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Periodontal Status of HIV Discordant Couples

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Abstract: *Periodontal diseases, especially gingivitis and periodontitis, are highly prevalent and a public health concern. Severe forms of these diseases cause ulceration of the oral epithelium, leading to entry of oral microbes and inflammatory products into systemic circulation. Early detection and management of these lesions is important to avoid this systemic spread. The aim of this study was to describe the periodontal status of HIV discordant couples seen in MoiTeaching and Referral Hospital/Moi University AMPATH clinics between October and December 2016.Socio-demographic characteristics, oral hygiene practices and oral health seeking behavior were obtained using a semi-structured questionnaire. Oral hygiene status was measured using Silness and Loe (1964) plaque index, while gingival inflammation was measured using Loe and Silness (1963) gingival index. Periodontitis was measured using Clinical Attachment Loss. Mean age for participants was 42.3 ±11.7. Periodontal parameters by HIV serostatus were clinically similar. However, HIV positive individuals had a lower gingival score which was statistically significant (χ^2=8.00, d f = 2, p=0.018). Chronic periodontitis was the most prevalent periodontal disease with 37.6 % of participants recording severe levels of the disease. Therefore, the study showed that periodontal parameters in HIV positive and HIV negative participants were clinically similar, although there was a statistically significant reduction in gingival inflammation seen in HIV positive individuals.*

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I. Introduction

Periodontal diseases affect structures that support and anchor the tooth [1, 2]. They are mainly caused by dental plaque microorganisms which cause inflammation in the gingival connective tissue resulting in gingivitis, which is reversible, if treatment is done. If inflammation spreads to the periodontal ligament and alveolar bone, the condition changes to an irreversible condition known as periodontitis. Symptoms of these diseases vary from minor ulceration of the oral epithelium to lesions that are as big as the size of the human palm. This leads to shedding of blood and fluids into the oral cavity with systemic spread of oral microbes and inflammatory products [3-4]. If treatment is not done, continuous tissue destruction leads to tooth loss and hence loss of function. This affects nutrition and self-esteem of affected individuals. However, the course, duration and severity of these diseases depend on the host immune response, which is modified by other risk factors including HIV[4-5]. Previous studies [22-3]have shown that HIV is associated with periodontal disease through its effects on the host immune response hence, there is need to monitor HIV infected individuals for early detection and treatment of periodontal diseases.

HIV discordant couples are increasing forming a study population for prevention of HIV transmission but information on their periodontal status is poorly documented. Information on their periodontal status is important in formulation of policy guidelines for their oral healthcare.

II. Materials and Methods

A descriptive cross-sectional study was carried out over a period of three months (October 2016 to December 2016) at Moi Teaching & Referral Hospital, Academic Model Providing Access to Health Care (AMPATH) clinics. A total of 194 individuals aged over 18 years were recruited to the study.

Study Design: Cross-sectional hospital based study.

Study Location: This study was done in a national teaching and referral hospital which collaborates with Moi University and other international universities led by Indiana University, through AMPATH clinics, in the care of HIV infected and affected individuals in the western part of Kenya.

Study Duration: October 2016 to December 2016.

Sample Size: 194 individuals

Sample Size Calculation: Sample size determination was done on the basis of prevalence of periodontal disease (80%). Since the study population was less than 10,000, it was adjusted using the Fisher's correction formula with confidence interval (CI) set at 5% and confidence level of 95%. The minimum sample size obtained was 204 but only 194 qualified to participate in the study according to the set criteria.

Subject and Selection Method: Snowballing technique was used to get the desired sample size. Staff in the retention program used their client register to identify HIV discordant couples and introduced them to the research protocol. Those contacted introduced their spouses and friends into the study. Ethical Approval was obtained and participants signed written consent.

Inclusion Criteria:
1. HIV discordant couples in the AMPATH retention register.
2. They must have lived as partners for more than a year.
3. Over 18 years of age

Exclusion Criteria:
1. Couples who were too ill to participate (not able to consent).
2. Pregnant women.
3. Uncontrolled diabetes.
4. Those who had received periodontal treatment in the three months prior to the study.
5. Cancer patients.

