CD4 count and oral health related quality of life of HIV-infected individuals at a tertiary healthcare center in Dharan – A cross-sectional study

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ABSTRACT
Background & Objectives: Patients with severe immuno-suppression are at risk of having poor oral hygiene and severe periodontal diseases, thus limiting their quality of life. The objective of this study was to assess the impact of oral health-related quality of life (OHRQoL) in patients with HIV/AIDS and its association with the CD4 cell count. **Materials & Methods:** A cross-sectional study was conducted using Oral Health Impact Profile-14 (OHIP-14) among 122 HIV/AIDS patients visiting the CD4 laboratory at a tertiary healthcare center at Dharan, from January-December 2009. Oral examination and recording of dental indices were done. CD4 cell count was correlated with OHIP-14 and dental indices using Spearman's rho; $p < 0.05$ was considered as statistically significant. **Results:** Sixty four males and 58 females with median age of 34 years had a mean CD4 cell count of 360.46 cells/mm3 (range=111-1076 cells/mm3). OHRQoL was affected in 25.4% of the individuals with mean OHIP-14 score of 2.5. Most of the individuals (85.7%) were on ART, never used tobacco (68%) or alcohol (74.5%). Mean OHI-S and DMFT were 1.65 and 1.57, respectively and periodontal pocket observed in only 3.3% individuals. The CD4 cell count had no significant positive correlation with OHIP-14 ((rs=0.071; p=0.61), OHI-S (rs=0.21; p=0.127) and DMFT (rs=0.015; p=0.912). There was no significant difference in parameters with regards to gender. **Conclusion:** Although CD4 cells are an important indicator for clinical aggravation of HIV infection, OHRQoL and oral health as measured by OHI-S, DMFT and CPI are not directly associated to the CD4 cell count.

Key words: CD4 cells; HIV/AIDS; oral health; quality of life

INTRODUCTION

The World Health Organization (WHO), in 1948, introduced a paradigm shift in the definition of health[1] and stated that, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." In dentistry, as per this new perspective on health, the ultimate goal of dental care should not be considered only as the absence of caries or periodontal or other dental disease, but, a patient's physical, psychological and social well-being should be considered as well. The aim of this new perspective has been confined by the concept of "oral health-related quality of life". As a working definition, Health-Related Quality of Life (HRQoL) may be defined as a person's assessment of how the following types of factors affect his/her well-being: (1) functional factors; (2) psychological factors (concerning the person's appearance and self-esteem); (3) social factors (such as interactions with others); and (4) the experience of pain/discomfort. When these considerations center on orofacial

concerns, Oral Health-Related Quality of Life (OHRQoL) is assessed.[1]

The traditional methods of measuring oral health use mainly clinical dental indices and focus on the absence or the presence of oral diseases. They do not inform us about the standard of health of the oral and related tissues that enables an individual to eat, speak and socialize without active disease, discomfort and embarrassment, and which contributes to general well-being.[2] Mulligan et al.[3] have stated that objective measures of dental diseases reflect only their clinical end-point and so there is a need to use multidimensional measures of diseases that consider their psychosocial aspects and functional impact.

Over the years, a number of socio-dental or OHRQoL measures have been developed and used for assessing oral health and to describe impacts of oral health on people's quality of life. They measure the degree to which oral conditions interrupt normal social role functioning such as change in ability to work, attend school or undertake parental or household duties. Some OHRQoL measures have been designed to assist in dental service planning by incorporating them with traditional normative measures in the process of dental need assessment. However, most of these OHRQoL measures have been carried out with adults in developed countries.[2] The importance of assessing the OHRQoL in immunocompromised individuals has been emphasized but a very few studies have been conducted on HIV populations.[3]

Oral health care workers can contribute effectively to the early diagnosis, prevention and treatment of HIV/AIDS. Approximately 40 to 50% of HIV positive persons have oral fungal, bacterial or viral infections that often occur early in the course of the disease. Oral lesions strongly associated with HIV infection are pseudo-membranous oral candidiasis, oral hairy leukoplakia, HIV gingivitis and periodontitis, kaposi sarcoma, and non-Hodgin lymphoma.[4,5] Xerostomia, as a result of decreased salivary flow rate not only increases the risk of dental caries[4] and periodontal disease,[6] but also impact negatively on quality of life because of difficulty in chewing, swallowing and tasting food.[4,5]

Mulligan et al.[3] conducted a study to compare the oral health-related quality of life (OHRQoL) between a group of HIV-infected women and a similar group of at-risk HIV-uninfected women, and to investigate the role of potential confounding clinical oral health and behavioral factors. The OHRQoL was inversely related to dental and periodontal diseases. It was also inversely related to smoking and freebase cocaine use. These inverse relationships were not confounded by HIV status. The study, therefore identified specific clinical and behavioral factors where dental professionals can intervene to possibly improve the OHRQoL of HIV-infected or at-risk HIV-uninfected women.[3]

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).[7] Patients with severe immuno-suppression are at risk of having poor oral hygiene and severe periodontal diseases, thus limiting their quality of life. The objective of this study was to assess the impact of oral health-related quality of life (OHRQoL) in patients with HIV/AIDS and its association with the CD4 cell count.

