Original Research Article

PREDICTORS OF MUCOCUTANEOUS DISORDERS IN HIV-INFECTED CHILDREN IN PORT HARCOURT, SOUTHERN NIGERIA

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ABSTRACT

Background: Unindentified and untreated mucocutaneous disorders can lead to adverse consequences among HIV-infected children. These include physical discomfort, disfigurement , loss of school attendance, social stigma , low self esteem and depression

Aim: To determine the predictors of mucocutaneous disorders in HIV-infected children receiving care in two tertiary hospitals in Port Harcourt, Southern Nigeria.

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Place and Duration of Study: the study was conducted over a six month period at the Paediatric infectious diseases clinic of the University of Port Harcourt Teaching Hospital (UPTH) and Rivers State University Teaching Hospital (RSUTH) Port Harcourt.

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Materials and Methods: It was a cross sectional study involving 372 HIV-infected children. Study participants were recruited by simple random sampling. Diagnosis of mucocutaneous disorders was based on clinical findings and relevant laboratory investigations.

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Results: The prevalence of mucocutaneous disorders in the study subjects was 30.1% with Pruritic Papular Eruptions as the most occurring lesion. Factors predictive of the occurrence of mucocutaneous disorders in HIV-Infected-subjects included: low socio-economic status (p-value=0.048;AOR=1.81, 95% CI=1.01-3.24), sub-optimal adherence to HAART (p-value=0.008; AOR=2.72,95% CI=1.29-5.73), WHO clinical stages 3 and 4 (p-

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value=0.043;AOR=2.48,95% CI=1.03-5.97) and non viral suppression (p-value=0.0001; AOR=15.78, 95% CI=8.52-29.25).

Conclusion: The presence of these factors in a HIV-infected child indicates a need for prompt evaluation for mucocutaneous lesions so as to limit morbidity and mortality from these disorders.

Keywords: Predictors, Mucocutaneous, Disorders, HIV-Infected-children, Port Harcourt

1. INTRODUCTION

Mucocutaneous disorders are lesions affecting the skin and the mucous membrane [1]. The skin refers to the layer of tissue forming the outer covering of the body while it's appendages include the hair, nails, sweat gland, sebaceous glands and mammary glands [1,2]. Mucous membranes are epithelial tissues which secrete mucus and line many body cavities and tubular organs such as the mouth, throat, nose, vagina, anus[1].The burden of mucocutaneous disorders is high among children all over the world and the advent of the Human Immunodeficiency virus (HIV) infection and Acquired Immune Deficiency Syndrome (AIDS) has further compounded this burden and diversity[3].

Among HIV-infected children, mucocutaneous disorders may result from the HIV infection itself or from opportunistic disorders secondary to the decline in cellular immunity[4]. The prevalence of mucocutaneous disorders in .HIV-infected children ranges from 13.1% to 85% in studies from different parts of the world [5-7]. This pattern and severity correlates directly with the degree of immunosuppression[6]. In early HIV infection, most of the mucocutaneous manifestations are similar to that seen in non HIV-infected children, but with progressive immunosuppression, the presentations become atypical, difficult to diagnose and often resistant to treatment [3,5,6,9]. This is even worse when adherence to antiretroviral therapy is suboptimal [10].

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Unidentified and untreated mucocutaneous disorders in HIV-infected children may result in physical discomfort, disfigurement , loss of school attendance, social stigma , low self esteem and depression [3,11,12]. However, when identified early, these disorders respond to highly active antiretroviral therapy (HAART) in addition to appropriate therapy based on the identified aetiologic agents [13].

The aim of this study was to evaluate the predictors of mucocutaneous disorders among HIV-infected children in Port Harcourt, Nigeria. This knowledge will help clinicians providing care for HIV-infected children to initiate timely evaluation, interventions as well as preventive measures that will help to limit morbidity and mortality from mucocutaneous disorders.