Procedure Methodology

Socio-demographic variables obtained and recorded using a questionnaire included: gender, age, occupation, level of education, dental/medical history, oral hygiene habits, smoking and alcohol use. Plaque score was recorded using Silness and Loe (1964) index. Gingivitis was assessed using Loe and Silness (1963) index. Assessment of gingival inflammation was done bysweeping the William's periodontal probe under light finger pressure at the gingival sulcus of the designated Ramjford teeth and recorded after waiting for 15 seconds.Periodontal probing depth and charting was done on all teeth that had at least half of the crown intact. Examination for the presence or absence of atypical periodontal diseases was done using the EC-Clearinghouse (1993) criteria. Other relevant information was obtained from the medical records.

Statistical Analysis

Data was pre-coded and entered into Microsoft Excel and SPSS version 20. Mean values were used to summarize data and present it in tables, graphs and pie charts. Chi Square and Fisher's tests were performed to test for differences in means of categorical variables between HIV negative and positive individuals. Results were considered statistically significant when $p<0.05$.

III. Results

Table No.1 gives a summary of the findings on periodontal parameters. On clinical examination, all participants had plaque deposits with a mean plaque score of 1.95 ± 0.69. Majority, 102 (52.5 %), of the participants had a plaque score of 1.1 to 2.0. Amount of plaque deposits depended on age, gender, frequency of brushing and habits like smoking. Majority, 33 (67.3%), of those with heavy plaque deposits were aged above 40 years. However, HIV status had no effect on amount of plaque deposits.

All participants had gingival inflammation with some form of gingival bleeding.Mean gingival index recorded was 1.54±0.60 with HIV positive and negative participants having a mean gingival score of 1.48 and 1.62, respectively. Majority, 90 (46.4%), of participants had moderate gingivitis while minority, 21 (10.8%), had severe gingivitis. Most of the HIV positive individuals, 51 (52.6%), had mild gingivitis while the least, 10 (10.3%), had severe gingivitis. Majority, 54 (55.7%), of the HIV negative individuals had moderate gingivitis and the least, 11 (11.3%), had severe gingivitis. This difference in gingival inflammation according to HIV status was statistically significant (χ^2 =8.00, df =2, p=0.018).

One hundred and sixty-seven (83.5%) HIV discordant couples had clinical attachment loss. Mean clinical attachment loss (CAL) recorded was 3.77± 2.21 mm. Majority (74.7%) had clinical attachment loss of more than 2mm.

Linear gingival erythema (LGE) was present in four (4.12%) of the HIV seropositive participants. One participant had necrotizing ulcerative gingivitis (NUG)/ necrotizing ulcerative periodontitis (NUP). LGE was more prevalent in males than females (3:1).

Table No. 1: Mean Periodontal Parameters by HIV Status

VARIABLES		**HIV status**				
		Negative		**Positive**		
		Frequency (n)	**Percent** (%)	**Frequency** (n)	**Percent** (%)	**Chi-square** (χ^2, df) p-value)
Plaque Index	○ Light Plaque	18	18.6%	25	25.8%	(1.48, 2) 0.477
	○ Moderate Plaque	53	54.6%	49	50.5%	
	○ Heavy Plaque	26	26.8%	23	23.7%	
Gingival Index	○ Mild gingivitis	32	33.0%	51	52.6%	(8.00, 2) **0.018***
	○ Moderate gingivitis	54	55.7%	36	37.1%	
	○ Severe gingivitis	11	11.3%	10	10.3%	
Clinical Attachment Loss	CAL 1-2mm	7	7.2%	10	10.3%	(2.59, 3) 0.459
	CAL 3-4mm	33	34.0%	40	41.2%	
	CAL >5mm	41	42.3%	31	32.0%	
	Gingivitis	16	16.5%	16	16.5%	

Distribution of Chronic Periodontitis

Chronic periodontitis was the most prevalent disease (83.5%). Prevalence and severity of chronic periodontitis in HIV discordant couples increased with age (Fig 1). However, there was early clinical attachment loss in participants aged 20 to 30 years with 35% recording severe disease.. Their distribution according to HIV status was almost clinically similar. However, HIV negative individuals had more of severe chronic periodontitis (Fig 2).