MATERIALS AND METHODS

A cross-sectional oral health-related quality of life (OHRQoL) study was conducted among HIV-positive adult individuals, visiting for regular medical checkup at CD4 laboratory of the CLS at BP Koirala institute of Health Sciences, Dharan, using the Oral Health Impact Profile-14 (OHIP-14). The study protocol was submitted to the Institutional Ethical Review Board and approval was obtained. Informed consent was obtained from all participants.

HIV-positive adult individuals, visiting for regular medical checkup at CD4 laboratory of the CLS at B.P. Koirala institute of Health Sciences, Dharan were included in the study. Individuals without informed consent, those who could not tolerate oral examination, and those who had undergone recent dental treatment (within three weeks before the study) were excluded from the study. Their HIV status had already been tested by Enzyme Linked Immunosorbent Assay (ELISA)[8] and confirmed by Western Blot.[9]

The individuals were asked to complete the OHIP-14 questionnaire including demographic information such as age, sex and occupation and oral health behavior, in a face-to-face interview conducted by the investigator. Clinical examination was carried out with the individual seated on an easy chair in an adequately illuminated room. The examiner and recorder were trained and calibrated

prior to the commencement of the study to ensure reliability of the instrument and indices used. A validation exercise was conducted during the study by re-examination of 10% of the subjects, so as to monitor examiner agreement and consistency during the course of the study. The oral hygiene status was assessed using Simplified Oral Hygiene Index (OHI-S).[10] Caries experience of the individuals was recorded using the WHO criteria for Decayed Missing Filled Teeth (DMFT).[11] Community Periodontal Index (CPI)[11] was used to examine the periodontal status. Accordingly, all the oral tissue was thoroughly examined for related lesions.

The OHIP-14 was originally developed in English as OHIP-49 consisting of 49 weighted items which covered seven dimensions of quality of life: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The shorter version (OHIP-14) was developed retaining two questions from each dimension. The OHIP-14 has demonstrated high reliability and validity. In order to measure the OHRQoL of HIV infected Nepali population, the index subjected to translation and adaptation process into Nepali[12] was used in the main data collection. CD4 cell count of each individual was obtained on the same day of examination. The required data was collected for a period of one year. Provision for referral to dental care was made for participants requiring dental treatment.

Statistical analysis of the data was done using Statistical Package for Social Sciences (SPSS) version 17. Frequency distributions of demographic details were conducted and mean CD4, mean OHI-S and mean CPI scores were obtained. The results were analyzed using appropriate statistical tests. Cronbach's alpha for internal reliability (0.76) and kappa for intra-examiner reproducibility (0.8) were observed. Chi-square test was used to compare between categorical variables. CD4 cell counts and the oral indices were correlated using Spearman's correlation test. The value $p < 0.05$ was considered as statistically significant.

RESULTS

A total of 64 males and 58 females consented to participate in the study. The age ranged from <20 years to >50 years (Table 1) with median age of 34 years consented to participate in the study. The mean CD4 cell count was 360.46 cells/mm^3 (range=111 to 1076 cells/mm3). OHRQoL was affected in 25.4% of the individuals with mean OHIP-14 score of 2.5 (Table 2). Most of the individuals (85.7%) were on antiretroviral therapy, never used tobacco (68%) or alcohol (74.5%). Mean OHI-S and DMFT were 1.65 and 1.57, respectively (Table 2) and periodontal pocket observed in only 3.3% individuals. The CD4 cell count had no significant positive correlation with OHIP-14 (rs=0.071; p=0.61) (Figure 1), OHI-S (rs=0.21; p=0.127) (Figure 2) and DMFT (rs=0.015; p=0.912) (Figure 3). There was no significant difference in parameters with regards to gender.

DISCUSSION

The most early and important indicators of HIV infection are oral manifestations. Oral lesions can have a significant impact on health-related quality of life. Oral health has strong association with physical and mental health. Oral health needs have increased significantly in people with HIV

Table 1. Age distribution

Age group (years)	Frequency	Percent
≤20	2	1.6
21-30	34	27.9
31-40	74	60.7
41-50	10	8.2
≥50	2	1.6

Table 2. Central tendency

Variable	Mean (SD)	Median (IQR)
Age	33.8 (7.3)	34 (30-38)
CD4 count	360.4 (181.1)	328 (256 – 422.2)
OHI-S	1.65 (0.9)	1.5 (1 – 2.1)
DMFT	1.57 (1.9)	1 (0 – 2)
OHIP-14	2.49 (7.1)	0 (0 – 1)

