

Patterns of head and neck lesions among HIV/AIDS patients on highly active antiretroviral therapy at Dodoma Regional Referral Hospital in Tanzania

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Abstract

Introduction: Head and neck lesions associated with Human Immunodeficiency Virus are considered to occur in over 50% of HIV- positive patients and occur in nearly 80% of all patients with acquired immunodeficiency syndrome. The introduction of highly active antiretroviral therapy has led to a remarkable reduction in the global burden of such lesions. Suppose such lesions are undiagnosed or untreated on a prompt basis. In that case, they may cause morbidity and mortality since some lesions, for example, head and neck cancers may interfere with vital functions of life such as respiration, deglutition, and speech. This study determined head and neck lesions among HIV/AIDS patients in Tanzania.

Methods: This was a hospital-based descriptive cross-sectional study that recruited 222 HIV/AIDS patients at a care and treatment clinic at Dodoma Regional Referral Hospital. Physical examination and laboratory investigations (histopathology, viral load and CD4 counts) were collected and data was analyzed using Statistical Package for Social Sciences (SPSS) version 23. P-value<0.05 was statistically significant.

Results: Of all the 222 patients recruited in this study, 26 (11.7%) had head and neck lesions. Most patients with head and neck lesions were females (57.6%). Half of the patients (50.0%) were between 40 and 59 years old. About 21 (80.8%) patients were diagnosed with HIV/AIDS within two years, and 22 (84.6%) were initially diagnosed with CD4 counts less than 200 cells/ μ L. The most common head and neck lesion was oral candidiasis (46.2%) and others were cervicofacial lymphadenitis (15.4%), head and neck squamous cell carcinoma (laryngeal and hypopharyngeal) (11.5%), sinonasal Kaposi's sarcoma (7.7%), odontogenic abscess (7.7%) and aphthous ulcers (7.7%) and the least encountered head and neck lesion was a ranula in 3.8% of patients. Similarly, a significant association was found between the occurrence of head and neck lesions with viral load, CD4 counts, duration since a patient was diagnosed with HIV/AIDS, presence of comorbid illness, alcohol consumption and cigarette smoking.

Conclusions: The prevalence of head and neck lesions among HIV/AIDS patients on HAART was low. Females outnumbered males in terms of being affected by head and neck lesions. Oral candidiasis was the most common head and neck lesion. Head and neck (laryngeal and hypopharyngeal) squamous cell carcinoma was the predominant subtype of malignant lesions in HIV/AIDS patients on HAART.

Keywords: Patterns; head and neck; lesions; HIV; AIDS; Tanzania

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Introduction

Head and neck lesions (H&N) occur more commonly in HIV-infected individuals and can predict the progression of HIV infection to AIDS (Masele et al., 2020). Regarding infection, oral candidiasis is the most common oral manifestation of AIDS with a prevalence of more than 70% among all head and neck lesions. Kaposi's sarcoma and non-Hodgkin's lymphoma have been classified as AIDS-related malignancies. However, with the introduction of highly active antiretroviral therapy (HAART), there has been a global reduction in the burden of head and neck lesions in adults and children (Tefera et al., 2019).

The introduction and recommendation of treatment for HIV/AIDS in the form of Antiretroviral Therapy especially combination therapy commonly known as Highly Active Antiretroviral Therapy, at least three antiviral drugs two of them are Nucleoside Reverse Transcriptase Inhibitors (NRTIs) with either a protease inhibitor or a Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs) have decreased the occurrence of head and neck lesions. They also help decrease viral load and increase CD4 count, which provides immunity against developing head and neck lesions (Ramirez-Crabtree et al., 2010).

In Tanzania, it was estimated that about 1.7 million people were living with HIV/AIDS (PLWH) with annual new HIV infections projected to be 68,000 cases (UNAIDS Data 2021).

HIV/AIDS has been the most typical cause of immunosuppression globally thus predisposing affected individuals to various diseases including head and neck cancers which are sometimes deleterious as they may interfere with vital functions of life such as respiration, phonation, and deglutition (Masele et al., 2020; Abraham et al., 2020; Abraham et al., 2018).

Another study from India found the following oral lesions in patients with HIV/AIDS;

pseudomembranous candidiasis (34.6%), erythematous candidiasis (15.4%), oral herpes (13.5%), oral hairy leukoplakia (7.7%), gingivitis (15.4%), hyperpigmentation (17.3%) and dry mouth (23.1%) (Rajan & Kannan, 2019).

