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RESEARCH ARTICLE

Factors Affecting the Prevalence of Skin Disorders among Human Immunodeficiency Virus (HIV) Infected Children in Aminu Kano Teaching Hospital (AKTH) Kano, Nigeria

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ABSTRACT

Introduction: Among HIV infected children, skin disorders are vital as they give a clue to diagnosis of the HIV disease. Various factors are associated with occurrence of skin disorders among HIV infected children.

Objectives: To determine the factors associated with prevalence of skin disorders among HIV infected children in Aminu Kano Teaching Hospital (AKTH) Kano, Nigeria.

Materials and Methods: It was a cross-sectional study conducted to determine the factors affecting skin disorders among HIV infected children attending Paediatric Infectious Disease Clinic of Aminu Kano Teaching Hospital, Kano, Nigeria. A total of 223 HIV infected participants aged 6 weeks to 14 years were recruited for this study. Chi-square test or Fishers exact test where necessary were used to determine the difference between proportions of categorical variables and level of significance was set at 0.05.

Multivariate analysis was used to further analyse significant relationships from the univariate analysis. The confidence level was set at 95% and a *p*-value less than 0.05 was considered statistically significant

Results: There were 110 (49.3%) males and 113 females (50.7%). The male to female ratio was found to be 1:1.1. Seventy-eight percent (78%) of the children had skin disorder.

A multivariate analysis showed that only age, social class and immune status were significantly associated with the occurrence of skin disorders.

Conclusion: Among the HIV infected children, age, socioeconomic class and immune status were the factors found to determine the Prevalence of skin disorders.

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INTRODUCTION

High prevalence rates of skin disorders between 21-87% was reported in sub-Saharan Africa [1]. The most common skin disorders in children in this area include bacterial skin infections, scabies, viral skin infections especially molluscum contagiosum, dermatitis and papular urticarial [2]. The determinants of skin disorders among children in Africa include; age, gender, socio economic status of their parents, climate, overcrowding (resulting in high inter personal contact)

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and genetic factors [1]. Higher prevalence of skin disorders among some age groups, gender and social class and in some places is an evidence that socio-demographic factors play a vital role in occurrence of skin disorders. Children less than 5 years were reported to have higher prevalence of bacterial skin infections and dermatophytosis especially tinea capitis and scabies in sub-Saharan Africa [2]. Scabies and bacterial skin infections were reported to be commoner in more limited settings. Hot humid climatic condition, poor hygiene, poor access to water and overcrowding were reported to be associated with high prevalence of bacterial skin infections, scabies and skin reactions to insect bites [3].

Human immunodeficiency virus infection leads to progressive damage of the human immune system giving an opportunity for life-threatening opportunistic infections as well as cancers to thrive [4]. Infection with the Human Immunodeficiency Virus (HIV) has a devastating effect. Individuals, families and communities continue to be affected, particularly in sub-Saharan Africa [5,6]. Nigeria has a national HIV prevalence of 1.4 percent, with more than 1.9 million Nigerians living with HIV/AIDS by the year 2021, making Nigeria the fourth-highest country in the world in terms of HIV burden [5]. HIV/AIDS is a global health problem, with an estimated 38 million people (31.6 million -44.5 million) living with the virus as of the end of 2019, and 1.8 million (1.3 million-2.4 million) of them were children under the age of 15, the majority of whom lived in sub-Saharan Africa [6-8].

Some studies pointed out that one or more factors determine the prevalence of skin disorders among HIV/AIDS infected children [9-14]. These factors include; degree of immunosuppression, sociodemographic factors and use of Anti-retroviral drugs.

Wananukul, et al. [9] in Thailand studied 91 HIV positive children under the age of 13 years born to HIV positive mothers for skin disorders, they found skin disorders among 4.0%, 62.0% and 74.0% of those with mild, moderate and severe immunosuppression respectively.

