

Orofacial manifestations in HIV positive children attending Mildmay Clinic in Uganda

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Abstract The aim of this study was to assess the orofacial manifestations and their influence on oral function in human immunodeficiency virus (HIV) positive children attending Mildmay Clinic in Uganda. This was a cross-sectional study based on clinical examination, medical records and a structured questionnaire of 368 children aged between 1.5 and 17 years. The clinical examination for dental caries was based on decayed, extracted and filled teeth (deft) and decayed, missing and filled teeth (DMFT) indices as defined by World Health Organisation. The soft tissue orofacial lesions were assessed using the classification and diagnostic criteria as described by the Collaborative Workgroup on the Oral Manifestations of Pediatric HIV Infections. Approximately 67.4% of the children were on highly active anti-retroviral therapy (HAART). The majority (77.4%) of the children had at least one orofacial lesion associated with HIV, pseudomembranous candidiasis being the most prevalent. Overall, 61.7% of the children with orofacial lesions

reported at least one form of discomfort in the mouth. Discomfort was particularly associated with swallowing. The prevalence of orofacial lesions was significantly higher in children with poor oral hygiene and lower in those on HAART than in their respective counterparts. The CD4+ cell count, age and gender of the children did not significantly influence the distribution of orofacial lesions. The mean deft and DMFT scores were 11.8 and 2.7, respectively. The d- and D-components contributed 54.7 and 42.1%, respectively. Consumption of sugary snacks was directly associated with dental caries. Despite these children attending an HIV care centre of excellence, they have a high prevalence of orofacial manifestations associated with HIV. The majority of the children experienced discomfort in the oral cavity, particularly during swallowing.

Keywords Dental caries · HAART · HIV/AIDS · Orofacial manifestations · Uganda

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Introduction

Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) remains a serious cause of morbidity and mortality in both adults and children, especially in developing countries. By 2004, a total of 2.5 million children under the age of 15 years were infected with HIV and about 500,000 children had died of diseases related to HIV/AIDS [1].

Of significance to the dentist, children who are HIV positive have considerably higher rates of oral diseases, including soft tissue lesions, salivary gland dysfunction and dental caries compared to the general pediatric population [2–4]. Dental caries is a conventional oral disease that can occur in individuals even without HIV infection, however,

Coogan et al. [5], and Fine et al. [6], reported higher prevalence rates of caries in HIV infected children than their non HIV positive counterparts. HIV infection lowers the immune system of an individual by killing the CD4 T lymphocyte cells leading to the development of oral manifestations [7] that include soft tissue lesions and dental caries. Some of the oral lesions may be the first sign of HIV infection [8].

Previously, poor oral hygiene has been reported to contribute to the development of HIV related oral manifestations [7, 9]. Some of the patients with oral manifestations experience discomfort during oral function [10, 11]. The discomfort may translate into poor health-related quality of life [12] and debilitation [13] because of its negative impact on nutrition through difficulty in chewing, drinking, or taking salty and spiced foods. The rate of HIV related oral manifestations has generally declined and the oral health-related quality of life of HIV positive individuals has tremendously improved following the introduction of highly active antiretroviral therapy (HAART) [9, 14]. Despite the introduction of HAART including that, which prevents maternal child transmission, growing numbers of infants are still being born with HIV.

Several studies [5, 6] on oral lesions associated with pediatric HIV infection have been carried out in developed countries while in developing countries the information is scarce. The purpose of this study was to determine the magnitude of orofacial manifestations and their influence on the oral function in HIV positive children attending Mildmay Clinic in Uganda.

Materials and methods

The study participants were patients accessing dental and pediatric care at Mildmay Clinic, an HIV treatment centre of excellence located in an urban area proximate to Kampala, Uganda. The children who test positive for HIV using ELISA (HIV) and confirmed by Western blot are registered for health care at the clinic. Between November 2007 and February 2008, we randomly selected 368 children aged between 1.5 and 17 years. On average about 40 and 15 children report daily to the pediatric and dental units, respectively, for services. Based on this daily attendance, every 5th and 3rd child was selected from the pediatric and dental units, respectively, for the study. Severely ill children who required immediate medical attention were excluded from the study.

One trained dentist (JN) performed clinical examination for dental caries based on decayed, extracted and filled teeth (def^t) and decayed, missing and filled teeth (DMFT) indices as defined by World Health Organisation (WHO) [15] criteria in artificial light. The soft tissue orofacial lesions were assessed using the classification and

diagnostic criteria as described by the Collaborative Workgroup on the Oral Manifestations of Pediatric HIV Infections [2]. Bi-digital palpation on the cervical lymph nodes, submandibular and parotid glands was used to assess any swellings. Oral hygiene status was assessed based on simplified oral hygiene index [16] with modifications. The selected indicator permanent teeth were 16 and 31, and in their absence, tooth 26 and 41, respectively, were substituted. In the event that a child had not yet fully erupted the above indicator teeth, the deciduous teeth: 55 and 71 or 65 and 81 were assessed for oral hygiene status. The buccal surfaces of the selected upper molars and the lingual surfaces of the lower central incisors were assessed and scored in the following categories:

Good = no food debris on tooth surfaces.

