

Oral candida infection among HIV patients at Kilimanjaro Christian Medical Centre in northern, Tanzania

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Abstract

Background: Oral candidiasis has been a global health challenge especially in immunocompromised patients particularly with HIV infection. Though the incidence and prevalence of opportunistic infections have been reduced due to the use of anti-retroviral therapy (ART), oral candidiasis remains the most frequently HIV-associated oral lesion in Tanzania. This study aimed at determining the prevalence of oral candida infection in HIV positive patients and investigate the relationship between oral manifestations and the level of immunosuppression.

Method: This study was carried out at Kilimanjaro Christian Medical Centre in Moshi, Tanzania. The study included 314 HIV patients with complete clinical results records who were diagnosed with HIV and who were on ARV and attending the hospital for care and treatment.

Results: Prevalence of oral candida was 42.0% (132/314). Age group 6-27 years accounted for half of the infections (49/98). A significantly higher prevalence of candida infection (66.7%; 24/36) was observed among patients with <200 cells/ μ l than in those with 200-500 cells/ μ l or >500 cells/ μ l (Chi-square $\chi^2=14.9$, $p=0.001$). The mean CD4+T-cell counts in HIV patients infected with oral candida was lower (523 \pm 35) than patients without oral candida infection (645 \pm 31 cells/ μ l), (ANOVA, $p=0.009$). The mean CD4+ T-cell count among HIV patients on ART and those not on ART was not statistically different.

Conclusion: The prevalence of oral candida infection was significantly higher in patients with CD4+ cell counts less than 200 cells/ μ l.

Keywords: Oral, candida, HIV, Tanzania

Introduction

Human immunodeficiency virus (HIV) infection is major global health concerns due to its continued spread in different parts of the world. It has been revealed that candidiasis is a opportunistic infection and commonly occur in patients with HIV infection (Morgan, 2005), and most patients are infected with a strain originally existing as a commensal of the oral cavity (Wabe *et al.*, 2012). The incidence of candida infections in HIV patients has been increasing (Mousavi *et al.*, 2012) and poses a public health concern in Sub Saharan Africa. It has been reported that the rate of disease progression varies significantly among patients and can be indicated by laboratory markers (Patil & Ganapathy, 2011) and therefore, oral candidiasis has been shown to be an important indicator of increased immunosuppression (Santos *et al.*, 2001;

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Davoodi *et al.* 2010; Bodhade *et al.* 2011; Patil & Ganapathy, 2011). However, in some studies, non-HIV infected and those infected with HIV with higher CD4+ T cell counts have also been found infected with candidiasis (Katz *et al.*, 1992).

Though the incidence and prevalence of opportunistic infection have been reduced worldwide due to use of anti-retroviral therapy (ART) (Diz Dios *et al.*, 2001; Ceballos-Salobrena *et al.*, 2004), oral candidiasis remains the most frequent HIV-associated oral lesion in most developing countries including Tanzania. In Tanzania, oral candidiasis is the common condition in HIV infected patients with prevalence ranging from 20 % to 80 % (Schjødt *et al.*, 1990; Hamza *et al.*, 2006; Kahabuka *et al.*, 2007; Mwangosi & Majenge, 2011).

There is no study, which has explored the prevalence of oral candida infection in HIV/AIDS patients in northern Tanzania. Therefore, the objective of the present study was to retrospectively determine the prevalence of oral candida infection and investigate the relationship between oral manifestations and the level of immunosuppression among HIV positive patients attending Kilimanjaro Christian Medical Centre in northern Tanzania.

Material and Methods

Study area

This study was conducted at Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania. KCMC is a consultant referral hospital with 450 inpatient beds serving several regions in northern part of Tanzania.

Study design and data collection

The study was a descriptive retrospective involved HIV infected patients who received treatment and prescription at Child Centred Family Care Clinic at KCMC for a period of 12 months. A total of 314 files were selected from medical records by using convenient sampling. Patient's files were reviewed for demographic characteristics, ART use and CD4 T-cell counts. The inclusion criteria was HIV positive status and the exclusion criteria was incomplete record of data of patients who received care and treatment and those who were referred at KCMC from other health care facilities.