A study done in Dar es Salaam at a counselling and treatment centre showed that 29% of the participants had at least one oral lesion associated with HIV/AIDS where 11.5% was herpes simplex, 7.5% for oral candidiasis, 4% for oral hairy leukoplakia, 3.5% for Kaposi's sarcoma and 0.5% for angular cheilitis (Mwangosi & Tillya, 2012).

A study that was conducted in the Department of Oral and Maxillofacial Surgery at Muhimbili National Hospital in Tanzania found the following oral lesions; oral candidiasis (25.5%), osteomyelitis of the jaw (5.5%), odontogenic abscess (3.6%), oropharyngeal squamous cell carcinoma (14.5%), aphthous ulcers (3.6%), ranula (3.6%). Other head and neck lesions in HIV/AIDS patients in this study included Kaposi's sarcoma (10.9%), non-Hodgkin lymphoma (10.9%), mucoepidermoid carcinoma (3.6%), fibrosarcoma (1.8%), osteomyelitis of the jaw (5.5%), cervicofacial lymphadenitis (9.1%), ossifying fibroma (1.8%) and lipoma (1.8%) (Masele et al., 2020). On the other hand, a study done at the same national hospital in the department of otorhinolaryngology found the following sinonasal lesions; adenoid hypertrophy (1.5%), nasopharyngeal cancer (2.3%) and sinonasal cancer (3.8%). Other head and neck lesions included chronic suppurative otitis media (22.1%) and necrotizing otitis externa (2.3%) (Swai, 2011).

A study done in Tanzania found HIV/AIDS patients to be at an increased risk of developing various viral-induced cancers, including Kaposi's sarcoma, Burkitt's lymphoma, and primary central nervous system lymphoma. Kaposi's sarcoma was the most common cancer, occurring in 10% to 20% of people with HIV/AIDS. The second-most

common cancer is lymphoma, which is the cause of death in nearly 16% of people with AIDS and is the initial sign of AIDS in 3% to 4% of people living with HIV/AIDS. Both cancers are associated with Human Herpesvirus 8 (HHV-8) (Kapesa et al., 2018).

A study from Northwestern Tanzania at Kilimanjaro Medical Christian Centre, which is the largest zonal hospital in the Western zone, found the following ontological lesions: chronic suppurative otitis media (3%) and otitis externa (1%), adenoid hypertrophy (1%) (Shija et al., 2020).

Determining head and neck lesions in patients with HIV/AIDS is of paramount importance since prompt diagnosis and consequent management of such lesions have a remarkable role in improving the quality of life of HIV/AIDS patients. Suppose such lesions are undiagnosed or untreated on a prompt basis. In that case, they may cause significant morbidity and mortality since some lesions, for example, head and neck cancers may interfere with vital functions of life such as respiration, deglutition, and speech. (Abraham et al., 2018; Abraham et al., 2020)

So far head and neck lesions among patients with HIV/AIDS on HAART have not been adequately studied. Thus, this study aimed to address such an existing gap by determining the prevalence and characterization of head and neck lesions among HIV/AIDS patients on HAART attending the care and treatment clinic at Dodoma Regional Referral Hospital.

Methods

Study design and study duration.

It was a hospital-based cross-sectional study underpinned with a quantitative approach to determine the patterns of head and neck lesions among HIV/AIDS patients on HAART attending the care and treatment clinic (CTC) at Dodoma Regional Referral Hospital. Data

was collected from November 2022 to March 2023.

Sampling technique, sample size and study population

Consecutive sampling techniques were utilized to recruit two hundred and twenty-two patients upon consenting to participate. In this sampling technique, every subject who met the inclusion criteria was selected until the desired sample size was achieved. The study population was patients aged 1-69 years.

The study sample size was estimated using Kish Leslie formula (1965) for a cross-sectional study considering the proportion of HIV/AIDS patients with head and neck lesions as 15.9% in a study that was conducted at Muhimbili National Hospital, Tanzania (Masele et al., 2020). The minimum sample size was 205 participants; considering the 5% non-response rate, we obtained a sample of 228 participants though only 222 were recruited in this study.

Inclusion criteria

HIV/AIDS patients on HAART attended care and treatment clinics and consented to participate.

Exclusion criteria

Those who were mentally unfit to consent to participation and those aged under 18 years whose caregivers/parents were not ready to consent on their behalf so that they could be recruited.

