Assessing the Level of Oral Manifestations in HIV-Infected Patients on Antiretroviral Therapy in Kintampo Municipal Hospital

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Abstract— One of the early symptoms of HIV infection are the oral lesions, which may predict the progression to acquired immunodeficiency syndrome (AIDS). These lesions are considered to affect the individual's productivity and general quality of life. This research examined the prevalence of oral manifestations in HIV-infected patients attending antiretroviral therapy clinic at the Kintampo Municipal Hospital in the Bono East Region of Ghana. The prevalence of oral manifestations among the study participants was 11.95%. Gingivitis recorded the highest prevalence (6.10%). The odds ratios for gender against all the predisposing factors were all greater than one, showing that the factors had a possibility of predisposing the respondents to oral manifestations. Consumption of medications and lifestyle had a statistically significant relation with oral lesions with values (χ^2=12.941, P-value=0.01) and the relationship between lifestyle and the presence of oral lesions (χ^2=48.375, P-value=0.000) respectively. With the effect on the quality of life, 26.70% of the population complained of pain and discomfort. The study recommends that routine oral health care be added to HIV infected individuals' line of treatment with regular oral health education. Lastly, it is recommended that further studies be conducted into oral manifestation among HIV infected individuals using a longitudinal study. This would increase understanding of the subject matter and inform proper policy decisions.

Index Terms— Oral Manifestations, Oral Health Quality of Life, People Living with HIV/AIDS, Antiretroviral Therapy

I. INTRODUCTION

The global impact of human immunodeficiency virus (HIV) has posed major health problems in most populations when the first reports were published (Eisinger & Fauci, 2018). Human immunodeficiency virus (HIV) attacks and targets immune cells. According to Kapila et al. (2016) this viral infection may result in the emergence of a collection of signs and symptoms known as acquired immunodeficiency syndrome (AIDS).

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Its interference with the immune system makes persons with AIDS more susceptible to illnesses that might not affect healthy people's immune systems, such as opportunistic infections and tumors.

According to Oladejo & John (2017) sexual contact (oral, vaginal, or anal), blood transfusion, shared hypodermic needles, and vertical transmission through breastfeeding are all possible pathways for HIV infection. HIV/AIDS has its primary site of infection in humans specifically their immune cells, resulting in a compromised immunity and predisposition to various opportunistic infections.

Chaiyachati et al. (2014) intimates that measures to curb the disease such as technologies to produce Antiretroviral Therapy (ART) has improved substantially in the past three decades since the outbreak making the illness chronic and lowering mortality rates drastically.

Nearly 38 million people are infected with HIV globally according to UNAIDS (2020), with an average incidence of 1.7 million. Among those with the disease, 36.2 million being adults and 1.8 million infants. At the end of 2019, 67 percent of HIV persons had access to antiretroviral treatment. Low- and middle-income countries are home to the most people with HIV. In western and central Africa, 4.9 million (13%) of people have HIV, second only to eastern and southern Africa (20.7 million). Ghana reports about 20,000 new cases with HIV/AIDS accounting for about 13,000 deaths.

Mitchell et al (2019) explains that with a classical syndromic disease such as HIV/AIDS, oral diseases, are among the early warning signs of the viral infection and may even predict the prognosis of the acquired immunodeficiency syndrome (AIDS). Oral warts, hairy leucoplakia, oral thrush, cancer sores and gum disease are the most common oral lesions that manifest in the oral cavity of an HIV infected person (Ranganathan & Umadevi, 2019). Invariably, Evans and Stoddart (2017) intimates that these lesions create discomfort while feeding, resting, and engaging in social contact to the already weakened immune system; this influences their self-esteem.

A study conducted by Frimpong et al. (2017) in the Bono and Ashanti region revealed that the rate of oral diseases due to HIV infection was increasing at an alarming rate, with patients presenting with more than one oral lesion from their examination findings. For instance, the Annual Report, KMOTSC (2019) showed that four out of every five HIV-infected patients, attending the dental clinic reported with a complaint of lesions in the oral cavity that had an impact on their well-being, such as pain, inability to eat efficiently,

properly engage with others, and, worst of all, leading to morbidity and mortality. The dilemma is that, to what extent are the oral lesions common, and what predisposing factors apart from retro infection cause these lesions and what is the overall effect of the oral lesions on the well-being of the patients at Kintampo Municipal Hospital.

