

EVALUATION OF PERIODONTAL STATUS OF HIV INFECTED PATIENTS WITH SPECIAL REFERENCE TO CD4 CELL COUNT IN MEKELLE HOSPITAL, ETHIOPIA

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ABSTRACT

Background: Exacerbated chronic periodontitis is part of the spectrum of periodontal diseases that has been described in association with the human immunodeficiency virus (HIV) infection. Few studies have been carried out in developing countries in Sub-Saharan Africa. **Objective:** This study was aimed to evaluate the periodontal status of HIV seropositive patients and to find out if any correlation exists between the severity of periodontal disease and the CD4 cell count in HIV patients. **Methods:** This was a comparative study of the periodontal status of 64 HIV-positive subjects. They were grouped according to their CD4 T cell count as Group A- Subjects with CD4 cell count between 200-500 μ L and Group B- Subjects with CD4 cell count < 200 μ L. Patients oral hygiene status were recorded using oral hygiene simplified index. Severity of periodontal disease in both the groups of HIV seropositive patients were clinically determined using probing pocket depth (PPD). **Results:** It was found that most of the patients in each group were having score "3" as their highest score. A statistically significant association was found between immune status as depicted by CD4 cell count and periodontal status as shown by highest PPD and CAL scores in the present study. **Conclusions:** The present study confirms the effect of immunosuppression on periodontal diseases in HIV infected patients.

Keywords: PPD and Type-2 Diabetes mellitus.

INTRODUCTION

For decades, physicians and dentists have paid close attention to their own respective fields, specializing in medicine pertaining to the body and the oral cavity, respectively. However, recent findings have strongly suggested that oral health may be indicative of systemic health. Currently, this gap between allopathic medicine and dental medicine is quickly closing, due to significant findings supporting the association

between periodontal disease and systemic conditions such as cardiovascular disease, type 2 diabetes mellitus, adverse pregnancy outcomes, and osteoporosis. Significant effort has brought numerous advances in revealing the etiological and pathological links between periodontal disease and other systemic conditions affecting immune system. Considerable interest has been directed toward the nature and incidence of oral and periodontal

diseases in HIV-infected individuals. Exacerbated chronic periodontitis is part of the spectrum of periodontal diseases that has been described in association with the human immunodeficiency virus (HIV) infection. As far as the early 1990s, studies exploring the possible influence of HIV infection on conventional periodontitis reported severe gingival inflammation and attachment loss in HIV-seropositive patients^{1,2} compared with HIV-negative controls³. Most of these studies were cross-sectional in design, although these findings were refuted in other studies among Caucasian and African HIV-positive individuals respectively^{4,5}.

In spite of these reports, other recent studies failed to show differences in the severity of chronic periodontitis between HIV-positive and HIV-negative individuals⁶. The variation in the prevalence of chronic periodontitis has been attributed to methodological and racial differences^{4,7}. It is interesting to note that most of these studies have been conducted in well-developed countries with few in Sub-Saharan Africa, which bears the largest burden of the HIV infection accounting for over 60%⁸.

Most recent well-controlled studies from developed^{9,10} and developing¹¹ countries have equally provided conflicting results. The cross-sectional Indian study carried out among HIV-positive patients using the community periodontal index (CPI) of Treatment Needs revealed significant greater periodontal breakdown in the HIV-positive cohort than age-matched controls¹¹. These observations are not surprising considering the deterioration in the immune system of the host. This is hall-marked by the gradual depletion of CD4 T-cells resulting in neutrophil hyperactivity and consequent destruction of the periodontal tissues.

The CD4 cell count is widely employed to stage HIV disease, for differential diagnosis of current complaints/symptoms, to consider opportunistic infections, prophylaxis and to make decision of initiating antiretroviral therapy (ART). Patients with severe immunosuppression are at risk of having poor oral hygiene and severe periodontal diseases, thus limiting their quality of life. However, there have been few clinical studies that investigated whether CD4 count in human immunodeficiency virus infection (HIV) could be associated with chronic periodontitis^{12,13,14}. Therefore the aim of this study was to find out any correlation between the severity of periodontal disease and the CD4 cell count in HIV- positive patients.

METHODOLOGY

A comparative cross-sectional, analytical study was carried out at a dedicated Mekelle Hospital. Tigray region, Ethiopia. Before starting the study, a study protocol was first approved by MU,CHS, Research and Community Office, Ethiopia.

