed 1) to stage HIV disease, 2) for differential diagnosis of current complaints/symptoms, 3) to consider opportunistic infections prophylaxis, 4) to make decision of initiating antiretroviral therapy. Initial immune suppression is indicated by CD4 levels below 500 cells /mm^3 and signals the first appearance of systemic and oral opportunistic infections (1).
Oral candidiasis, Hairy leukoplakia, Kaposi's sarcoma, Non-Hodgkin's lymphoma and periodontal disease have been listed as lesions strongly associated with HIV

infection (2). Patients with severe immunosuppression as a consequence of infection by human immunodeficiency virus (HIV) are at risk for a number of severe periodontal diseases (3). Periodontal manifestation in patients with HIV was first described by Winkler and Murray in 1987 (4). Nevertheless, reports of periodontal disease prevalence among HIV seropositive subjects vary widely (5,6). Moreover, the question as to whether the CD4 cell count affects periodontal disease still remains. Deterioration of the immune system in HIV infection consequent to the depletion of CD4 T cells adversely affects the host defence in the dento-gingival region and increases the susceptibility to periodontal damage (7). The initial lesion in the development of periodontal disease is inflammation of the gingiva. The earliest symptom of gingival inflammation is bleeding on probing. The use of bleeding rather than color changes to diagnose early gingival inflammation is preferred as bleeding is an objective sign and requires less subjective estimation by the examiner. Therefore, the purpose of the present study was to report on the prevalence of gingival bleeding and to investigate the association between gingival bleeding and CD4 cell counts in HIV positive individuals.

Materials and Methods

In the present study, fifty-one serologically confirmed HIV positive adult individuals visiting an outpatient clinic for regular medical check at Infectious Disease Cell, Attavar Hospital, Mangalore were recruited. The HIV status was evaluated by enzyme-linked immunosorbent assays (ELISA-HIV). Three separate positive ELISA-HIV tests were considered confirmatory. CD4 cell count was obtained within 30 days from the day of examination by flow cytometry. Participants were excluded if they were unable to tolerate oral examination and had undergone recent dental treatment (within 3 weeks of the study). Ethical Committee clearance from Institutional Review Board and written informed consent was obtained from all the participants.

Fig. 1. Correlation of CD4 cell count with bleeding index



Demographic details, Plaque index (8) and bleeding index (9) were recorded by a single calibrated examiner. Statistical analysis was carried out using SPSS software version 10. Frequency distribution of demographic details, mean CD4, mean plaque index and mean bleeding index scores were obtained. Correlation of CD4 cell count with bleeding index was analyzed using Spearman's correlation test. $p < 0.01$ was considered statistically significant (Figure 1).

Results

Table 1 gives the age and gender distribution of the study population. 76.5% of the population were married, 11.8 % were single and another 11.8 % were widowed. Only 15.7% were on the basic regimen of the antiretroviral therapy (Table 2). No subject was on any antibiotics or antifungals. The majority of the population never used tobacco (60.8%) or alcohol (74.5%). Mean plaque index and bleeding index score was 1.40 and 0.96 respectively. In relation to CD4 cell count, 47.1 % showed < 200 cells/mm^3, 41.2 % between 200 – 500 cells/mm^3 and only 11.7 % more than 500 cells/mm^3, with a mean count of 249.86 cells/mm^3. It was observed that gingival bleeding increased with reduced CD4 cell count, however when correlation was drawn between mean CD4 cell count and gingival bleeding no significant positive correlation was seen with Spearman's correlation value as 0.20 and $p = 0.14$ (Table 3).

Table 1. Age and Gender distribution of the study population.

Gender	N (%)	Mean Age ± S. D
Male	32 (62.7%)	36.93 ± 5.66
Female	19 (36.5%)	33.78 ± 9.68
Total	51 (100%)	35.76 ± 7.48

Table 2. Antiretroviral Therapy Usage and Duration of the study population.

Antiretroviral Therapy	Males	Females
	N (%)	N (%)
Usage		
Yes	7 (21.9%)	1 (5.3%)
No	25 (78.1%)	18 (94.7%)
Duration		
1-3 months	5 (15.6%)	1 (5.3%)
4-6 months	0 (0%)	0 (0%)
> 6 months	2 (6.3%)	0 (0%)

Table 3. Relationship between CD4 cell count and Bleeding Index (BI).

CD4 cell Count	N (%)	Mean BI score	Spearman's Correlation Value	p value
< 200 cells/mm^3	24 (47.1%)	0.92	0.22	0.28
200 – 500 cells/mm^3	21(41.2%)	0.96	0.20	0.14
> 500 cells/mm^3	6(11.7%)	1.14	0.31	0.54
Mean count - 249.86 cells/mm^3	51(100%)	0.96	0.20	0.14

Discussion

Most of the previous studies suggested increased severity and prevalence of periodontal disease in HIV positive individuals. This increase in periodontal tissue damage with immunosuppression due to HIV has been reported by other investigators (10,11) in Australian and Scottish populations, respectively, though it has not been widely documented on other populations and never reported before in a developing country (12).