There is limited research on HIV's influence on the mouth, which can lead to a variety of lesions that can be harmful to the health of people living with Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome (PLWHA). Therefore, this study seeks to determine the level of Oral Manifestations and its effect on HIV-infected patients at the Kintampo Municipal Hospital.

II. METHODOLOGY

A. Study Area
The study was carried out in Kintampo, the capital of the Kintampo North Municipality in the Bono East region of Ghana. Kintampo connects the southern part of Ghana to the northern enclaves. It shares boundaries with other districts such as the Kintampo south district to the south, Bole district to the west, Pru district to south east, East Gonja district to north east and Central Gonja district to the north.

B. Study Population
The study population consisted of all patients who were receiving ART at the Kintampo Municipal Hospital from September 2020 to September 2021.

C. Study Design
This was a descriptive quantitative cross-sectional study conducted among two hundred and thirty-six (236) patients visiting the ART clinic of the Kintampo Municipal Hospital (KMH) in the Bono East region of Ghana.

D. Sampling and Sample size determination
To select the respondents, a convenient sampling approach was used. This was done in collaboration with the staff in charge of registration of the patients at the ART clinic of the Kintampo Municipal Hospital. The sample size was Two Hundred and Thirty-Six (236) participants.

E. Data Collection Tool and Procedure

A four-part questionnaire was used to gather data. The first part captured the sociodemographic characteristics such as; age, gender, marital status and level of education. The second part covered the oral manifestations in the PLWHA. This was done by training and calibrating a five (5) member team, made up of two (2) registered Dental surgery assistants, one (1) dental therapist and two (2) dental surgeons. They were taught how to examine, elicit signs and detect the various oral lesions and they were to seek for confirmation from a senior member of the team if they had any doubt with the signs they were seeing. Examination was done with patient sitting under a direct source of daytime light complemented with artificial light source for easy visibility.

The third and the fourth part of the questionnaire assessed the predisposing factors of the oral manifestations and the effects of the oral manifestation on the overall well-being of the patients.

The inclusion criteria were patients diagnosed of HIV who were receiving treatment at the ART clinic and who consented to take part in the research study. The exclusion criteria were patients who were too ill to participate in the research and those who were on a short course of treatment for Post Exposure Prophylaxis (PEP)

F. Data Analysis
The data was input into a spreadsheet program (Microsoft Excel 2016), and analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 25.0. and Jamovi. Descriptive statistics tool was used to summarize different variables (frequencies and means) and presented in the form of tables for the demographic data, prevalence of oral manifestations in HIV-infected patients, the predisposing factors of the Oral Manifestations, and the effects of the Oral Manifestation on the overall well-being of the patients. Association of the independent variables with prevalence, predisposing factors and over all wellbeing was assessed with a confidence interval of 95%. To detect the strength of association, a p-vale of <0.05 was considered significant.

III. RESULTS

Table 1: Demographic Characteristics and Oral Manifestation

Variable	Category	Frequency (Percentage)
Age (38.76+7.6)	16-25 (22.75)	11(4.662)
	26-35 (31.34)	69(29.24)
	36-45 (40.51)	111(47.03)
	46-55 (45.55)	45(19.07)
Gender	Male	43(18.22)
	Female	193(81.78)
Marital Status	Single	91(38.56)
	Married	139(58.90)
	Divorced	6(2.54)
Level of Education	None	89(37.71)
	Primary	94(39.83)
	Secondary	45(19.07)
	Tertiary	8(3.39)

Source: Field Data, 2021

From Table 1, a total of 81.78% females and 18.22% male participants took part in the study with an average age of 28.76 years.

