Pattern of Skin Disorders and Associated Factors Among Human Immunodeficiency Virus (HIV) Infected Children in Aminu Kano Teaching Hospital Kano, Nigeria

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ABSTRACT

Background: The skin is one of the earliest systems affected by HIV/AIDS. Factors such as degree of immunosuppression, sociodemographic factors and use of antiretroviral drugs were found to be associated with skin disorders among HIV infected children. Knowledge of these skin disorders and the associated factors may aid in early diagnosis of HIV amongst infected children in Nigeria.

Objective: To determine the factors associated with skin disorders in HIV infected children at Aminu Kano Teaching Hospital Kano, Nigeria (AKTH).

Methods: This is a cross-sectional study of 223 HIV infected children aged 6 weeks to 14 years. Descriptive statistics were done using SPSS 24. Tables were used to document frequency and percentages. Chi-square test or Fishers exact test were used where necessary to determine the difference between proportions of categorical variables and level of significance was set at 0.05.

Results: A significant association was observed between low socio-economic class and infections and infestations (p value - 0.005), more specifically the bacterial skin infections (0.04). Severe immunosuppression was significantly associated with fungal skin dermatoses (p value - 0.03).

Conclusion: Pattern of skin disorders among HIV infected children was associated with their socioeconomic class and degree of immunosuppression. These findings suggest that the skin infections in HIV infected children can be controlled with improving the economic status and immunity of the affected.

Schéma des troubles cutanés et facteurs associés chez les enfants infectés par le virus de l'immunodéficience humaine (VIH) à l'hôpital universitaire Aminu Kano de Kano, au Nigéria.

Abstrait

Contexte: La peau est l'un des premiers systèmes touchés par le VIH/sida. Des facteurs tels que le degré d'immunosuppression, les facteurs sociodémographiques et l'utilisation de médicaments antirétroviraux se sont avérés associés à des troubles cutanés chez les enfants infectés par le VIH. La connaissance de ces troubles cutanés peut aider au diagnostic précoce du VIH chez les enfants infectés au Nigéria.

Objectif: Déterminer les facteurs associés aux troubles cutanés chez les enfants infectés par le VIH à l'hôpital universitaire Aminu Kano de Kano, au Nigéria (AKTH).

Méthodes: Il s'agit d'une étude transversale portant sur 223 enfants infectés par le VIH âgés de 6 semaines à 14 ans. Des statistiques descriptives ont été réalisées à l'aide de SPSS 24 : des tableaux ont été utilisés pour documenter la fréquence et les pourcentages. Le test du chi carré ou le test exact de Fishers ont été utilisés au besoin pour déterminer la différence entre les proportions de variables catégorielles et le niveau de signification fixé à 0,05.

Résultats: Une association significative a été observée entre la classe socio-économique faible et les infections et infestations (valeur p - 0,005), plus précisément les infections bactériennes de la peau (0,04). Une immunosuppression sévère était significativement associée à des dermatoses cutanées fongiques (valeur p - 0,03).

Conclusion: La tendance des troubles cutanés chez les enfants infectés par le VIH était associée à leur classe socioéconomique et à leur degré d'immunosuppression. Ces résultats suggèrent que les infections cutanées chez

les patients atteints du VIH peuvent être contrôlées en améliorant le statut économique et l'immunité des personnes touchées.

Mots-clés: Troubles cutanés, Enfants infectés par le VIH, Classe socioéconomique, Immunosuppression.

Introduction

Human immunodeficiency virus infection (HIV) is a global health problem, estimated to have infected more than 38 million people worldwide by the end of 2019. About 1.8 million among the infected people were children less than 15 years mostly from sub-Saharan Africa. Nigeria has a national HIV prevalence of 1.4 percent, and more than 1.9 million Nigerians are estimated to live with HIV/AIDS by the year 2021. Nigeria has the fourth-highest HIV burden in the world.[1] Skin disorders are important in HIV infected children as they contribute to the risk of other illnesses like glomerulonephritis, sepsis, heart diseases and cancers.[2]

The skin is one of the earliest systems affected by HIV/AIDS.[3] The decrease in CD4+T cell count, the shift in Th2 cytokine profile, the molecular mimicry (a mechanism where foreign antigen shares sequence or structural similarities with self-antigen) and over expression of super antigens (antigens that cause non-specific activation of T- cells and massive cytokine release) are very significant factors in the development of skin diseases in HIV infection. Some factors such as degree of immunosuppression, sociodemographic factors and use of antiretroviral drugs were found to be associated with skin disorders among HIV infected children by some authors.[4-6] In a study by Wannukul *et al*[7], where 91 HIV infected children were recruited, they found that seborrheic dermatitis was associated with mild immunosuppression.