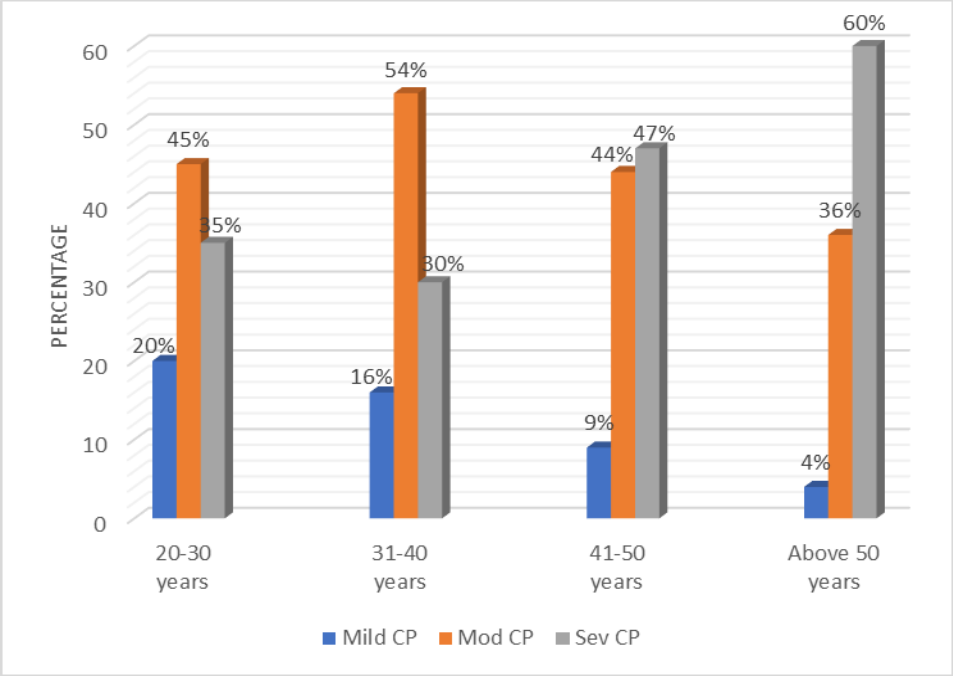

Fig. 1: *Distribution of Chronic Periodontitis According to Age*

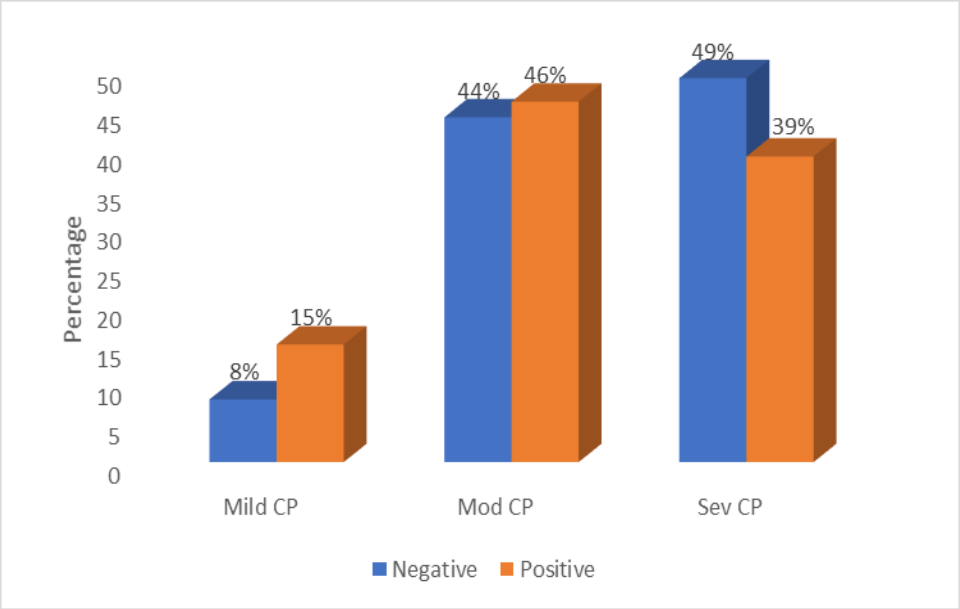

Fig.2: *Distribution of Chronic Periodontitis in HIV Positive and Negative Participants*

IV. Discussion

The aim of the study was to describe the periodontal status of HIV discordant couples attending MoiTeaching and Referral Hospital/ Moi University AMPATH Clinics. The periodontal parameters were clinically similar in HIV negative and positive individuals. However, there was a statistically significant difference (χ^2 =8.00, df =2, p=0.018) seen in gingival inflammation, with HIV positive individuals recording lower mean gingival scores. This could be explained by the following factors; depressed host immune response, use of a combination of anti-retroviral drugs and oral antibiotic prophylaxis by HIV infected individuals. Severity of periodontal disease depends on the host immune response which is weakened by HIV infection of the T-Lymphocytes .This means the cellular response is slow in HIV infected individuals. Prolonged use of antibiotics could also have led to a reduction in the number of periodontal pathogens .This is because antibiotics have been shown to play a role in periodontal disease treatment [10-11, 21]. Furthermore, viruses have been associated in the aetiology of periodontal disease and use of antiretroviral drugs could target these pathogens causing disease resolution and reduced gingival inflammation [5, 12]. This is in agreement with other studies [4-5, 22-3] that have reported reduced gingival inflammation among HIV infected individuals on HAART.

Prevalence of severe chronic periodontitis in the current study was higher (37.1%) than that reported by Sibuti et al (4.3%) [6]. This could be explained by the different socio-demographic characteristics and associated risk factors of the two study populations [7-8, 13]. Sibuti had majority of participants in the 30-39 year category, thus a younger population with 63.4% having attained secondary school education compared to the current study that had majority (77.3%) of the couples coming from rural areas with low socioeconomic status.Poor oral hygiene