Recruitment methods

The principal investigator was positioned at the selected CTC, and patients attended on an outpatient basis were selected until the desired sample size of 222 patients was attained.

Data collection tools

A structured questionnaire adapted from previously published studies and modified to fit the current study was used to collect data (Masele et al., 2020; Shija et al., 2020). The first version was prepared in English and the final

draft was translated to Swahili since the study participants in the chosen study area were more conversant with Kiswahili. The questionnaire comprised the following parts: (i) Socio-demographic characteristics of study participants, (ii) Information on HIV/AIDS status and associated factors, and (iii) Occurrence of head and neck lesions among HIV/AIDS patients on HAART. The questionnaire comprised both open and closed-ended questions. When participants encountered difficulties interpreting the set questions the principal investigator assisted them. The procedure included self-introduction by the principal researcher, introduction of the topic and purpose of the study. The researcher then requested their participation in the study. Participants were assured of free participation and withdrawal from the study at any time if they wished to do so. Validity was ensured by reviewing the literature and pilot testing the instrument prior to the study by involving 10% of the sample size from the health facility and those excluded during the commencement of actual data collection.

Measurement of variables

Dependent variables: The dependent variable for the study was (i) Head and neck lesions among HIV/AIDS patients on HAART.

Independent variables: The independent variables for the study were the socio-demographic characteristics and HIV/AIDS status of the study participants.

Results

Socio-demographic characteristics and disease duration profile of the study participants

222 patients were recruited in this study, most of whom were from urban areas (n=128,57.7%) while those from rural areas were (n=94,42.3%). Females (n=122, 55.0%) predominated the study than males

Data processing and analysis

The collected data were cleaned and analyzed using the SPSS version 23 software package. Categorical variables were expressed as frequencies and proportions, continuous variables as means, and standard mean error. The Chi-square test was used to ascertain the association between independent (socio-demographic characteristics and HIV/AIDS status of the study participants) and dependent factors (occurrence of head and neck lesions). All the independent variables with p-values <0.05 were considered statistically significant.

Ethical considerations

The Directorate of Research, Publication and Consultancy of the University of Dodoma approved ethical clearance dated 26th September 2022, with an approval number MA.84/261/02/. Furthermore, permission to collect data at the selected health facility was obtained from the District Medical Officer. Both verbal and written individual informed consent was obtained from the study participants after they were fully informed about the study goals and the involved process. Participants were assured privacy and confidentiality. Anonymity was maintained using code numbers on the questionnaire instead of the participant's name. The participant had absolute freedom and the right to withdraw from the study anytime.

(n=100,45.0%) with a male-to-female ratio of 1:2.5. Over 86% (n=191) of the patients were aged between 20 and 59 years and the last age group was of <20 years (n=11,5%) with the mean age of 40.94 years. Most (n=119, 56.3%) of the patients were self-employed and about (n=50,22.5%) had no employment. Also, most participants had a primary level of education (n=72,32.4%), and only (n=34, 19.3%) had a

university/college level of education. More than half of them (n=140,63.1%) were married. About 55.9% (n=124) were diagnosed with HIV/AIDS for less than two years by the time of the study. More than half of the participants

(n=171,79.7%) were initially diagnosed to have CD4 counts of more than 200 cells/ μ L, and also 92.3%(n=205) had a viral load of more than 1000 copies at diagnosis. (Table 1)

Table 1: Socio-demographic characteristics of the participants and disease duration profile (N= 222)

	Sub variable	Frequency/n (%)
Gender	Male	100 (45.0)
	Female	122 (55.0)
Age (years)	0-19	11 (5.0)
	20-39	95 (42.8)
	40-59	96 (43.2)
	60-79	20 (9.0)
Marital status	Married,	140 (63.1)
	Widowed,	23 (10.4)
	Divorced,	11 (5.0)
	Cohabiting	5 (2.3)
	Single	38 (17.1)
	Others	5 (2.3)
Educational level	Non-formal	47 (21.2)
	Primary	72 (32.4)
	Secondary	69 (31.1)
	University/college	34 (19.3)
Occupation	Employed	53 (23.9)
	Self employed	119 (53.6)
	Unemployed	50 (22.5)
Residence	Urban area	128 (57.7)
	Rural area	94 (42.3)
Duration since being diagnosed to have HIV/AIDS (years)	>2	98 (44.1)
	<2	124 (55.9)
CD4 count when diagnosed to have HIV/AIDS (cells/μL)	>200	177 (79.7)
	<200	45 (20.3)
Viral load when diagnosed with HIV/AIDS	>1000	205 (92.3)
	<1000	17 (7.7)