A total of 64 patients in a age group between 20-50 years (mean age-36), visiting for regular medical checkup at CD4 laboratory of Mekelle hospital, Ayder Campus, Tigray region, Ethiopia were selected using following inclusion and exclusion criterias:

Inclusion Criteria

- 1) Age of the patient between 20 to 50 years.
- 2) HIV seropositive patients.
- 3) Patients may or may not be on ARVs

Exclusion Criteria

- 1) Individuals below the age of 18 years.
- 2) Uncooperative adults.
- 3) Adults who would not give their consent to be examined.
- 4) Adults whose CD4 cell counts are not available in the hospital records.
- 5) Adults having diabetes mellitus.
- 6) Pregnant females or lactating mothers.
- 7) Periodontal therapy in preceding 6 months.

Prior to initiating study, the purpose and design of the study was explained to patient and informed consent was signed by every patient. Then semi-structured, self-administered questionnaires were used to obtain information on the sociodemographic characteristics of the participants. The questionnaires consisted of following questions like: demographic profile, medical and health history, as well as oral health information. Oral health information such as the frequency of cleaning and type of cleaning was recorded in the specially designed chart. Variables such as age, Body Mass Index (BMI), CD4 counts, hypertension, diabetes mellitus, and genital infection were confirmed by medical chart available from the hospital.

Confidentiality of the information was assured by omitting names of the study subjects from the questioner and maximum effort was made to maintain privacy of the respondents during the interview.

Clinical Measurements

Patients were examined under good illumination with the help of mouth mirror, tweezer, explorer, Marques color coded probe and with pellets of cotton. Patient's oral hygiene status was assessed by Simplified Oral Hygiene Index (OHI-S) by John C. Green and Vermillion (1964)¹⁵.

Probing Measurements

The following probing measurements were recorded for assessment of the results in both the groups. The Probing Pocket Depth (PPD) and Clinical Attachment Level (CAL) were recorded at four surfaces of all the teeth except third molars. These measurements were recorded with Marques color coding probe (calibrations at 3mm, 6mm, 9mm and 12 mm). Mobility grades were also recorded for all the teeth (except third molars) to confirm the amount of clinical attachment loss.

Statistical Analysis

Statistical analysis of the data was done using Statistical Package for Social Sciences (SPSS) 11.0 version and Excel 2000. Frequency distributions of demographic details were conducted and mean OHI-S scores was obtained. The mean and standard deviation (Mean \pm SD) values were calculated for the clinical parameter including PPD in both the groups. The mean data was analyzed for the statistical significance by standard statistical method. Pearson's Chi-square tests of association, t-test and analysis of

variance were used to compare qualitative and quantitative variables where appropriate. Logistic regression analysis was used to determine the association between HIV status (CD4 cell count) and severity of periodontitis while adjusting for significant demographic variables in the bivariate analysis. Analyses were performed at 95% confidence level therefore probability value (p) less than 0.05 was considered statistically significant.

RESULTS

A total of 64 HIV-positive patients were enrolled into the study (Table.1). Of the HIV-positive patients, 29 were females and 35 were males, giving a male:female ratio of 2:1. The mean age (standard deviation) of the HIV-positive patients were 36.0 years.

Table 1. demonstrates the distribution of highest OHI-S score among HIV seropositive patients. It was shown that OHI-S Score 3 was the most prevalent score where higher percentages of males (34.2) were affected compared to females (20.6). Out of 64 patients, 18 patients (28.12) showed OHI-S score 3.

Table 1: Distribution of highest OHI-S Score in HIV Seropositive patients [n (%)]

Sex	Highest OHI-Score				
	0	1	2	3	4
Males(35)	4 {11.4}	5{14.25}	8(22.8)	12{34.2}	6{17}
Females(29)	10(20.0)	6(20.6)	4(13.7)	6 (20.6)	3{10.3}
Total(64)	14{21.8}	11{17.18}	12(18.75)	18(28.12)	9{14.06}

Table 2. shows percentage of subjects with periodontitis was higher among males (42.8) as compared to females (34.4). However, distribution was statistically significant ($P < 0.05$).

Table 2: Periodontal status of HIV Seropositive patients [n (%)]

Sex	Non-periodontitis PD= 2-3mm	Periodontitis PPD >5mm
Males(35)	20{57}	15{42.8}
Females(29)	19{65.5}	10{34.4}
Total(64)	39{60.9}	25{39}

Table 3. reveals the oral hygiene status of two groups based on CD4 cell count. OHI-score 3 was most prevalent in both the groups-group A (CD4 cell count 200-500 μ L) and group B (CD4 cell count < 200 μ L). However, group B patients showed higher percentage (45.4) of OHI-S score 3.