Table 2: Level of Prevalence of Oral Manifestations among the Respondents

Oral Manifestations	N	Prevalence Rate
Aphthous Ulcers	36	15.3
Angular Cheilitis	11	4.7
Pseudomembranous Candidiasis	47	19.9
Erythematous Candidiasis	16	6.8
Linear Gingival Erythema	15	6.4
Necrotizing Ulcerative Gingivitis	4	1.7
Gingivitis	144	61.0
Oral and Perioral Pigmentation	9	3.8
Total	**282**	**11.95**

Source: Field Data, 2021

From Table 2, the overall prevalence of oral manifestations was 11.95%. Gingivitis showed the highest prevalence with 6.10%.

Table 3: Association between Predisposing Factors and Oral Manifestations

Predisposing factor	N	χ^2	P-value	OR
Medications/drugs	28	1.62	0.20	1.67
Oral trauma	18	1.93	.099	1.63
Other infections	2	1.289	0.26	1.04
Chronic disease	12	2.45	0.04	1.12
Nutritional deficiencies	14	0.68	0.41	0.61
Lifestyle	22	1.23	0.27	1.64

Source: Field Data, 2021, $\chi 2$: Pearson's chi-square value. %: column percentage. *p<0.05

From Table 3, Association between oral manifestations and chronic diseases showed a significant relation (χ^2=2.45, P-value =0.04).

Table 4.1 Effect of Oral Manifestations on the Quality of Life (Pain, Chewing and Swallowing)

Oral Manifestation	Pain/Discomfort		Difficulty chewing		Difficulty swallowing	
	P	CI	P	CI	P	CI
Aphthous Ulcers	0.028	0.198-1.27	0.048	0.165-1.21	0.045	0.915-.954
Angular Cheilitis	0.40	0.126-2.48	0.46	0.141-3.19	0.431	0.891-.960
Pseudomembranous Candidiasis	0.357	.599- .452	0.50	0.45-1.96	0.111	0.030-1.819
Erythematous Candidiasis	0.230	.597-4.933	0.171	0.672-5.59	0.677	0.105-6.853
Linear Gingival Erythema	0.631	.306-3.258	0.473	0.205-2.77	0.705	0.113-7.411
Necrotizing Ulcerative Gingivitis	0.286	.673-.788	0.321	0.696-.808	0.260	0.442-45.76
Gingivitis	0.037	.636-2.095	0.036	0.633-2.16	0.519	0.332-2.472
Oral and Perioral Pigmentation	0.552	.157-3.846	0.613	0.176-4.322	0.504	0.891-.960

Source: Field Data, 2021, $\chi 2$: Pearson's chi-square value. %: column percentage. *p<0.05

From Table 4.1, in the determination of the association between the oral manifestations and the quality of life (pain, chewing and swallowing), there was degree of significance between aphthous ulcerations against pain/discomfort, difficulty chewing and difficulty swallowing (*p*-value =0.028), (*p*-value =0.048) and (*p*-value =0.045) respectively. Likewise, gingivitis also

showed a level of statistical significance with pain and difficulty in swallowing (*p*-value =0.037) and (*p*-value =0.036) respectively.

4.2. Effect of Oral Manifestations on the Quality of Life (Speech and Self-esteem)

Oral manifestations	Difficulty with Speech		Social (Self-esteem)	
	P	*CI*	*P*	*CI*
Aphthous Ulcers	0.270	0.203-1.84	0.032	0.117-1.027
Angular Cheilitis	0.55	0.242-5.63	0.208	0.038-2.410
Pseudomembranous Candidiasis	0.181	0.207-1.530	0.325	0.612-2.596
Erythematous Candidiasis	0.492	0.330-4.50	0.336	0.488-4.420
Linear Gingival Erythema	0.269	0.045-2.79	0.489	0.210-2.84
Necrotizing Ulcerative Gingivitis	0.123	0.743-39.90	0.328	0.701-.812
Gingivitis	0.398	0.423-1.733	0.0413	0.609-2.086
Oral and Perioral Pigmentation	0.200	0.785-.883	0.625	0.180-4.428

Source: Field Data, 2021, $\chi 2$: Pearson's chi-square value. %: column percentage. *p<0.05

From table 4.2, in the determination of the association between the oral manifestations and the quality of life (speech and self-esteem) aphthous ulcerations showed a degree of significance against self-esteem (*p*-value =0.032). Likewise, gingivitis also showed some level of statistical significance with self-esteem (*p*-value =0.0413).