In all patient files reviewed oral candida were diagnosed clinically. During reviewing process, all patients files with complaints as either or not painful ulcers in the mouth were recorded. All files which were recorded as painful ulcers in the mouth were further reviewed to identify and record those with whitish patches like unfresh milk.

Data analysis

Analysis of data was carried out using Statistical Package for Social Sciences (SPSS) version 20.0 (SPSS Inc., Chicago, USA). Descriptive statistics for categorical data were summarised and

tabulated while for continuous variables such as age, CD4 T-cell count mean values were calculated using t-test after checking for the normality. For the categorical outcome variables frequencies and proportions was computed whereas association between categorical variables was computed using Chi-square test. A value <0.05 were considered to be statistically significant.

Ethical considerations

Ethical approval was sought from the Kilimanjaro Christian Medical University College Research and Ethics Review Committee. Permission to conduct the study and review medical records was granted by the Director of Kilimanjaro Christian Medical Centre. Each patient's file was given a study identification number and confidentiality was maintained. No names or any personal information was recorded from the patient files.

Results

The study included 314 (male=111; females=203) HIV positive patients, the median age of the study participants was 24 years (range= 1-81 years). Generally, of the 314 HIV positive patients, 42.0% (132/314) were positive for oral candida infection while 58.0% (182/314) were negative. Fifty-two (46.8%) of the males and 80 (39.4%) of the females had candida infection (Table 1). ART usage was 43.7% (111/254) among patients with candida infection and 56.3% (143/254) among patients without candida infection. There was no difference in ART usage among patients with or without candida infection. (Chi-square $\chi^2=1.50$, $p=0.21$).

Table 1: Demographic characteristic, ART usage and and CD4+T-cel

Variables	Response	No.	Oral Candida infection		P-value
			Positive % (n)	Negative % (n)	
All patients)		314	42.0 (132)	58.0 (182)	-
Sex	Male	111	46.8 (52)	53.2 (59)	0.20
	Female	203	39.4 (80)	60.6 (123)	
ART use	Yes	254	43.7 (111)	56.3 (143)	0.21
	No	60	35.0 (21)	65.0 (39)	
Age category (years)	1-5	33	27.3 (9)	72.7 (24)	0.05
	6-17	98	50.0 (49)	50.0 (49)	
	≥18	183	40.4 (74)	59.6 (109)	
CD4 + T-cell category (cells/μl)	<200	36	66.7 (24)	33.3 (12)	0.001
	200-500	113	45.1 (51)	54.9 (62)	
	>500	165	34.5 (57)	65.5 (108)	

Age group 6-27 years accounted for half (50.0%; 49/98) of the infections as compared to those within 1-5 years 27.3% (9/33) and ≥ 18 years 40.4% (74/183), though the association was marginally significant (Chi-square $\chi^2=5.69$, $p=0.05$). A significantly higher prevalence of candida infection (66.7%; 24/36) was observed among patients with <200 cells/μl followed 45.1% (51/113) and lastly 34.5% (57/165) among patients with 200-500 cells/μl and >500 cells/μl, respectively (Chi-square

$\chi^2=14.9, p=0.001$).

Table 2: Mean CD4+ T-lymphocyte cells among HIV positive patients

Variable	Response	No.	CD4+ T- cell (cells/ μ l)	Mean \pm SD	P-value
Oral Candida Infection	Positive	132	523 \pm 35		0.009
	Negative	182	645 \pm 31		
Use of ARV	Yes	254	582 \pm 423		0.29
	No	60	644 \pm 357		

Key: SD= Standard Deviation, CI= Confidence Interval, ANOVA= Analysis of Variance

The overall CD4+T-cell count mean was 594 \pm 411. The mean CD4+T-cell counts in HIV patients infected with oral candida was lower (523 \pm 35) than in patients without oral candida infection (645 \pm 31), (ANOVA, $p= 0.009$). Mean CD4+ T-cell among HIV patients who were on ART and those not on ART was not different (Table 2).