Another study by Wananukul, et al. [10] in Thailand found prevalence rates of 62.0%, 43.0% and 20.0% of skin disorders among children under the age of 13 years with severe, moderate and mild immunosuppression respectively. Panya, et al. [11] in Tanzania found prevalence of skin disorders among children 6 months to 16 years with mild, moderate and severe immunosuppression to be 71.0%, 84.5% and 97.0% respectively.

Umoru, et al. [12] in Benin City, Nigeria, in a cross sectional study among 100 HIV infected children and equal number of age and gender matched non- HIV infected children, found 98.3% of those with severe immunosuppression had skin disorders, 55.2% of those with moderate immunosuppression and 46.1% of those with no immunosuppression had skin disorders. All above studies

pointed out the effect of degree of immunosuppression on prevalence of skin disorders among HIV infected children.

Yichalal, et al. [13] found no significant difference in the prevalence of skin disorders among HIV-infected children aged less than 5 years and HIV-infected children greater than 5 years. The prevalence of skin disorders was 77.7% among those less than 5 years and 71.7% among those greater than 5 years. Males and females were found to be equally affected by the skin disorders (72.5% and 72.6% respectively).

Similarly, Panya, et al. [11] in Tanzania, found males and females to be equally affected by skin disorders.

Umoru, et al. [12] in Benin, Nigeria 2012 found skin disorders to be more common among HIV infected children 5-10 years (48.8%), 43.8% of the participants with skin disorders were less than 5 years and 7.8% were adolescents. No difference was observed in the occurrence of skin disorders among HIV infected children of different gender.

Shittu, et al. [14] in Ilorin, Nigeria, utilized a descriptive cross sectional design to study the skin disorders in HIV infected individuals. They were able to demonstrate a higher prevalence of skin disorders among HIV infected individuals from low socioeconomic status. However, adults aged 18 years and above were the participants in the study.

Reula, et al. [15] in Spain, carried out a retrospective observational study of 210 HIV infected children over two decades. They determined the role of antiretroviral therapies in mucocutaneous manifestations in the HIV- infected children and found a significant decrease in the prevalence of mucocutaneous manifestations in children with HIV on HAART, as only 10% of those on HAART had any type of mucocutaneous manifestation.

In Ibadan, Nigeria, Katibi, et al. [16] studied 150 HIV -infected children for presence of skin disorders, 83.3% of those not on ART had skin disorders while only 42.5% of those on ART were found to have skin disorders.

Local literatures on the factors affecting prevalence of skin disorders among HIV infected children are limited in number.

OBJECTIVES

To determine the effect of degree of immunosuppression on prevalence of skin disorders among HIV infected children attending paediatric infectious disease clinic in AKTH.

To determine the effect of socio-demographic factors such as age, gender, socio-economic status on the prevalence of skin disorders among children attending paediatric infectious disease clinic in AKTH.

To determine the effect of use of Anti-retroviral drugs on skin disorders among HIV/AIDS infected children attending paediatric infectious disease clinic in AKTH.

MATERIALS AND METHODS

The study was a cross-sectional study to determine the factors affecting prevalence of skin manifestations among HIV infected children Aged 6 weeks to 14 years attending paediatric infectious disease clinic of AKTH.

After obtaining Ethical clearance from the Ethical and Research Committee of Aminu Kano Teaching Hospital, as well as informed consent from the parents and verbal assent from children aged > 7 years, the study recruited 223 HIV-positive children using a systematic sampling process. The confidentiality of the information was maintained. Children who declined a physical examination, children with malignancies, children on long-term steroids (more than one month), and children on cytotoxic drugs were all excluded from the analysis.

The research was conducted between July 10th and October 20th, 2017. Data was collected using a pre-tested interviewer-administered questionnaire. A sociodemographic history was gathered, as well as the history of any skin lesions that might have been present. The participants' socioeconomic status was determined using the approach proposed by Oyedeji [17] (Appendix 1).