practices and oral health seeking behavior due to low socioeconomic status could have led to mild disease progressing to severe forms of disease.The mean age of participants was in the 4th decade and this could explain the high prevalence recorded since periodontal disease is at its peak in this decade [24]. HIV status had no statistically significant effect on periodontal disease prevalence. This is in agreement with a South African study [23] that concluded that HIV is not an independent risk factor in causing periodontal disease.However, the role of other risk factors was not established since the study did not match for age and gender nor did it control the confounders.

Despite the prevailing socio-demographics and associated risk factors, the prevalence of severe chronic periodontitis in this study population was noted to be much higher compared to that of normal population. Ogawa et al [24] reported a global prevalence of 9-15% in severe chronic periodontitis. Since periodontal diseases are chronic inflammatory conditions, chances are that there was a change in the homeostatic balance in terms of the microbial flora and host response. Prolonged chronic inflammation could have led to gene mutation in receptors, enzymes and cytokines involved in inflammation [15-18]. There is also the possibility of bacterial gene mutation and resistancethat occurs with prolonged use of antibiotics [21]. Maybe the new strains had more virulent factors and hence caused more tissue destruction. However, more genetic and microbial studies are needed to ascertain this since there were a few limitations in this study. Control of confounders and matching for age and gender was not done during proposal development and this made it difficult to do association studies.

Snowballing technique could also have led to participants with periodontal problems volunteering to participate hence causing high prevalence results.

V. Conclusion

Periodontal status of HIV discordant couples in the sample population was clinically similar. However, HIV positive participants recorded a lower gingival inflammation score that was statistically significant.

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