Discussion

The prevalence of oral candidiasis in our study was lower than that previously reported in Dar es Salaam, Tanzania (Kahabuka *et al.*, 2007) and Nigeria (Esebelahie *et al.*, 2013). However, it was higher than that reported in Uganda (Nanteza *et al.*, 2014). The observed differences in the prevalence are likely to be due to different study designs and population. A study by Kahabuka *et al.* (2007) employed prospective cross-sectional design while Nanteza *et al.* (2014) used consecutively cross-sectional design. Both the two studies excluded individuals ≤ 18 years old (Nanteza *et al.*, 2014; Kahabuka *et al.*, 2007). On the other hand, the study in Nigeria (Esebelahie *et al.*, 2013) compared candida colonization in asymptomatic HIV patients and control.

Although in our study we could not find any difference between the prevalence of candida infection between males and females, a study in India indicated that more males than females were infected with oral candida (Ranganathan *et al.*, 2004). In Nigeria, Okonkwo *et al.* (2013) reported that more females than males are infected with oral candida. We observed that HIV patients with age of 6 to 17 years were more infected by oral candida infection than the other age groups. While there is no clear explanation to this, a previous study in Nigeria reported that adults (2-40 years) are more frequently infected with candida infection than other age groups (Eweka, 2012).

Although there are evidences that the use of ART in HIV patients decrease the prevalence of oral candidiasis (Schmidt-Westhausen *et al.*, 2000; Dunic *et al.*, 2004), our findings indicate that four out of ten of the patients on ART were infected. This rate was higher than that previously reported in Dar es Salaam by Hamza *et al.* (2006). Similar to our findings, a recent study in Nigeria (Esebelahie *et al.*, 2013) reported that 44.0% of patients who are on ART were infected with oral candida infection. Reason for this high prevalence of oral candida infection among patients on ART is probably due to lack of ART adherence (Owotade *et al.*, 2013; Abebe & Kassa, 2014).

Comparing the mean oral candida infection between those on ART and those not on ART, our findings could not establish any association between the two. Similar findings have been reported elsewhere (Costa *et al.*, 2006; Nweze & Ogbonnaya, 2011; Kwamin *et al.*, 2013).

It has been reported that during the course of HIV infection, the rate of candida infection is inversely associated to the CD4 T-cell counts of the patient (Pappas *et al.*, 2003) and several studies documented that oral candida infected patients have low (< 200cells/ μ l) CD4+ T cells (Davoodi *et al.*, 2010; Bodhade *et al.*, 2011; Patil & Ganapathy, 2011). We have noted a significant association between oral candidiasis and CD4+ T-cell count. The prevalence of candida infection was significantly higher in patients with CD4+ cell counts less than 200 cells/ μ l. This is inline with previous report by Delgado *et al.* (2009) which showed that CD4+ T-cell counts <200 cells/ μ l were significantly more frequent in patients with oral candidiasis.

The present study used secondary data in which some important variables could have not been documented well. Laboratory results on candida diagnosis were not available during data collection. Also in our study we did not have data for the duration of ART use, which would have given a clear picture in associating occurrence of candida infection. Although our study was limited to secondary data and from only one health care facility, we report a high prevalence of oral candida infection among HIV patients in northern Tanzania. We have noted a significant association between oral candidiasis and CD4+ T-cell count.

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Competing Interests

No competing interest to declare

Authors' contributions

DCK designed the study, participated in data collection and designed the manuscript. GN participated in data collection, provided critical advice on data analysis and manuscript writing. MRM provided critical advice on data analysis and manuscript writing. JGM and JS reviewed files and participated in designing the manuscript. SM critically reviewed the manuscript.

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