IV. DISCUSSION

A. Prevalence of HIV Oral Manifestations

About 50-80% of people living with HIV/AIDS (PLWHA) develop oral manifestations which are the most important and earliest signs of AIDS disease progression (Pakfetrat et al., 2015). But the advent of antiretrovirals has seen a significant drop in oral manifestations in PLWHA. An observation that is limited to the developed countries leaving developing ones behind attributed to multiple barriers to oral health access (El Howati & Tappuni, 2018). This suggest that understanding these barriers and how PLWHA cope with the oral manifestations could help in deploying tailor-cut solutions to resource-limited localities.

The prevalence of oral lesions was 11.95%. In sub-Saharan Africa, Pakfetrat et al., (2015) reported a prevalence rate of 10.1 %, compared to this study which was conducted in Ghana, a country found in sub-Saharan belt with almost similar demographics. A study in Uganda by Agwu et al (2016) reported a prevalence rate of oral lesions to be 13.2%.

Gingivitis (6.10%) was found in this study to be the most notable oral manifestations, which is different from Nouaman et al. (2015) findings in Cote d'Ivoire where pseudomembranous candidiasis was the most prevalent in HIV-infected individuals. Similarly, Nugraha et al. (2018) also identified pseudomembranous candidiasis to be the most represented in their study that involved three West African countries; Senegal, Cote d'Ivoire and Mali.

Pseudomembranous candidiasis is well recorded to be the most occurring oral manifestations in PLWHA either on ART or not irrespective of how developed the oral health system is in a country. Hence, it is not surprising that it is the second most prevalent in this study (1.99%) with erythematous candidiasis being 0,68%. Though other findings have reported a higher prevalence rate of 13.15% and 10.53%v for pseudomembranous type of candida infection and erythematous type of candida infection respectively (Berberi et al., 2015).

From the study recurrent aphthous ulcerations represented the lesions with the third prevalence rate which was 1.52% as compared to the study by Frimpong et al., (2017) which they reported about 4% prevalence of pseudomembranous candidiasis.

In a study conducted by Nugraha et al. (2017) HIV/AIDS patients with linear gingival erythema (LGE) were about 6.95% which is higher as compared to the prevalence rate of linear gingival erythema 0.64% in this current study. The prevalence rate as reported by (Portela et al., 2018) varies widely in different studies, ranging from 0 to 48%.

Another finding by Herrera et al. (2018) showed wide variations in the various oral manifestations among the adults in the study, with regards to the Acute Necrotizing Ulcerative gingivitis (ANUG). From this study, prevalence of NUG was 0.17% juxtaposing it with the findings by Portela et al., (2018) who reported a prevalence rate of 10%.

Prior to the introduction of ART, Kaposi sarcoma developed in up to 30% of AIDS patients (Gonçalves et al.,

2017) and remains the second commonest tumour in HIV patients, with approximately 900 cases per year in the United States in recent years, including cases in patients on long term combined ART (Robbins et al., 2015). With the current findings showing no report of Kaposi sarcoma, Chalya et al. (2015) reported in their findings among PLWHIA reported HIV/AIDS-related cancer, Kaposi Sarcoma was about 2.4%, whereas Koski et al. (2015) intimated that the level of prevalence of HIV/AIDS associated Kaposi Sarcoma had declined from the period of 2003 to 2011 with a presentation from 10.1% to 7.4%.