Umoru *et al* [8] in Benin City, Nigeria, observed a significant association between pruritic papular eruption (PPE) and severe immunosuppression; and infections and infestations were more common among HIV patients with severe immunosuppression. Pityriasis versicolor and acne were seen among HIV patients with no immunosuppression. Yichala *et al* [9] found that non-infectious dermatoses were more prevalent among children older than 5 years (46.4%), compared with those less than 5 years (35.5%). While infectious dermatoses were more common among children less than 5years (96.4%) compared with children 5-10years (78.8%) and those > 10years (81.4%); these were not significant, p value - 0.62 and 0.32 respectively. Nagendran *et al* [10] in India observed that the advent of HAART had significantly altered the pattern of mucocutaneous manifestations irrespective of age and gender. The prevalence of both infectious and inflammatory dermatoses had also reduced with the use of HAART; although an increased incidence of adverse cutaneous drug reactions was observed. This study highlights the factors affecting pattern of skin disorders among HIV infected children in Northern Nigeria which will ultimately aid early diagnosis and management.

Objectives

To determine the factors associated with types of skin dermatoses among HIV infected children attending pediatric infectious disease clinic in Aminu Kano Teaching Hospital Kano, Nigeria (AKTH).

Methods

This was a cross-sectional study among children aged 6 weeks to 14 years who attended paediatric infectious disease clinic of AKTH. Two hundred and twenty-three HIV infected children were recruited into the study between July and October 2017 using a systematic sampling method. Ethical clearance was obtained from the Ethical and Research Committee of Aminu Kano Teaching Hospital (NHREC/21/08/2008/AKTH/EC/1447, AKTH/MAC/SUB/12A/P-3/VI/1547), while informed consent was taken from the parents and verbal assent from children aged > 7years. Children who refused a physical examination, have malignancies and those <7years whose HIV status was undisclosed to them were excluded from the study. Others excluded included those who had been on steroids for more than one month and those on cytotoxic drugs.

A pre- tested interviewer administered questionnaire was used to collect the data. The social class of the participants was calculated using Oyedeji´s classification.[11] The whole skin was

examined in a well-lit room after adequate exposure of the patient by the investigator to identify all possible lesions. Pictures of the skin lesions were taken and physical examination of all systems was carried out on each child. Most of the diagnoses were made clinically, and patients needing further evaluation and treatment were referred to the dermatology clinic of the Aminu Kano Teaching Hospital while those with readily treatable conditions had drugs prescribed. Rapid HIV antibody testing by determine® method, PCR, CD4+ count, and Full blood count were retrieved from the subject's record. CD4+ counts done within 3 months of the study recruitment period was used.

The data was entered into a statistical package for the social sciences SPSS version 24 which was used to generate frequency tables and charts. Descriptive statistics were used, and data documented as frequencies and percentages. Differences between proportions of categorical variables were evaluated using the Chi-square test or the Fisher exact test (where necessary). The confidence level was set at 95% and a *p*-value less than 0.05 was considered statistically significant.

Results

Two hundred and twenty-three HIV infected children aged 6 weeks to 14 years were enrolled. The mean age ± standard deviation of the HIV-infected children was 84.68 ± 40.34 month. There were 110 males (49.3%) and 113 females (50.7%) HIV positive children. Male to female ratio 1:1.1. Table 1 shows the socio-demographic characteristic of the study population.

There was no significant association between the types of skin disorders and age group or gender. This is shown in Tables11 and III. However, Tables IV shows that infections and infestations were significantly associated with low socioeconomic status among HIV-infected children (χ^2= 10.60, p value 0.005). Moreover, Table V shows a significant association between fungal skin infection and severe immune deficiency. (χ^2=6.97, p value 0.03).

Dermatophytoses were the most common skin lesions found in all age groups. (Figure I). Dermatophytoses (9%), oral candidiasis (4.5%), and pruritic papular eruptions (4.9%), Epidermodysplasis verriciformis (1.8%), herpes zoster (2.2%) and impetigo (1.8%) were more common among males, while furunculosis (6.7%) and atopic dermatitis (2.7%) were seen more in females. Viral warts, scabies and Seborrhoiec dermatitis were found equally in both sexes (Figure 2). Pruritic papular eruption (6.3%), oral candidiasis (4.9%), seborrheic dermatitis (2.7%) were more common among patients from low socioeconomic class. Dermatophytoses (6.7%), viral warts (3.6%), epidermodysplasia verruciformis (1.8%), and herpes zoster (1.3%) were more common among subjects from middle socioeconomic class. Impetigo (0.9%) was more common among subjects from upper socioeconomic class (Figure 3). Figure 4 shows that all skin disorders were more common with severe immunosuppression. Atopic dermatitis was seen equally among those with severe and moderate immunosuppression.