In this investigation, gingival bleeding was used as a parameter of periodontal disease and its association with CD4 cell counts was examined. It was seen that as the immunosuppression increased denoted by lower CD4 cell counts, the gingival bleeding also increased, nevertheless no positive correlation could be drawn. Likewise, McKraig et al. (13) reported that immunosuppression measured by CD4 cell count was not significantly associated with HIV-associated periodontitis (HIV-P) ($p = 0.47$). However, they found a trend for persons with AIDS defining illness to be less likely than persons without AIDS to have HIV-P. On the other hand, a study by Vastardis et al. (14) showed that individuals with severe immunosuppression presented with a significantly lower bleeding index as compared with individuals with moderate/mild HIV immune suppression. In a study by Ranganathan et al. (12) in an Indian population revealed the prevalence of both periodontitis and gingivitis to be significantly greater in the CD4 < 200 group (92% and 96 % respectively) than in the CD4 > 200 group (81% and 85% respectively). Conversely, Gonçalves et al. (15) reported that Brazilian patients with periodontal health presented with lower T CD4 lymphocyte mean levels (291 + 241 cells/mm^3) than the group with periodontitis (411 + 256 cells/mm^3).

The present study included subjects visiting for regular check-up, thereby eliminating the bias of those reporting to dental clinics with oral complaints, hence are more representative of HIV infected groups. The study was limited to fifty-one individuals due to logistics reasons. Bleeding index by Saxton and van der Ouderaa (9) was recorded as it a full mouth and a sensitive index.

To conclude, our study shows that individuals with lower CD4 cell count have higher gingival bleeding index scores. This could be explained by the fact that increasing immunosuppression can enhance one's susceptibility to periodontal disease. Thus, CD4 cells are not only an important indicator for clinical aggravation of HIV infection, but also for the progression of periodontal disease as measured by bleeding index. However, periodontal disease is not positively correlated with the cell count and therefore the treatment of periodontal disease should be based on signs and symptoms presented.

References

1. Lewis DA. Antiretroviral combination therapy for HIV infection. Dent Update. 2003 Jun; 30 (5):242-7.
2. Classification and diagnostic criteria for oral lesions in HIV infection. EC- Clearinghouse on Oral Problems Related to HIV Infection and WHO Collaborating Centre on Oral Manifestations of the Immunodeficiency Virus. J Oral Pathol Med. 1993 Aug; 22 (7):289-91.
3. Winkler JR, Robertson PB. Periodontal disease associated with HIV infection. Oral Surg Oral Med Oral Pathol. 1992 Feb; 73(2):145-50.
4. Winkler JR, Murray PA. Periodontal disease. A potential intraoral expression of AIDS may be rapidly progressive periodontitis. CDA J. 1987 Jan; 15 (1):20-4.
5. Swango PA, Kleinman DV, Konzelman JL. HIV and periodontal health. A study of military personnel with HIV. J Am Dent Assoc. 1991 Jul; 122 (7):49-54.
6. Drinkard CR, Decher L, Little JW, Rhame FS, Balfour HH Jr, Rhodus NL, et al. Periodontal status of individuals in early stages of human immunodeficiency virus infection. Community Dent Oral Epidemiol. 1991 Oct; 19 (5):281-5.
7. Lifson JD, Engelman EG. Role of CD4 in normal immunity and HIV infection. Immunol Rev. 1989 Jun; 109: 93-117.
8. Loe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. Acta Odontol Scand. 1963 Dec; 21:533-51.
9. Saxton CA, van der Ouderaa FJ. The effect of a dentifrice containing zinc citrate and triclosan on developing gingivitis. J Periodontol Res. 1989 Jan; 24 (1):75-80.
10. Smith GL, Cross DL, Wray D. Comparison of periodontal disease in HIV seropositive subjects and controls (I). Clinical features. J Clin Periodontol. 1995 Jul; 22 (7):558-68.
11. Yeung SC, Stewart GJ, Cooper DA, Sindhusake D. Progression of the periodontal disease in HIV seropositive patients. J Periondontol. 1993 Jul; 64 (7):651-7.
12. Ranganathan K, Magesh KT, Kumarasamy N, Solomon S, Viswanathan R, Johnson NW. Greater severity and extent of periodontal breakdown in 136 south Indian human immunodeficiency virus seropositive patients than in normal controls: A comparative study using community periodontal index of treatment needs. Indian J Dent Res. 2007 Apr-Jun; 18 (2):55-9.
13. McKraig RG, Thomas JC, Patton LL, Strauss RP, Slade GD, Beck JD. Prevalence of HIV-associated periodontitis and chronic periodontitis

in a southeastern US study group. J Public Health Dent. 1998 Fall; 58 (4):294-300.
14. Vastardis SA, Yukna RA, Fidel PL Jr, Leigh JE, Merchante DE. Periodontal disease in HIV-positive individuals: association of periodontal indices with stages of HIV disease. J Periodontol. 2003 Sep; 74 (9):1336-41.
15. Gonçalves Lde S, Ferreira SM, Silva A Jr, Villoria GE, Costinha LH,Souto R, et al. Association of T CD4 lymphocyte levels and subgingival microbiota of chronic periodontitis in HIV-infected Brazilians under HAART. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2004 Feb; 97 (2):196-203.