Prevalence of head and neck lesions, socio-demographic characteristics, and disease duration profile of HIV/AIDS patients on HAART and with head and neck lesions

A total of 26 (11.7%) patients had head and neck lesions. (Figure 1) Among patients with head and neck lesions, 15 females (57.6%) had H&N lesions than 11 males (42.4%). Half of them, 13 (50%), were aged 40 to 59 years, with the less

affected age group being 0 to 19 years, 2 (7.7%). On the other hand, 15 (57.7%) of the patients with H&N were from rural areas, and 13 (50%) had partners. On the other hand, 21 (80.8%) of the patients with H&N lesions were diagnosed to have HIV/AIDS within two years by the time the study was conducted, and 22 (84.6%) patients were initially diagnosed to have CD4 counts less than 200 cells/ μ L. (Table 2)

Figure 1: Prevalence of head and neck lesions among HIV/AIDS patients on HAART

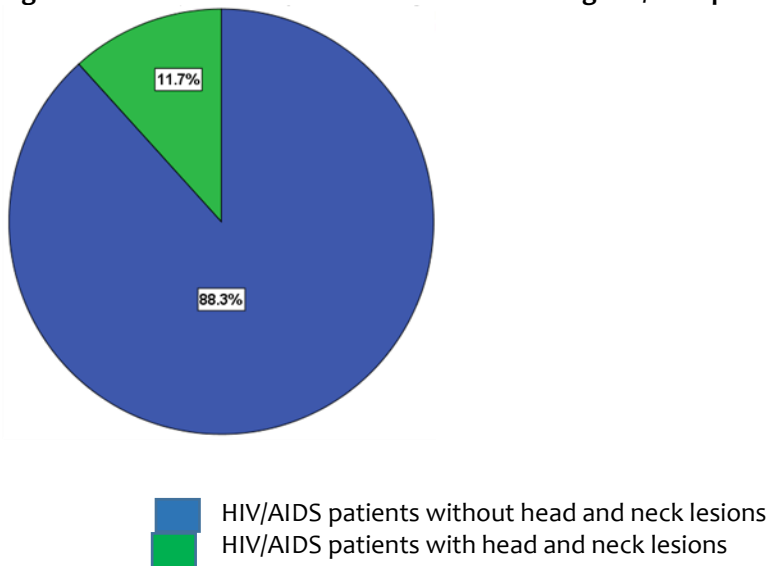


Table 2: Socio-demographic characteristics and disease duration profile of HIV/AIDS patients with head and neck lesions and on HAART, (N=26)

Variable	Sub- variable	Frequency, n(%)
Sex	Female	15 (57.6)
	Male	11 (42.4)
Age (years)	0-19	2 (7.7)
	20-39	7 (26.9)
	40-59	13 (50.0)
	60-79	4 (15.4)
Residence	Urban area	11 (42.3)
	Rural area	15 (57.7)
Marital status	With partner	13 (50.0)
	Without partner	13 (50.0)
Duration since diagnosis of HIV/AIDS (years)	>2	5 (19.2)
	<2	21 (80.8)
CD4 count when diagnosed with HIV/AIDS (cells/ μ L)	<200	22 (84.6)
	>200	4 (15.4)

Anatomical location for head and neck lesions and their specified aetiology among HIV/AIDS patients on HAART

About 20 (77%) of head and neck lesions were found in the mouth/oral cavity, 5 (19.2%) around the neck and 1 (3.8%) lesion was found in the oropharynx. There were 14 (53.8%) patients with infectious processes as the predominant

specified aetiology for head and neck lesions, 5 (19.3%) had malignant lesions, 5 (19.3%) had inflammatory lesions, and 1 (3.8%) had benign lesions. (Table 3)

Table 3: Anatomical location for head and neck lesions and their specified aetiology among HIV/AIDS patients on HAART, N=26

Anatomical location for the lesion	Frequency, n (%)	Specified aetiology for head and neck lesions	Frequency, n (%)
Oral cavity (mouth)	20 (77)	Infectious process	14 (53.8)
Neck(larynx+hypopharynx)	5 (19.2)	Malignant lesions	5 (19.3)
Oropharynx	1 (3.8)	Inflammatory conditions	5 (19.3)
Total	26 (100)	Benign lesions	1 (3.8)
		Others	1 (3.8)
		Total	26 (100)

Specific head and neck lesions among HIV/AIDS patients on HAART

Regarding specific head and neck lesions among HIV/AIDS patients on HAART, 12 (46.2%)

patients had oral candidiasis, and it was the predominant head and neck lesion, and the least encountered lesion was ranula and was found in 1 (3.8%) patient. (Table 4).