2. MATERIAL AND METHODS

2.1 Study Design

This was a cross-sectional study carried out over a six month period. It was both descriptive and analytical.

2.2 Study Area

The study site was the Paediatrics infectious diseases clinics of the University of Port Harcourt Teaching Hospital and the Rivers State University Teaching Hospital both located in the city of Port Harcourt, Southern Nigeria.

2.3 Study Population

The study involved 372 HIV-infected children aged six weeks to 18 years

2.4 Sampling method

As at the time of the study, the Paediatric infectious diseases clinics in the two hospitals had a total of 597 HIV-infected children in attendance. Out of this number, 372 study subjects were recruited by simple random sampling. The sample size for the study was derived based on the prevalence of mucocutaneous disorders in HIV-infected children as reported in a previous Nigerian study [14].

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2.5 Data collection

Semi-structured interviewer administered questionnaires were used to obtain socio-demographic and relevant clinical data as well as data to determine adherence to HAART. WHO clinical stage, CD4 count and viral load within six months of the study period were retrieved from the patients medical case file. Subsequently, a complete dermatological examination of the scalp/hair/, skin, nails and oropharyngeal mucosa was conducted to determine the presence of mucocutaneous lesions. Diagnoses of mucocutaneous disorders were mainly clinical but microbiological and histopathological samples were collected where relevant.

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2.6 Data analysis

Data was analyzed using the IBM SPSS version 22.0. Statistical significance was set at a p-value < 0.05. Descriptive statistics were reported using frequency tables and charts. Categorical variables were compared using Chi Square test. Multiple logistic regression analysis of factors associated with mucocutaneous disorders was done in HIV-infected subjects to identify the Predictors of mucocutaneous disorders. Statistical significance was set at 95% confidence interval with p-value < 0.05.

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2.7 Ethical Considerations

Ethical approval for the study was obtained from the Research Ethics Committee of both health institutions. Also. written informed consent was obtained from the parents or guardians of all participating children. Assent was obtained from children aged seven years and above.

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3. RESULTS AND DISCUSSION

The study subjects consisted of 372 HIV-infected children with a male to female ratio of 0.8:1. The mean age of the study subjects was 9.98±4.60 years

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The prevalence of mucocutaneous disorders among the study participants was 30.1%. Table I I shows that Pruritic Papular Eruption (PPE) was the most commonly occurring lesion.

Table II and III show that the factors associated with a higher prevalence of mucocutaneous disorders in HIV-infected subjects included: male gender (χ^2=6.370; P=0.012), low socioeconomic class (χ^2=10.257; p-value=0.006), sub-optimal adherence to HAART (χ^2=32.872; P=0.0001), WHO clinical stage 4 (χ^2=354.616; P=0.0001), moderate and severe immunosuppression based on CD4 count (χ^2=162.227; P=0.0001) and non viral suppression(χ^2=124.551; P=0.0001). Table IV shows that the predictors of mucocutaneous disorders included: low socio-economic status (P=0.048;AOR=1.81, 95% CI=1.01-3.24), sub-optimal adherence to HAART (P=0.008; AOR=2.72,95% CI=1.29-5.73), WHO clinical stages 3 and 4 (p-value=0.043;AOR=2.48,95% CI=1.03-5.97) and non viral suppression (P=0.0001; AOR=15.78, 95% CI=8.52-29.25).

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Table 1: Distribution of Specific Mucocutaneous Disorders among the Study Subjects

Category	HIV-infected n =120(%)
Fungal	**41 (34.1)**
Tinea capitis	17(14.2)
Oral candidiasis	15(12.5)
Tinea corporis	4(3.3)
Pityriasis versicolor	3(2.5)
Tinea manum	1(0.8)
Tinea pedis	1(0.8)
Viral	**28(23.3)**
Verruca planae	19(15.8)
Varicella	3(2.5)
Molluscum contagiosum	3(2.5)
Anogenital wart	2(1.7)
Herpes zoster	1(0.8)
Measles	0(0.0)
Bacterial	**8(6.7)**
Impetigo	2(1.7)
Furunculosis	3(2.5)
Folliculitis	3(2.5)
Infestations	**8(6.7)**
Scabies	8(6.7)
Inflammatory	**35(29.2)**
Pruritic papular eruptions	34(28.4)
Atopic dermatitis	0(0.0)
Psoriasis	1(0.8)
Others	**0(0.0)**
Vitiligo	0(0.0)