B. Association of Predisposing Factors to Oral Manifestations

From the study, it was reported that patients who were put on other medications drugs i.e. Non-Sterodal Anti-inflamatroy Durgs (NSAIDS) and antibiotics had about 11.96% chance of developing these Oral lesions. This finding is similar to the that of Fratto and Manzon (2014) who reported that examination of patients put on antipsychotics showed 12.10% gingival swelling and oral ulcerations. Buttressing it further, Hasturk & Kantarci (2015) indicates that 10.85% of patients who are put on immune suppressants such as cyclosporine suffered gingivitis. Though the study among patients on anti-hypertensives also suggested other lesions were found, the percentage was 26.55% according to Bajkovec et al. (2021).

Shaik & Pachava (2017) reported in their study that some nutritional deficiencies such as some vitamins (C&D) and minerals have a detrimental effect in the oral cavity in 6% of the respondents who were recruited into their study and this is similar to the findings in this study which reported about 5.93% of Oral lesions that is due to a nutritional deficiency. Alotaibi (2019) reported that 12.8% of the patients who reported with Oral lesions in HIV patients who had pain and discomfort in chewing had a nutritional challenge especially most of these patients found it difficult to masticate to effect proper digestion therefore affecting their nutritional levels. Furthermore, Pflipsen & Zenchenko (2017) explains the reason to this nutritional deficiency to be related to some of the drugs that are prescribed to these patients which led to these nutritional defects. If the repair of these oral tissues is not adequately met due to nutritional deficiencies it predisposes them to these lesions according to Alotaibi (2019).

Trauma-related Oral lesions accounted for 7.63% of the predisposing factors that are responsible for causing oral diseases in HIV infected patients. Other findings which reported oral lesions due to trauma was due mostly to those who had lost some teeth and were habitual wearers of dentures, as this prosthesis led to traumatic lesions with use (Haneke, 2019).

According to Sharma & Garg (2018), Oral manifestations are associated with other systemic infections or chronic conditions such as Diabetes Mellitus in about 12.5% of HIV infected patients. The finding from this showed that 12% of patients was found to have chronic diseases that also had the Oral lesions. A similar study by Rohani (2019) also reports of 13.2% which is almost similar with the findings from this study. This markedly was explained by Trindade et al. (2014) who touted that in diabetes, due to poor metabolic regulation this sort of prolongs healing of oral ulcers which is a typical common finding among HIV/ADIS patients. Pseudomembranous candidiasis is also a common finding in diabetic patients due to weakened immune system predisposing the patients to such fungal infections (Kinane et al, 2017).

From Table 3, in determining associations between the predisposing factors likely to expose the respondents to oral manifestations apart from the HIV infection, the data showed that predisposing factors such as oral trauma, other infections outside HIV infection, and lifestyle did not show any level of significance. Association between oral manifestations and chronic diseases showed a significant relation. This is consistent with the findings by Jayakaran (2014) which showed a significant relation between lifestyle and oral manifestations. According to Yousefi & Abdollahi (2018), they also reported that taking of medications for treatment of chronic diseases such as hypertension especially with calcium channel blockers also had a level of significance. In a cross-sectional study by Schnabel & Hedrich, (2019), the level of significance with the oral manifestations was reported to be with gender and other periodontal infections which is not consistent with this study. So, the influence of lifestyle on these oral manifestations might be due to reckless lifestyles that are lived by these patients even though they are bedeviled significantly with weakened immune systems.

C. Effect of Oral Manifestations on the Quality of Life

Generally, oral lesions might be ignored by clinicians nonetheless it has been found out to have an impact significantly on the oral health quality of life (OHQoL) of infected patients (Liberali et al., 2013). These lesions might predispose the infected individual to pain, discomfort, dryness of mouth-xerostomia of the mouth due to decrease in saliva secretion and swallowing difficulties. The OHQoL encompasses thus physically discomfort, psychologically discomfort, limitations with function, disability, physical disability, psychological and physical disability (Pizzolato et al., 2018).