After sufficient exposure of the patient by the investigator to identify any potential skin lesions, the investigator performed a thorough dermatological examination of the hair, scalp, trunk, nails, oral mucosa, genitalia, and extremities, as well as a complete physical examination of all systems on each child in a well-lit space. The children were examined with the aid of a chaperon. Every lesion was photographed. The majority of the diagnoses were taken on the basis of clinical evidence. Lesions requiring further diagnosis and care were referred to the Aminu Kano

Teaching Hospital's dermatology clinic, whereas those with easily treatable disorders were prescribed medications.

Rapid HIV antibody testing using the Determine® process, PCR, CD4+ count, and full blood count are all part of the standard workup for all patients attending the PIDC, which is funded by the Institute of Human Virology (IHVN-N CDC/UMD-PEPFAR) program, and were retrieved from the subject's file. A CD4+ count taken about three months prior to recruitment was used.

The data was entered into SPSS version 24, a computational kit for social sciences. Frequency tables and charts were created using the data. The Chi-square test or the Fisher exact test is used to assess differences in proportions of categorical variables (where necessary) and level of significance was set at 0.05.

Multivariate analysis was used to further analyse significant relationships from the univariate analysis. The confidence level was set at 95% and a *p*-value less than 0.05 was considered statistically significant.

RESULTS

The study recruited 110 (49.3%) males and 113 females (50.7%) with male to female ratio of 1:1.1 Most of the study participants were in the age group of 5-9 years. Seventy-eight percent (78%) of the children had one or more skin disorders.

Tables 1 & 2 show that skin disorders were significantly more prevalent among HIV-infected children from low socio-economic class ($\chi^2 = 8.61, p < 0.001$), those with severe immunosuppression ($\chi^2 = 13.07, p \text{ value } 0.001$) and those aged 5-9 years.

Table 1: Factors associated with skin disorders among HIV infected children.

Characteristic	Frequency of skin lesion <i>n</i> = 223 (%)		χ^2	<i>p</i> - value
	Present	Absent		
Age (years)				
0-4	64 (28.7)	159 (71.3)	6.01	0.05**
5-9	69 (30.9)	154 (69.1)		
10-14	41 (18.4)	182 (81.6)		
Sex				
Male	86 (38.6)	137 (61.4)	0.003	1.00
Female	88 (39.5)	135 (60.5)		
Childs socio-economic class				
Lower	78 (35.0)	145 (65.0)	8.61	0.01**
Middle	65 (29.1)	158 (70.9)		
Upper	31 (13.9)	192 (86.1)		
Immune status				
Mild immunosuppression CD4% >25%	29 (13.0)	194 (87.0)	13.07	0.001**
Moderate immunosuppression CD4% 15-24.9%	23 (10.3)	200 (89.7)		
Severe immunosuppression CD4% <15%	122 (54.7)	101 (45.3)		

χ^2 : Chi-square; *n*: number of subjects; **significant.

Table 2: Independent Predictors of skin disorders among HIV infected cases.

Variable	p value	Crude OR	Adjusted OR	95% CI Lower limit	95% CI Upper limit
Socioeconomic class					
Lower	0.01	0.87	2.376	1.218	4.636
Middle/Upper (reference category)		1			
Degree of immunosuppression					
Severe	0.001	1.140	3.128	1.629	6.006
Mild/moderate (reference category)		1			
Sex					
Male	0.52	0.21	1.24	0.65	2.350
Female (reference category)		1			
Age					
0-4years	0.23	0.63	1.87	0.68	5.19
5-9years	0.04	0.99	2.69	1.03	7.06
10-14 years (reference category)		1			

OR: Odds Ratio; CI: Confidence Interval

A Multivariate analysis showed that social class, immune status and age were significantly associated with the occurrence of skin disorders. HIV infected children from low socioeconomic class were more likely to have skin diseases Odds ratio = 2.38 at 95% Confidence interval (1.218–4.636), $p = 0.01$ compared to those in middle and upper socioeconomic class and those with severe immunosuppression were more likely to have skin disorders Odds ratio = 3.128 at 95% Confidence interval (1.629–6.006), $p = 0.001$ compared with those with moderate and mild immunosuppression. Children aged 5–9years were also more than two and half times more likely to have skin disorders compared with those aged 0–4years and those aged 10–14years odds ratio = 2.69 at 95% Confidence interval (1.03–7.06), $p = 0.04$. This is demonstrated in table 2.