Table II: Association between the Prevalence of Mucocutaneous Disorders and some Socio-demographic Characteristics in HIV-Infected Study Subjects.

Variables	Mucocutaneous Disorders		Total n (%)	Chi Square	p-value
	Present n (%)	Absent n (%)			
Age category					
<1-6 years	33 (35.1)	61 (64.9)	94 (100.0)	*1.924*	*0.382*
7-12 years	45(26.9)	122(73.1)	167(100.0)		
13-18 years	34(30.6)	77 (69.4)	111(100.0)		
Gender					
Male	62 (36.7)	107 (63.3)	169 (100.0)	*6.370*	*0.012**
Female	50 (24.6)	153 (75.4)	203 (100.0)		
Socio-economic status					
High	18(19.8)	73(80.2)	91 (100.0)	*10.257*	*0.006**
Middle	37 (27.6)	97 (72.4)	134 (100.0)		
Low	57 (29.8)	90 (61.2)	147 (100.0)		

**Statistically significant*

Table III: Association between the Prevalence of Mucocutaneous Disorders and some HIV-related Factors in the HIV-Infected Study Subjects..

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Variables	Mucocutaneous Disorders		Total n (%)	Chi Square	p-value
	Present n (%)	Absent n (%)			
Type of HAART					
First-line	96 (30.3)	221(69.7)	317(100.0)	*0.032*	*0.859*
Second-line	16 (29.1)	39 (70.9)	55(100.0)		
Adherence to HAART					
Sub-Optimal	35 (62.5)	21 (37.5)	56 (100.0)	*32.872*	*0.0001**
Optimal	77 (24.4)	239 (75.6)	316 (100.0)		
WHO Clinical Stage					
Stage 1	0 (0.0)	245(100.0)	245(100.0)	*354.616***	*0.0001**
Stage 2	82 (94.3)	5 (5.7)	87 (100.0)		
Stage 3	23 (69.7)	10(30.3)	33 (100.0)		
Stage 4	7 (100.0)	0(0.0)	7 (100.0)		
CD4 count					
Mild	16 (7.1)	210 (92.9)	226 (100.0)	*162.227*	*0.0001**
Moderate	48 (52.2)	44 (47.8)	92 (100.0)		
Severe	48(88.9)	6 (11.1)	54 (100.0)		
Viral load					
Viral suppression	17 (7.8)	201 (92.2)	218(100.0)	*124.551*	*0.0001**
No viral suppression	95(61.7)	59 (38.3)	154 (100.0)		

*Statistically significant **Fishers Exact Test

Table IV: Multiple Logistic Regression Analysis of Factors Associated with Mucocutaneous Disorders in HIV-Infected Study Subjects

Variables**	Coefficient(B)	Adjusted Odds ratio (AOR)	95% CI	p-value
Female gender	0.510	1.67	0.94–2.94	0.079
Low social class	0.591	1.81	1.01–3.24	0.048*
Underweight	0.732	2.08	0.85–5.07	0.107
Sub-Optimal adherence	1.001	2.72	1.29–5.73	0.008*
Late WHO clinical stage Stages 3 and 4	0.907	2.48	1.03-5.97	0.043*
No Viral Suppression from viral load	2.759	15.78	8.52–29.25	0.0001*

CI – Confidence Interval **Statistically significant*
***CD4 count excluded due to collinearity with viral load*

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Discussion

The prevalence of mucocutaneous disorders in HIV-infected children in our study is lower than that reported in several previous studies [5,6,8,15]. This difference may be due to the fact that all the children in our study were on Highly Active Antiretroviral Therapy (HAART) unlike the studies in comparison where the use of HAART was not universal.