Table 3. Total OHIP Score

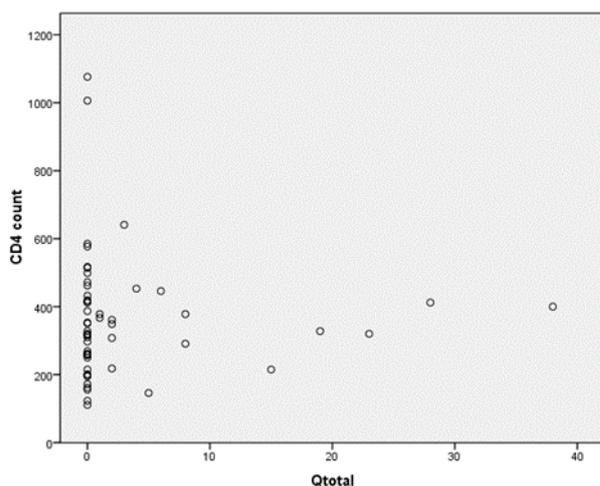| Score range	Frequency	Percent
0	91	74.6
1-10	22	18.1
11-20	4	3.2
>20	5	4.1

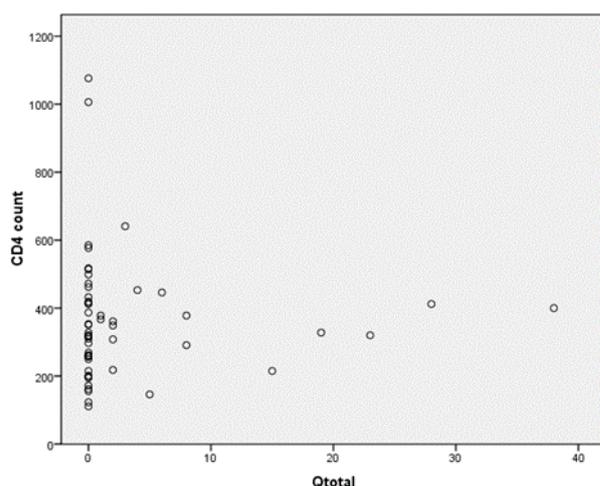Figure 1. Correlation of CD4 count with OHIP

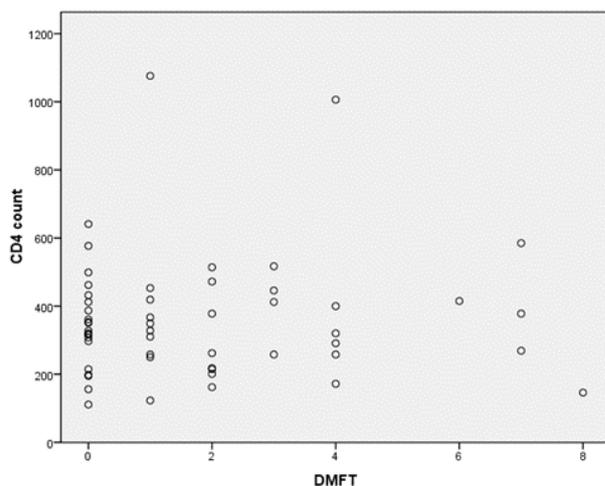Figure 2. Correlation of CD4 count with OHI-S

Figure 3. Correlation of CD4 count with DMFT

infection, especially in children. Among adults, the needs are particularly in relation to periodontal diseases.[5]

OHRQoL was affected only in 25.4% of the individuals with mean OHIP-14 score of 2.5. Only four subjects had OHIP-14 score between 11 to 20 and only five subjects had the score more than 20. This is highly in contrast to the WIHS oral cohort,[3] which showed that HIV-infected women had significantly poorer OHRQoL than HIV-uninfected women. The median OHIP-14 scores ranged from 25.0 points for the HIV-uninfected women to 28.4 for the HIV-infected women.

The Simplified Oral Hygiene Index (OHI-S) provides inferences on oral cleanliness of the individuals in a quantitative manner. The index has two components: oral debris and oral calculus, which are factors considered in oral cleanliness. OHI-S, used for assessing oral hygiene individually as well as in population groups, has been considered a reasonably sensitive method. The mean OHI-S score of 1.65 ± 0.95 in the study population shows fair oral hygiene. A study by Doshi et al.[7] showed a significant difference between HIV positive individuals and controls. The overall mean OHI-S score was higher among the HIV positive individuals. In regards to the antiretroviral therapy use, a significant difference (p=0.03) was observed in the mean OHI-S score among females. Those on therapy had a higher score compared to those not on therapies.

Although plaque and gingival status of the subjects were not part of the observation in the study, periodontal pocket was observed in only 3.3% individuals, a fairly less indication of periodontal defects. A study by Ranganathan et al.[13] 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). This, however was in contrast to Goncalves et al.[14] who reported that Brazilian patients without periodontitis presented with lower T CD4 lymphocyte mean levels (291 + 241 cells/mm3) than the group with periodontitis (411 + 256 cells/mm3).

Studies have shown that patients under ART have much lower dental caries as compares to those who do not use this therapy.[6] The same can be said for HIV-associated periodontal disease.[7] The oral hygiene of the patients depend upon their regular oral hygiene practice. In this study, the early initiation of ART on the patients could possibly have decreased/prevented oral lesions/manifestations thereby improving the OHRQoL of

affected people.

CONCLUSION

Although CD4 cells are an important indicator for clinical aggravation of HIV infection, in the population studies, OHRQoL and oral health as measured by OHI-S, DMFT and CPI are not directly associated with the CD4 cell count.

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