DISCUSSION

Findings in this study have shown that Immune status was significantly associated with the occurrence of skin disorders, which is reported by many authors in literature. This is in keeping with the findings of Wannanukul, et al. [10], Panya, et al. [11] Yichalal, et al. [2] Umore, et al. [12] and Osinaike, et al. [18]. A study in Ibadan, Nigeria [16] was also able to correlate severe immunosuppression with high prevalence of skin diseases. Although their studies used different HIV staging system and recruited children of different age groups they all reported that skin lesions were more frequent as the immune status declined. Increasing reduction of T lymphocytes number and functions as the HIV disease progress is probably the reason for increasing prevalence of skin diseases that usually occur as the disease progresses. These data may also be explained by the immunological and nutritional alterations caused by HIV disease, which are more pronounced in patients with advanced-stage disease [19].

The high prevalence of skin disorders among HIV-infected children correlate with low socioeconomic status.

A study in Ilorin, Nigeria [14] also demonstrated higher prevalence of skin disorders among HIV infected people from low socioeconomic class. The similarity found between this study and that in Ilorin, Nigeria [14] despite the differences in age of study population in this study (6 weeks to 14 years) and that in Ilorin [14] (adults 18 years and above) may be because the socio economic class of the children in this study was obtained from the characteristics of their parents who are also adults. Low socio economic class is known to be associated with higher risk of chronic diseases, including skin diseases [20]. The increased risk of chronic diseases among those from low socioeconomic class is a result of unequal distribution of opportunity to live a healthy life among different social classes such as; access to health care, educational attainment, relative deprivation, access to sanitation and variable exposure to environmental hazards among others [20].

This study showed that the prevalence of skin disorders was significantly higher among children aged 5–9years. This is similar to what was observed by Umore, et al. [12] in Benin, Nigeria who found skin disorders to be more prevalent among school aged children (48.4%). Panya, et al. [11] in Tanzania also reported higher prevalence of skin disorders among children aged 6–10years which is similar to findings in this study. While Endayehu, et al. [13] in Ethiopia found prevalence of skin disorders to be higher among HIV infected children less than 5 years (77.7%) compared to those less than 5 years (71.7%) even though the difference is not statistically significant. The differences observed in the prevalence of skin disorders among different age groups in various studies may be as a result of differences in cultural practices that predispose some age groups to some environmental factors which can cause skin disorders which are more common in some areas.

This study showed no significant difference in the prevalence of skin disorders among HIV infected children of different sexes. This is different from findings in Benin,

Nigeria [12]. Their study showed that skin lesions were more prevalent among males (62.0%). Studies in Ethiopia [13] and Abuja, Nigeria [21] were also able to show differences in prevalence of skin disorders among HIV-infected children based on gender. This may be as a result of composition of study population in terms of gender in their study and this study. However, the effect of socio-demography on the incidence of skin disorders can be seen in the higher prevalence of certain skin disorders in certain genders, age groups, and locations [2].

CONCLUSION

This study demonstrated that among the HIV infected children attending PIDC clinic of Aminu Kano Teaching Hospital, the most significant factors associated with development of skin disorder are; age, immune status and socioeconomic class.

LIMITATION OF THE STUDY

This study was unable to determine the effect of ART use on the prevalence of skin disorders among HIV infected children because 98.0 % of the participants were on ART this is in accordance with the current Nigerian National guideline for treatment of HIV infected people.

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