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Concerning factors associated with occurrence of mucocutaneous disorders in HIV-infected children, there was no association between the prevalence of mucocutaneous disorders and the age of study subjects. A similar finding was reported by Endayehu *et al*[8] in Ethiopia and Panya *et al* [5] in Tanzania. In contrast, Olomukoro[15] in Abuja as well as Nair *et al*,[15] and Pol *et al*,[17] both in India all found a higher prevalence of mucocutaneous disorders among children in the older age group 5-12 years. However, these studies in comparison all involved a more narrow age range unlike the present study which involved children from age six weeks to 18 years which may have contributed to the disparity noted.

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This study also noted that mucocutaneous disorders were significantly more common in HIV-infected males compared to females. This finding may be partly explained by the sometimes more adventurous nature of males which increases their chances of contact with the aetiologic agents of some of the mucocutaneous disorders reported. This agrees with finding by Panya *et al*,[5] in Tanzania where infectious dermatosis were reported to be more common in males than females. Other studies nonetheless found no difference between males and females in this regard [5,16,17].

Furthermore, mucocutaneous disorders were significantly most prevalent among HIV-infected subjects in low socio-economic classes . The reason for this is unclear but it could be inferred that children in low socio-economic class may be more exposed to overcrowding and poor sanitary conditions which may contribute to the higher prevalence of mucocutaneous disorders recorded in them in comparison to those in high socio-economic class.

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With regards to HIV-related factors associated with prevalence of mucocutaneous disorders, this study found that mucocutaneous disorders were significantly more common among HIV-infected subjects with sub-optimal adherence compared to those with optimal adherence. This may be expected as sub-optimal adherence results in progressive viral replication and immunosuppression which may contribute to the higher prevalence of mucocutaneous disorders noted.

Mucocutaneous disorders were also significantly more prevalent among HIV-infected subjects with advanced WHO clinical stage as well as those with moderate and severe immunosuppression compared to those with mild immunosuppression This is expected as the T-cell decline seen with these stages would have increased the susceptibility to various mucocutaneous disorders. This finding has also been corroborated by previous authors [6,8,14,18,19].

Following Multiple logistic regression analysis of these factors associated with the occurrence mucocutaneous disorders in HIV-infected subjects in the present study, the

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predictors of mucocutaneous disorders in these children included low socio-economic class, sub-optimal adherence to HAART, late WHO clinical stages (stages 3 and 4) and non viral suppression. This implies that the finding of any of these predictive factors in a HIV-infected child should warrant evaluation for the presence of mucocuatneous disorders. This will promote early diagnosis and interventions to improve outcome.

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4. CONCLUSION

Factors predictive of mucocutaneous disorders in HIV-infected children include low socio-economic class, sub-optimal adherence to HAART, late WHO clinical stages (stages 3 and 4) and non viral suppression. The presence of these factors in a HIV-infected child indicates a need for prompt evaluation for mucocutaneous lesions so as to limit morbidity and mortality from these disorders.

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CONSENT

All authors declare that written informed consent was obtained from the parents/guardians of all participating children. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

All authors declare that ethical approval for the conduct of this study was obtained from the Research Ethics Committees of the institutions where the study was carried out.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCES

1. Mucocutaneous (n.d.). Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, Seventh Edition . Available at http:// medical dictionary .thefreedictionary.com/mucocutaneous. Accessed on 21st January 2022.