Fair = food debris covering one third or less of the exposed tooth surfaces.

Poor = food debris covering more than one third of the exposed tooth surface.

The findings were compiled on a WHO [15] recommended form with modifications. To assess the reproducibility in recording oral lesions, a blind duplicate examination of 30 children was done, after the main examination. The Cohen's kappa value was 0.79, with no evidence of systematic errors ($p = 0.23$, paired t test).

The children's parents/guardians were interviewed regarding oral hygiene, oral function discomfort and dietary habits using a pre-tested semi structured questionnaire [15]. Medical records were reviewed for clinical information on medication and immunological status measurement history. All procedures conformed to protocol approved by Ethical Review Committees of Makerere University School of Public Health as well as Mildmay Clinic, Uganda. The parents/guardians consented on behalf of all the selected children.

Data analyses

The collected data were double-checked for errors and completeness. They were analysed using bivariate analyses and the Chi-squared tests to assess predictors of oral disease. The paired t test was used to assess any systematic errors in recoding the oral lesions. The probability of significance was set at the two-sided 5% level. Analyses were conducted with Statistical Package for Social Sciences (SPSS, version 15 for Windows, Chicago, IL, USA).

Results

There were no significant differences in the distribution of orofacial lesions between the children selected from the

dental and pediatric units, and the data were thus pooled. A total of 368 HIV positive children between the ages of 1.5–17 (mean 8.8) years participated in the study (Table 1). The age group 6–10 years constituted the largest proportion 38.6% (142/368) of the study children. Approximately 52.7% of the children were girls and 51.9% were rural residents. The majority (70.7%) of the children were orphans (Table 1).

Table 1 The frequency distribution of the children according to age, gender and socio-economic status of their parents/guardians, oral hygiene practices, dietary habits, medication and discomfort during oral functions ($n = 368$)

Variable	Categories	Number	Percentage
Age (years)	1.5–5	97	26.4
	6–10	142	38.6
	11–15	102	27.7
	16–17	27	7.3
Gender	Boys	174	47.3
	Girls	194	52.7
Residence	Rural	191	51.9
	Urban	177	48.1
Orphan	Yes	260	70.7
	No	108	29.3
Dentition status	Deciduous	111	30.1
	Mixed	55	15.0
	Permanent	202	54.9
Oral hygiene	Good	36	9.8
	Fair	245	66.6
	Poor	87	23.6
Consumption of sugary snacks	Yes	250	67.9
	No	118	32.1
Frequency of taking sugared snacks ($n = 250$)	Once a day	57	22.8
	Twice a day	46	18.4
	Occasionally	147	58.8
Taking HAART	Yes	248	67.0
	No	120	33.0
Duration of HAART ($n = 248$)	>2 years	86	34.6
	3–5 years	100	40.3
	6–9 years	62	25.1
	>9 years	0	0.0
CD4+ cell count ($n = 330$)	<200	56	16.9
	200–500	96	29.0
	>500	178	53.9
Discomfort in the mouth	Yes	227	61.7
	No	141	38.3
Discomfort during function ($n = 227$)	Tooth brushing	99	43.6
	Chewing	28	12.3
	Swallowing	162	71.4

Approximately 67.4% ($n = 248$) of the children were on HAART. Different drug combinations constituted the HAART with Combivir and Efavirenz being the most prevalent (19%) combination of the therapy. The duration of HAART ranged from <1 to 9 years with 25.1% of the children having been on the therapy for 6–9 years (Table 1).

The majority (77.4%, $n = 285$) of the children had at least one soft tissue orofacial lesion associated with HIV (Table 2). Oral candidiasis of pseudomembranous variant was the most prevalent oral lesion (Table 2).

Overall, 61.7% of the children with oral lesions reported at least one form of discomfort in the mouth during oral function (Table 1). The most frequent specific forms of discomfort were pain, 55%; burning sensation, 35% and loss of taste, 10%. The discomfort was associated with swallowing, 71.4%; tooth brushing, 43.6% and chewing food, 12.3% (Table 1), especially if salty or spiced. Thirty eight (10.3%) of the children had their CD4+ cell count taken more than 6 months before the present study and were excluded from analysis when comparing immunological status and oral lesions. About 83.0% ($n = 274$) of the children had at least 200 CD4+ cells/ μ l of blood (Table 1). The prevalence of orofacial lesions was significantly higher in children with poor oral hygiene ($p = 0.004$) and lower in those on HAART ($p = 0.025$) than their respective counterparts. The duration of HAART was indirectly associated with the prevalence of orofacial

Table 2 The frequency distribution of children according to type of orofacial lesions ($n = 368$)

Oral lesion	Number	Percentage
Oral candidiasis		
Pseudomembranous	186	50.5
Angular cheilitis	38	10.3
Hairy leukoplakia	16	4.3
Recurrent aphthous	15	4.1
Necrotizing gingivitis	15	4.1
Necrotizing periodontitis	1	0.3
Oral Kaposi's sarcoma	12	3.3
Recurrent herpes labialis	2	0.5
Chapped lips	7	1.9
Oral warts	6	1.6
Molluscum contagiosum	49	13.3
Cervical lymphadenopathy	105	28.5
Parotid enlargement	92	25.0
Submandibular enlargement	2	0.5
Dental caries ^a		
Deciduous ($n = 216$)	137	63.4
Permanent ($n = 182$)	86	47.3

^a Some of the children have mixed dentition

lesions ($p = 0.034$). The CD4+ cell count, age and gender of the children did not significantly influence the distribution of orofacial lesions ($p > 0.05$).

