

Table 3: Prevalence of specific oral lesions and their relationship with CD4+ count in HIV positive subjects

Oral lesions	Number of oral lesions based on CD4+ count/ml (%) n (%)			Mean CD4+ count (SD)	P value
	<200	200-499	>500		
Erythematous candidiasis	3 (60.0)	1 (20.0)	1 (20.0)	200.0 (194.8)	0.29
Pseudomembranous candidiasis	27 (73.0)	8 (21.6)	2 (5.4)	156.1 (172.5)	0.01
Angular cheilitis	5 (71.4)	2 (28.6)	0 (0.0)	137.9 (152.6)	0.48
Necrotizing ulcerative gingivitis	1 (100.0)	0 (0.0)	0 (0.0)	179.0 (0.0)	0.64
Necrotizing ulcerative periodontitis	1 (50.0)	1 (50.0)	0 (0.0)	169.0 (0.0)	0.16
Linear gingival erythema	5 (62.5)	2 (25.0)	1 (12.5)	182.1 (154.8)	0.83
Hairy leukoplakia	0 (0.0)	1 (100.0)	0 (0.0)	258.0 (0.0)	0.38
Kaposi's sarcoma	1 (100.0)	0 (0.0)	0 (0.0)	148.0 (0.0)	0.64
Cervical lymphadenopathy	2 (100.0)	0 (0.0)	0 (0.0)	360 (199.4)	0.43
Melanotic hyperpigmentation	5 (45.5)	5 (45.5)	1 (9.1)	228.1 (145.5)	0.72
Xerostomia	7 (63.6)	3 (27.3)	1 (9.1)	201.0 (172.9)	0.77
Salivary gland swelling	2 (100.0)	0 (0.0)	0 (0.0)	173.0 (0.0)	0.43
Thrombocytopenic purpura	1 (100.0)	0 (0.0)	0 (0.0)	164.0 (0.0)	0.64
Ulceration NOS	3 (100.0)	0 (0.0)	0 (0.0)	36.0 (28.6)	0.26
Herpes zoster	1 (50.0)	0 (0.0)	1 (50.0)	345.0 (220.6)	0.21
Facial palsy	1 (100.0)	0 (0.0)	0 (0.0)	28.0 (0.0)	0.64
Recurrent aphthous ulcer	3 (75.0)	1 (25.0)	0 (0.0)	135.8 (94.4)	0.61

SD: Standard deviation, HIV: Human immunodeficiency virus, NOS: Not otherwise specific

Table 4: Logistic regression table showing predictive odds of CD4 count values for oral candidiasis

	B	SE	P value	OR
CD4 count <100	-1.222	0.559	0.03	3.39
CD4 count <200	-0.012	0.696	0.99	2.36
CD4 count <300	-0.260	0.887	0.77	1.30
CD4 count <400	-0.857	1.033	0.41	1.01
CD4 >400	0.000	1.087	1.000	1.00

SE: Standard error, OR: Odds ratio

and oral candidiasis ($P = 0.03$). Adjusted OR for developing oral candidiasis at < 100 cells/ml was found to be 3.39. Adjusted OR for patients with CD4+ count > 400 cells/ml was found to be 1.00 revealing no added risk.

Discussion

Oral lesions are common findings in HIV infection. The main factor associated with the development of oral lesions is damage to the immune system, specifically loss of CD4+ lymphocytes, which are involved in cell-mediated immunity.^[18] Earlier studies have reported that HIV patients with a CD4+ count of < 200 cells/ml had more oral lesions.^[12,18,21] A similar finding was recorded in this study in which 68.4% of the total HIV-related oral lesions were in the group of patients with CD4+ count of < 200 cells/ml.

The prevalence of 57.0% of HIV related-oral lesion as shown in this study, is in keeping with Campisi *et al.*,^[7] which reported a prevalence of 56.5% in HIV+ Italian women, but higher than the 43.9% reported among HIV+ Nigerian women by an earlier study.^[9] These discrepancies might be as a result of

other demographic and/or clinical factors. The prevalence of 52.4% oral lesions in HIV negative women reported in this study compared with earlier report of 57.7%.^[22]

The inverse relationship between the CD4+ counts and the prevalence of oral mucosal lesions in HIV infected patients has been previously reported.^[1,21,23,24] Similarly, this study observed a significant inverse relationship between CD4+ counts and the prevalence of oral lesions in HIV infected patients. These findings indicate that the occurrence of oral lesions in HIV patients could be a useful guide in determining a reduction in the immunological status of HIV patients. This agrees with reports that CD4+ depletion was strongly associated with a high level of viral load.^[18] Therefore, clinicians and researchers are advocating oral lesions as a useful tool for the diagnosis and detection of the progression of HIV infection.^[18,24]

The main factor associated with the development of oral opportunistic lesions is the CD4+ count.^[18] The onset of oral candidiasis and oral hairy leukoplakia is heralded by a sustained reduction in the CD4+ blood cell count associated with a sharp increase in viral load.^[25] An earlier study^[23] observed that oral lesions found among a cohort of 737 persons in Italy infected with HIV were significantly associated with CD4+ count of < 300 cells/ml. In a study done on a population of 43 subjects in Greece,^[26] oral hairy leukoplakia was found to be associated with CD4+ counts < 200 cells/ml. Analysis of oral lesions in 81 HIV-positive subjects and 31 HIV-negative subjects and their CD4+ counts in a study done at Oyo, Nigeria has shown that CD4+ counts < 500 cells/ml were significantly associated

with having pseudomembranous candidiasis and angular cheilitis.^[27] Another study,^[21] reported oral candidiasis and melanotic hyperpigmentation could be used as markers of immunosuppression depicted by CD4+ counts < 200 cells/ml while oral hairy leukoplakia could indicate HIV-ribonucleic acid \geq 20,000 copies/ml in an adult Nigerian population. Similarly, this study revealed that the presence of oral candidiasis and hairy leukoplakia were associated with CD4+ counts < 200 cells/ml. Both oral candidiasis and oral hairy leukoplakia have been accepted to be of value in staging and classification schemes for HIV disease.^[2,12,18] In addition, they are also used as clinical correlates of CD4+ count.^[2] However, a study^[28] reported that HIV-related oral lesions may not be diagnostic of immunodeficiency, as some patients may have these lesions at high CD4+ counts while others do not have them despite low CD4+ counts. Nevertheless, a study conducted on sero-positive Hemophiliacs has shown that advanced stage of immune suppression and presence of oral lesions were significantly associated ($P = 0.04$).^[29]

Thus far, CD4+ cell count is recognized and widely used as a marker for HIV-related disease progression. Accordingly, the Centers for Disease Control and Prevention has proposed a revised classification system and AIDS case surveillance definition that incorporates both clinical signs and symptoms as well as one laboratory marker, CD4+ cell count.^[30]

Conclusion

As the CD4+ count was decreasing the presence of oral lesions was increasing in the study.

The presence of pseudomembranous candidiasis was found to be significantly associated with CD4+ count level < 200 cells/ml in this study. This association of oral candidiasis with CD4+ cell counts could be used as additional markers of immunosuppression and progression of HIV infection, particularly in a developing country like Nigeria where CD4+ count cannot be determined routinely.

However, the study limitation was the unavailability of detailed bio data and past medical history of patients.

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