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2. Appendages of the skin (n.d.). The American Heritage Science Dictionary. Available at http://www.dictionary .com/browse/appendages-of-skin. Accessed on 22nd January 2022.
3. Oninla OA. Mucocutaneous Manifestations of HIV and the Correlation with WHO Clinical Staging in a Tertiary Hosptal in Nigeria. AIDS Research and Treatment 2014. Available at http://dx.doi.org/10.1155/2014/360970. Accessed on 21st January 2022.
4. Schwartz RA, Zalewske A, Erdal E. Cutaneous manifestations of HIV. Medscape reference. Accessed on 20th December 2021..
5. Panya MF, Mgonda YM, Massawe AW. The pattern of mucocutaneous disorders in HIV-infected children attending care and treatment centres in Dar es Salaam, Tanzania. BMC Public Health 2009;9:234.
6. Okechukwu AA, Okechukwu OI, Paul J. Patterns of skin disorder and its relationship with CD4 cell count in a cohort HIV-infected children. Journal of Medicine and Medical Sciences 2011;2(10):1131-38.
7. Sturt AS, Anglemeyer A, Berk D, Maldonado YA. Temporal trends in mucocutaneous findings among Human Immunodeficiency Virus infected children in a population based cohort. Pediatr Dermatol 2013;30(4): 451-6.
8. Endayehu Y, Mekasha A, Daba F. The pattern of mucocutaneous disorders in HIV-infected children attending care and treatment in Tikur Anbesa specialized hospital, Addis Ababa,Ethiopia. BMC Dermatology 2013; 13:12.
9. Jindal N, Aggarwal A, Kaur S. HIV seroprevalence and HIV associated dermatoses among patients with skin and mucocutaneous disorders. Indian J. Dermatol. Venereal. Leprol 2009; 75(3):283-6.
10. Ugwu RO, Eneh A. Factors influencing adherence to paediatric antiretroviral therapy in Port Harcourt, south-south Nigeria. Pan Afr Med J. 2013;16:13.
11. Lowe S, Ferrand RA, Morris-Jones R, Salisbury J, Mangeya N, Dimairo M, *et al.* Skin

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disease among Human Immunodeficiency Virus-infected adolescents in Zimbabwe ; a strong indicator of underlying HIV infection. Pediatr Infect Dis J 2010;29(4):346-51.

12. Coopman SA, Johnson RA, Platt R, Steen RS. Cutaneous diseases and drug reactions in HIV infection. N. Engl. J. Med 1993;328(23)1670-74.
13. Tse Ian CT. Dermatological manifestations of HIV Disease, System Review. Available at www.info.gov.hk>aids>pdf. Accessed on 30th December 2022.
14. Umoru D, Oviawe O, Ibadin M, Onunu A, Esene H. Mucocutaneous manifestations of pediatric human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) in relation to degree of immunosuppression; a study of a west African population. Int J Dermatol 2012; 51(3):305-12.
15. Nair SP, Mathew R. A clinic-epidemiological study of dermatoses in Pediatric HIV patients in a tertiary care center. Indian J Paediatr Dermatol 2016; 17:186-9.
16. Olomukoro CN. Spectrum of Dermatophytosis in HIV-infected children in National Hospital Abuja, Nigeria. A Dissertation submitted to the National Post Graduate Medical of Nigeria in part fulfillment of the requirement for the Fellowship of the college in Paediatrics. Lagos; 2015.
17. Pol RR, Vanaka RN, Yelamali BC, Badakali AV. Pattern of Mucocutaneous Infections in HIV infected children at a tertiary Hospital, North Karnataka India. Int J Contemp Pediatr 2015; 2(4): 419-23.
18. Katibi OS. Mucocutaneous manifestations in HIV-infected children correlated with CD4+ counts, percentages and viral load in University College Hospital (UCH) Ibadan. A Dissertation submitted to the National Post Graduate Medical of Nigeria in part fulfillment of the requirement for the Fellowship of the college in Paediatrics. Lagos; 2010.
19. Wananukul S, Deekajorndech T, Panchareon C, Thisyakorn U. Mucocutaneous findings in Pediatric AIDS related to degree of immunosuppression. Pediatr Dermatol. 2003;20:289-294.