Table 4: Specific head and neck lesions among HIV/AIDS patients on HAART, N=26

Specific head and neck lesions	Frequency, n (%)
Oral candidiasis	12 (46.2)
Cervicofacial lymphadenitis	4 (15.4)
Head and neck squamous cell carcinoma (larynx+hypopharynx)	3 (11.5)
Sinonasal Kaposi's sarcoma	2 (7.7)
Odontogenic abscess	2 (7.7)
Aphthous ulcers	2 (7.7)
Ranula	1 (3.8)

The association between occurrence of head and neck lesions and socio-demographic characteristics of HIV/AIDS patients on HAART

There is a statistically significant association between the occurrence of head and neck lesions and some socio-demographic characteristics of the study participants, such

as level of education (P value=0.000) and occupation (P=0.026). On the other hand, there was no statistically significant association between the occurrence of head and neck lesions and patients' age, gender, marital status and type of residence (p-value>0.05) (Table 5).

Table 5: Association between sociodemographic characteristics and occurrence of head and neck lesions among HIV/AIDS patients on HAART

Variable	Sub-variables	Occurrence of H&N lesions		p-value
		No (n=196) (%)	Yes (n=26) (%)	
Gender	Female	107 (87.7)	15 (12.3)	0.765
	Male	89 (89.0)	11 (11.0)	
Age (years)	0-19	9 (81.8)	2 (18.2)	0.267
	20-39	89 (90.6)	7 (9.4)	
	40-59	82 (86.3)	13 (13.7)	
	60-79	16 (80.0)	4 (20.0)	
Marital status	Married	127 (90.7)	13 (9.3)	0.555
	Widowed	19 (82.6)	4 (17.3)	
	Divorced	9 (81.8)	2 (18.2)	
	Cohabiting	5 (100.0)	0 (0.0)	
	Single	32 (84.2)	6 (15.8)	
	Others	4 (80.0)	1 (20.0)	
Level of education	Non-formal	36 (76.6)	11 (23.4)	0.000
	Primary	60 (83.3)	12 (16.3)	
	Secondary	66 (95.7)	3 (4.3)	
	University/college	34 (100)	0 (0.0)	
	Self-employed	103(86.6)	16 (13.4)	
	Unemployed	41(82.0)	9(18)	
Residence	Urban	117(69.4)	11(30.6)	0.092
	Rural	79(81.8)	15 (18.2)	

Association between the occurrence of head and neck lesions and associated factors among HIV/AIDS patients on HAART

There was a statistically significant association between the occurrence of head and neck lesions and various associated factors. Among the factors is the CD4 count of HIV/AIDS patients on diagnosis with (a p-value of 0.000). Another association of significance was the

duration since being diagnosed with HIV/AIDS (p-value of 0.005), which mainly occurred in those diagnosed with HIV/AIDS in less than two years by the time the study was conducted. Other factors associated were viral load on diagnosis, alcohol consumption, cigarette smoking and frequency of using ARTs (P-values < 0.05) (**Table 6**)

Table 6: Association between the occurrence of head and neck lesions and other associated factors among HIV/AIDS patients

Variable	Sub-variables	Occurrence of H&N lesions		p-value
		No(n=196) (%)	Yes(n=26)(%)	
CD4 count on diagnosis of HIV/AIDS (cells/ μ L)	<200 >200	23 (51.1) 173 (97.7)	22 (48.9) 4 (2.3)	0.000
Duration since being diagnosed with HIV/AIDS (years)	<2 >2	103 (83.0) 93 (94.9)	21 (17.0) 5 (5.1)	0.05
Viral load on diagnosis of HIV/AIDS	<1000 >1000	192 (93.7) 4 (23.5)	13 (6.3) 13 (76.5)	0.000
Presence of other comorbid illness/chronic illness	No Yes	181 (91.4) 15 (62.5)	17 (8.6) 9 (37.5)	0.000
Alcohol consumption	No Yes	151 (96.2) 45 (69.2)	6 (3.8) 20 (30.8)	0.000
Cigarette smoking	No Yes	181 (90.5) 15 (68.2)	19 (9.5) 7 (31.8)	0.002
Having treatment partner	No Yes	12 (66.7) 184 (90.2)	6 (33.3) 20 (9.8)	0.009
Frequency of using ART	Everyday Some days	167(94.4) 29 (64.4)	10 (5.6) 16 (35.6)	0.000