Table 3: Distribution of Highest OHI-S Score in Group A & Group B IN HIV Seropositive Patients [n (%)]

Group	CD4 Cell Count	No. of Patients	Highest OHI-S Score				
			0	1	2	3	4
Group A	200-500	42	8{19}	5{11.9}	9(21.4)	14{33.3}	6{14}
Group B	<200	22	1{4.5}	2{9}	5(22.7)	10{45.4}	4{18}
Total		64	9{14}	7{10.9}	14(21.8)	24{37.5}	10{15.6}

Table 4. shows the subjects with periodontitis vs. subjects without periodontitis, as measured by highest probing pocket depth (PPD) and clinical attachment level (CAL) score in groups A and B. Percentage of subjects with Periodontitis was higher in group B (63.6) as compared to group A (23.8). Further, through Chi square test it was found that the distribution was statistically significant ($P < 0.05$).

Table 4: Periodontal status of Group A and Group B IN HIV Seropositive Patients [ⁿ(%)]

Groups	CD4 Cell Count	No. of Patients	PERIODONTAL STATUS	
			Non-Periodontitis	Periodontitis
Group A	200-500	42	32{76.1}	10{23.8}
Group B	<200	22	8{36.3}	14{63.6}
Total		64	40{62.5}	24{37.5}

DISCUSSION

The present study has been carried out with the purpose to evaluate the periodontal status in terms of OHI-S and PPD of HIV infected patients and their association with the immunosuppression as expressed by CD4 cell count of the individuals.

A total of 64 HIV positive subjects were divided into two groups on the basis of CD4 cell count as Group A (CD4=200-500 μ L) and Group B (CD4<200 μ L). To prevent any bias, subjects were taken at random from the Outpatient Department, Mekelle Hospital, Ethiopia. However, some important confounders for chronic periodontitis such as smoking and diabetes which have been identified as classical risk factors in the prevalence and severity of periodontitis were excluded.

The Simplified Oral Hygiene Index (OHI-S) provides interferences on oral cleanliness of the individuals in a quantitative manner¹⁵. OHI-S used for assessing oral hygiene individually as well as in population groups, has been considered a reasonably sensitive method. In the present study, it was found that most prevalent OHI-S Score among HIV infected subjects was score 3, where males showed higher OHI-S percentage (34.2%) than females (20.6%). A possible explanation for the findings of present study might be the fact that females are more concerned of their oral hygiene maintenance. Also, males showed the history of chronic smoking habit since many years.

In this present study, males (42.8%) were found to be more affected with periodontitis than females (34.4%) and the distribution was statistically significant ($P < 0.05$). This observation is in contrast to one of the past study, where women had significantly more severe periodontal disease than men¹⁶. However, limited studies are available showing differences based on gender.

Furthermore, this study also evaluated the oral hygiene status of two groups based on CD4 cell count. OHI-S score 3 was the most prevalent score in both the groups and (37.5%) of the

subjects with periodontitis. The prevalence of periodontitis was significantly greater in patients having CD4 <200 μ L (63.6%) than in the group having CD4=200-500 μ L (23.8%). Males were found to be more affected than females. A study by Ranganathan et al. in an Indian population showed that the prevalence of both periodontitis (92%) and gingivitis (96%) in the CD4 <200 group were significantly greater than in the CD4>200 group (81% and 85% respectively)¹¹. Another study by Kroidl et al. in a German population recorded a prevalence rate of 30%¹⁷. In a similar study among HIV infected persons in Poland, it was reported that more advanced periodontal changes were observed as HIV infection time increases¹⁰. This may be due to the deterioration in their immune system, characterized by a gradual depletion of the CD4 lymphocytes, which compromises the dento-gingival region.

The present study confirms that as stage of HIV infection advances, periodontal status worsens. Although there are limited studies available for comparison of such observation. A statistically significant association was found between immune status as depicted by CD4 cell count and periodontal status as shown by highest PPD and CAL measurements in the present study.

SUMMARY AND CONCLUSION

HIV positive patients in this study had significantly poorer periodontal status which was attributed to their HIV infection and lower level of education. This highlights the need for regular periodontal screening of HIV-positive patients and early treatment of diagnosed periodontitis while working in collaboration with HIV specialists to improve the overall quality of life of these patients.

One limitation of the present study was the relatively small study sample. In order to reach to more reliable conclusions, larger number of patients especially individuals with CD4 cell counts <200 μ L in this geographical region are further needed to throw more light on the observations made in this study.

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