From Table 4.1, in the determination of the association between the oral manifestations and the quality of life (pain, chewing and swallowing) it was shown that among the various manifestations that were reported in the population, there was no statistical significance against angular cheilitis, pseudomembranous candidiasis, erythematous candidiasis and necrotizing ulcerative gingivitis against pain, swallowing and chewing which are all physical and functional indicators of quality of life. Aphthous ulcerations showed a degree of significance against pain/discomfort, difficulty chewing and difficulty swallowing (p-value =0.028), (p-value =0.048) and (p-value =0.045) respectively. Likewise, gingivitis also showed a level of statistical significance with pain and difficulty in swallowing (p-value =0.037) and (p-value =0.036) respectively. Pain/discomfort represented the highest among all the variables that reported on the impact of the oral manifestations on the QoL. It is evident that most people might not be able to bear with pain, so they report any issues of pain as compared to the other variables which might not

necessarily have a toll effect directly on them according to Petersen & Ogawa, (2018). Consequently, Deinzer et al., (2014) enumerates that since most people might perceive pain to be obnoxious and having an impact on them significantly especially affecting their daily lives. So, it is obvious that most of respondents reported pain as the major complaint on the quality of life. According to Owiti (2020), severe pain affects the quality of life and self-esteem. These lesions also cause pain and halitosis and thus leads to poor quality of life (Petersen & Ogawa, 2018).

Oral lesions in HIV/AIDS can cause social disability affecting both their confidence and self-esteem. From Table 4.2, aphthous ulcerations showed a degree of significance against self-esteem (p-value =0.032). Likewise, gingivitis also showed some level of statistical significance with self-esteem (p-value =0.0413). These findings were supported by that of Rodrigues et al. (2020) argued that lesions in the oral cavity affects the general social well-being of the patient from the study findings among some South American indigenes.

Psychological discomfort and disability which are also indicators in the OHQoL measurement were also affected. With 13.10% responding that they had a challenge emotionally which affected their self-consciousness and making them suffer some level of embarrassment due to oral lesions. This finding is consistent with Kaur et al. (2017) who opined that dental conditions have a major effect on aesthetics and psychosocial behaviour of teenagers, thereby impacting their self-esteem. On the other hand, common oral conditions affect chewing, diminishes appetite, exposes to sleep disorders, and poor success in school and work (Glick et al., 2012). So Zarco et al. (2012) suggested that to improve in diet and socialization, properly managing oral lesions is important as there is a bidirectional relationship between the two. Psychologically, everyday life tasks such as work, education and family relationships are affected, contrasting it with the report by Bennadi and Reddy (2013), who suggest that apart from pain and life-threatening cancers, these oral lesions have little effect on social life.

From the study, the indicator which showed less response was the difficulty swallowing, thus 7.20% had difficulty in swallowing during eating. A descriptive study in a population in Saudi Arabia showed about 24.8% reporting with a challenge with dysfunctions, such as difficulties in chewing, swallowing, and feeding, resulting in food avoidance and/or alteration and, finally, inadequacy of diet as reported by Jayakaran (2014). The findings in this research clearly gives a clear indication, that oral lesions have impact on the OHQoL.

V. CONCLUSION

This study underscores that fact that oral manifestations remain an important clinical marker among HIV-infected individuals attending ART clinics, with gingivitis being the most common condition observed. Pseudomembranous candidiasis and aphthous ulcerations were also identified, while malignancies such as Kaposi sarcoma were not recorded. The findings further suggest that there are predisposing factors which may contribute to the occurrence of these manifestations apart from HIV infections such as

medications i.e. NSAIDS etc and trauma. Importantly, gingivitis and aphthous ulcerations were shown to have a significant effect on the quality of life of participants, particularly in relation to chewing, swallowing, pain, and self-esteem. These results emphasize the need for integration of routine oral health screening and management within HIV care programs to be able to improve on the overall health and well-being of PLWHA.

Limitations
This study used convenience sampling technique and it has its demerits such as the potential for sampling bias and reduced generalizability of the findings.

Ethical Consideration
Ethical approval was sought from the Ghana Health Service Ethics Review Committee (GHS-ERC053/07/20). Permission was also sought from the Kintampo Municipal Health Directorate and the Medical Superintendent of the Kintampo Municipal Hospital, Kintampo North.

Conflict of Conflict of Interest: None

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