Discussion

Head and neck lesions are commonly encountered in HIV/AIDS patients and the advent of HAART is expected to reduce the burden and manifestation of such lesions. Data remains scarce on whether patients with HIV/AIDS on HAART remain susceptible to head and neck lesions. There is not any study on head and neck lesions that has been conducted in central Tanzania despite the significant number of HIV/AIDS patients attending various

care and treatment clinics to receive ARTs. This study aimed to address such a gap by being the first study of its type in central Tanzania.

In this study, most participants were females (55%) aged between 1 and 69. Most participants (86%) were aged 20 to 59 years. These findings were like those reported in the study from Tanzania in which 71.1% of participants were females and over 92.5% were aged between 20 to 59 years (Masele et al., 2020). The mean age of patients was 40.94

years, higher than reported in Nigeria, where the mean age was 35 (Eweka et al., 2012). Another study from Kenya reported the mean age of participants being 37 years (Butt et al., 2008). The similarity in the findings may be due to the same study design utilized in the studies under comparison.

In our study, 11.7% of patients with HIV/AIDS had lesions in the head and neck region. These findings were much lower than what was depicted in a study done in Tanzania where the prevalence was 16% (Masele et al., 2020); in Kenya, the reported prevalence of head and neck lesions was 27% (Butt et al., 2008) and another study that was conducted in Venezuela reported 85% of the study participants to be affected by head and neck lesions (Bravo et al., 2006). The lower prevalence of head and neck lesions among HIV/AIDS patients in this study may be due to the use of HAART by our study participants, which provides the benefit of decreasing plasma viral load and increasing CD4 counts, thus reducing the prevalence of head and neck lesions.

Most of the participants in this study with head and neck lesions (86.4%) and considerably low CD4 counts (less than 200 cells/ μ L) were more susceptible to developing head and neck lesions than those with CD4 counts greater than 200 cells/ μ L. These findings were like those from the study done in Tanzania where more than 60% of patients with head and neck lesions had CD4 count <200 cells/ μ L (Masele et al., 2020). On the other hand, these findings were contrary to those reported in a study from Iran, which reported 95% of the lesions to have occurred in participants with a CD4 count of less than 350 cells/ μ L (Saravani et al., 2017). Patients with such lower CD4 counts are severely immune-compromised, and thus, there is an increased risk and severity of opportunistic infections and AIDS-defining malignancies (Cobucci et al., 2015).

About the anatomical location of head and neck lesions among HIV/AIDS patients on HAART, the most standard site noted in this study was the oral cavity/mouth in about 77% of the study participants and this was similar to what has been reported in the study conducted in Ghana where the mouth/oral cavity was the most everyday involved site in 48.2% of the cases (Opoku-Buabeng & Dompok, 2012) contrary to another study conducted in Europe which reported the most familiar location to be the oropharynx in 19.38% of cases (Haase et al., 2021).

On the other hand, about 53.7% of the lesions in patients recruited in this study were of infectious cause. These findings were dissimilar to those from another study in Tanzania, where the typical group of head and neck lesions was the malignant process in 44.8% of cases (Masele et al., 2020).

The most common lesion in this study was oral candidiasis occurring in 46.2% of the patients with head and neck lesions and was also observed in 84.6% of patients with CD4 counts <200 cells/ μ L. The above study findings were similar to a study done in Tanzania, whereby 78% had oral candidiasis (Masele et al., 2020) and also similar to another study conducted in Iran that reported the most joint lesions to be oral candidiasis by 48% (Saravani et al., 2017). Similar findings can be depicted from the study done in Nigeria that reported about 47.7% of participants had oral candidiasis, which was the typical lesion (Eweka et al., 2012). Such resemblance in the studies under comparison may be because oral candidiasis is one of the most common opportunistic infections associated with HIV infection, whose manifestations are related to the depressed level of immunity (Qanche et al., 2021).