The children were found to have different sets of dentition: permanent, 54.9%; deciduous, 30.1% and mixed dentition, 15.0% (Table 1). The mean deft and DMFT scores were 11.8 and 2.7, respectively. The overall prevalence of dental caries was 54.1% ($n = 199$). Rampant caries was found in 25.8% (95/368) of the children, particularly in those with primary dentition. Approximately 39.5 and 47.3% of the deft and DMFT scores were contributed by f- and F-components, respectively. The d- and D-components contributed 54.7 and 42.1%, respectively. Oral hygiene was indirectly ($p = 0.032$) and consumption of sugary snacks was directly associated with dental caries ($p = 0.005$) in the two dentitions.

Discussion

In the present study, 77.4% of the children had at least one form of HIV related orofacial lesion. This value closely compares with 73.0% reported in a previous study [11] of Ugandan HIV infected children. Magalhaes et al. [17] and Anak et al. [18] reported lower values: 52.6 and 57.5% of oral lesions among HIV infected children in Brazil and Thailand, respectively. A number of contributing factors have been cited for the increased prevalence of oral lesions in developing countries, namely, lack of early diagnosis and medical care, poor nutritional status, minimal or sporadic access to HAART medications, reliance on humanitarian efforts outside of their country, low CD4 T lymphocyte counts, and being orphaned or abandoned [8, 17–22]. Most of these factors are important issues affecting these Ugandan HIV positive children.

We found the prevalence of orofacial lesions to be indirectly and significantly associated with HAART. This is in agreement with Aguirre et al. [9] and Schmidt-Westhausen et al. [14] who reported a decrease in the prevalence of soft tissue oral lesions, particularly oral candidiasis, Kaposi's sarcoma and hairy leukoplakia following the HAART administration. However, Greenspan et al. [23] reported a statistically significantly higher prevalence of oral warts among patients on HAART than their counterparts who were not taking HAART.

Oral candidiasis is the most prevalent oral lesion and significant cause of morbidity in HIV disease. In the present study, at least half of the children had oral candidiasis of the pseudomembranous variant (Table 2). About 61.7% of the children had a history of discomfort in the mouth, particularly pain on swallowing (Table 2), which may translate into malnutrition and rapid clinical deterioration. Moreover, 43.6% of the children reported pain

associated with tooth brushing (Table 1). Indeed, we found high levels of poor oral hygiene (Table 1), which in addition to consumption of sugary snacks could have contributed to the observed high dental caries experience and prevalence in this study population. Costa et al. [24] and Masserente et al. [25] indicated that reduced immunological response, decreased salivary function and continuous use of medicines that have been formulated as syrups or sugared solutions are usual characteristics of children with AIDS. These are some of the known factors associated with increased experience and prevalence of dental caries. High caries prevalence has previously been reported in HIV infected children [8, 21, 25].

It should be noted that Mildmay Clinic is one of the few HIV care centres in Uganda with dental health care services. The strength of this service at the clinic is reflected by the high f- and F-components observed in the caries scores of this study population. Previously, these components of caries scores were rarely recorded in Ugandan HIV positive children with no available dental services at their health facility [11]. Despite the high restorative care, a significant proportion of children's teeth remained untreated implying that dental caries is a burden in the present study population. Apart from the clinic based dental care available at the health facility, preventive approach may go a long way to control the burden of dental caries in this population. A proposal for basic package oral health care (BPOC) has previously been presented for under-served communities [26]. The leading principle of the BPOC is that it can easily be available for all, with the emphasis on oral urgent treatment, exposure to appropriate and affordable fluoride toothpaste as well as atraumatic restorative treatment.

Howell et al. [27] concluded in their study that medically well-managed HIV positive children have significant oral disease, and that more soft tissue lesions are associated with low CD4 T lymphocyte counts. In the present study, there was no influence of CD4 T lymphocyte count on the occurrence of oral lesions. It should be noted that the CD4 T lymphocyte count values were obtained from medical records, retrospectively, and could have markedly changed by the time the study was carried out. This inevitably renders the finding to be interpreted with caution. Further studies are necessary to verify if there is any true relationship between immunologic status and orofacial lesions in this population.

Conclusions

Although these children were attending an HIV treatment centre of excellence, they have a high prevalence of orofacial manifestations associated with HIV. In spite of the

availability of dental care services, a large proportion of children had unmet dental treatment. Oral lesions were associated with discomfort during oral function, particularly, swallowing and tooth brushing which may lead to a vicious circle of poor clinical health of these HIV positive children.

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