The most common head and neck malignancy in this study was head and neck squamous cell carcinoma (11.5%), which does not belong to the group of AIDS-defining

illnesses that includes Kaposi's sarcoma (Cobucci et al., 2015). This has been linked to low immunity (immunosuppression) in the patients. Also, it can be explained by the role played by Human Papillomavirus (HPV) in causing HNSCC since its prevalence is increased in patients with HIV/AIDS (Beachler & D'Souza, 2013). However, the above findings were similar to those from the study done in America, where about 50% of patients with HIV/AIDS had head and neck squamous cell carcinoma, and the typical site was the oropharynx (Haase et al., 2021).

Dissimilar findings can be depicted from the study done in New York where Kaposi's sarcoma was the most familiar head and neck cancer in 49.7% of cases (Singh, 1999) and another study in Kenya which reported Kaposi's sarcoma to be the most joint head and neck cancer in 68% of studied patients (Butt et al., 2008). Such similarity may be due to Human herpesvirus-8 (HHV-8) being the most ordinarily implicated virus in cancer causation in immunocompromised patients. It has been reported that oral, craniofacial and cutaneous manifestations of AIDS-related Kaposi's sarcoma are relatively common, occurring in around 20% of patients affected by the disease (Agaimy et al., 2017). This is contrary to the findings from this study, which found that the prevalence of KS was relatively low (7.7%). The low prevalence of KS in this study may be attributed to the use of HAART, as randomized clinical trials have shown a protective effect of HAART against the development of KS, even in patients with relatively low immune status (Hoffman et al., 2017).

Moreover, several factors were reported to be associated with the occurrence of head and neck lesions including the duration since one is diagnosed to have HIV/AIDS. In this study from Dodoma, Tanzania, the duration since patients were diagnosed with HIV/AIDS was found to exhibit a similar relationship with the occurrence of head and neck lesions where

80.8% of these lesions occurred in those diagnosed to have HIV/AIDS in less than two years and 84.6% of the lesions occurred in those diagnosed to have CD4 counts less than 200 cells/ μ L and also 76.5% of the lesions occurred in patients with viral load greater than 1000 copies on diagnosis. The above findings were similar to those reported in a study from Tanzania, which reported age, CD4 count and duration since being diagnosed with HIV/AIDS were the risk factors that influence the occurrence of head and neck lesions among patients with HIV/AIDS (Masele et al., 2020). Other factors that were found to increase the occurrence of head and neck lesions in this study were the presence of comorbid illnesses such as diabetes mellitus, alcohol consumption and cigarette smoking, frequency of ART consumption and those without treatment partners. These findings were similar to those reported in various studies which reported alcohol consumption and cigarette smoking to be fundamental in causing the severity of the disease (Mmbaga, 2013) and also similar to what was reported in a study from China which reported the presence of comorbid illnesses like diabetes mellitus to increase susceptibility to the occurrence of head and neck lesions by 76.5% (Chen et al., 2015).

Regarding the study limitation, the study was conducted at a single health facility, and therefore, results cannot be generalizable to HIV/AIDS patients countrywide.

Conclusion

The prevalence of head and neck lesions among HIV/AIDS patients on HAART in this study was low. The low prevalence may have been attributed to the use of highly active antiretroviral therapy by all the study participants, which decreased plasma viral load and increased plasma CD4 counts. Oral candidiasis was the most joint head and neck lesions that belonged to the group of

opportunistic infections and was in line with what was expected among patients with remarkably lower CD4 counts and higher viral load since most patients with head and neck lesions had CD4 levels below 200 cells/ μ L and viral load of greater than 1000copies. Pertaining head and neck cancers, head, and neck squamous cell carcinoma (laryngeal and hypopharyngeal cancers) was the predominant subtype of the malignant lesions. On the other hand, a significant association was found between the occurrence of head and neck lesions with viral load, CD4 counts, duration since a patient was diagnosed with HIV/AIDS, presence of comorbid illness, alcohol consumption and cigarette smoking.

Authors' contributions

ZSA, IYD and AAK contributed to the

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conceptualization, data collection, and analysis study. ZSA, IYD and AAK were involved in manuscript preparation. ZSA and AAK profoundly reviewed the manuscript.

Declaration of competing interests

The authors declare no further conflicts of interest.

Funding source

This research received no specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Acknowledgements

The authors acknowledge Dodoma Regional Referral Hospital for providing a favorable environment for conducting the study and for the recruited patients for enabling the data collection process to be successful.

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