Table I: Socio-demographic characteristics of the study population.

Characteristic	HIV infected cases n= 223 (%)	HIV-negative controls n=223 (%)
Gender		
Male	110 (49.3)	110 (49.3)
Female	113 (50.7)	113 (50.7)
Age		
0-4 years	77 (34.6)	77 (34.6)
5-9 years	98 (43.9)	98 (43.9)
10-14years	48 (21.5)	48 (21.5)
Socioeconomic class*		
Lower	110 (49.3)	110 (45.3)
Middle	80 (35.9)	97 (43.5)
Upper	33 (14.8)	25 (11.2)
Child's ethnicity		
Hausa	185 (82.9)	192(86.0)
Yoruba	14 (6.3)	9 (4.1)
Igbo	12 (5.4)	8 (3.6)
Others	12 (5.4)	14 (6.3)

* Social class I&II: upper, social class III: middle and social class IV&V: lower

Table II: Types of skin disorders in HIV infected children among various age groups

Category of skin disease	Age in years				
	0-4years n =223 (%)	5-9 years n =223(%)	10-14years n =223(%)	χ^2	P value
Infections and infestations	50 (22.4)	50 (22.4)	23 (10.3)	4.67	0.10
Viral	16 (7.2)	11 (4.9)	13 (5.8)	6.15	0.05
Fungal	20 (8.9)	27(12.2)	7 (3.2)	3.15	0.21
Parasitic	2 (0.9)	5 (2.2)	1 (0.4)	#	0.65
Bacterial	12 (5.4)	7 (3.1)	2 (0.9)	5.58	0.06
Inflammatory	16 (7.2)	18 (8.1)	12 (5.4)	0.87	0.65
Miscellaneous	5 (2.2)	5 (2.2)	3 (1.3)	#	0.87

n number of subjects, % percentage, # Fishers exact test, χ^2 chi square

Table III: Types of skin disorders in HIV infected children and gender

Category of skin disease	Male n =223 (%)	Female n =223(%)	χ^2	P value
Infections and infestations	66 (29.6))	57 (25.5)	1.29	0.28
Viral	23 (10.3)	17 (7.6)	1.30	0.30
Fungal	29 (13.0)	25 (11.2)	0.55	0.53
Parasitic	4 (1.8)	4 (1.8)	#	1.00
Bacterial	10 (4.5)	11 (4.9)	0.03	1.00
Inflammatory	22 (9.9)	24 (10.8)	0.05	0.87
Miscellaneous	3 (1.3)	10 (4.5)	3.81	0.08

n number of subjects, % percentage, # Fishers exact test, χ 2 chi square

Table IV: Types of skin disorders in HIV infected children and socioeconomic class

Category of skin disease	High socioeconomic class n=223 (%)	Middle socioeconomic class n=223 (%)	Low socioeconomic class n=223 (%)	χ^2	P value
Infections and infestations	26 (11.6)	47 (21.1)	50 (22.4)	10.60	0.005 *
Viral	8 (3.6)	19 (8.5)	13 (5.8)	4.71	0.09
Fungal	10 (4.5)	18 (8.1)	26 (11.7)	0.96	0.61
Parasitic	1 (0.4)	3 (1.3)	4 (1.8)	#	1.00
Bacterial	7 (3.1)	7 (3.1)	7 (3.1)	6.51	0.04*
inflammatory	10 (4.5)	15 (6.7)	21 (9.4)	2.28	0.32
Miscellaneous	1 (0.4)	3 (1.3)	9 (4.0)	#	0.39

n number of subjects, % percentage, # Fishers exact test, χ^2 chi square

Table V: Types of skin disorders in HIV infected children and degree of immunosuppression

Category of skin disease	Mild CD4% >25% n=223(%)	Moderate CD4% 15-24.9% n=223 (%)	Severe CD4% <15% n=223 (%)	χ^2	P value
Infections and infestations	16 (7.1)	14 (6.3)	93 (41.7)	4.02	0.14
Viral	5 (2.2)	4 (1.8)	31 (13.9)	3.82	0.16
Fungal	5 (2.2)	7 (3.2)	42 (18.9)	6.95	0.03**
Parasitic	2 (0.9)	1 (0.4)	5 (2.2)	#	1.00
Bacterial	4 (1.8)	2 (0.9)	15 (6.7)	#	0.89
Inflammatory	11 (4.9)	7 (3.2)	28 (12.6)	0.32	0.89
Miscellaneous	2 (0.9)	2 (0.9)	9 (4.0	#	1.00

n number of subjects, % percentage, # Fishers exact test, χ^2 chi square, ** significant

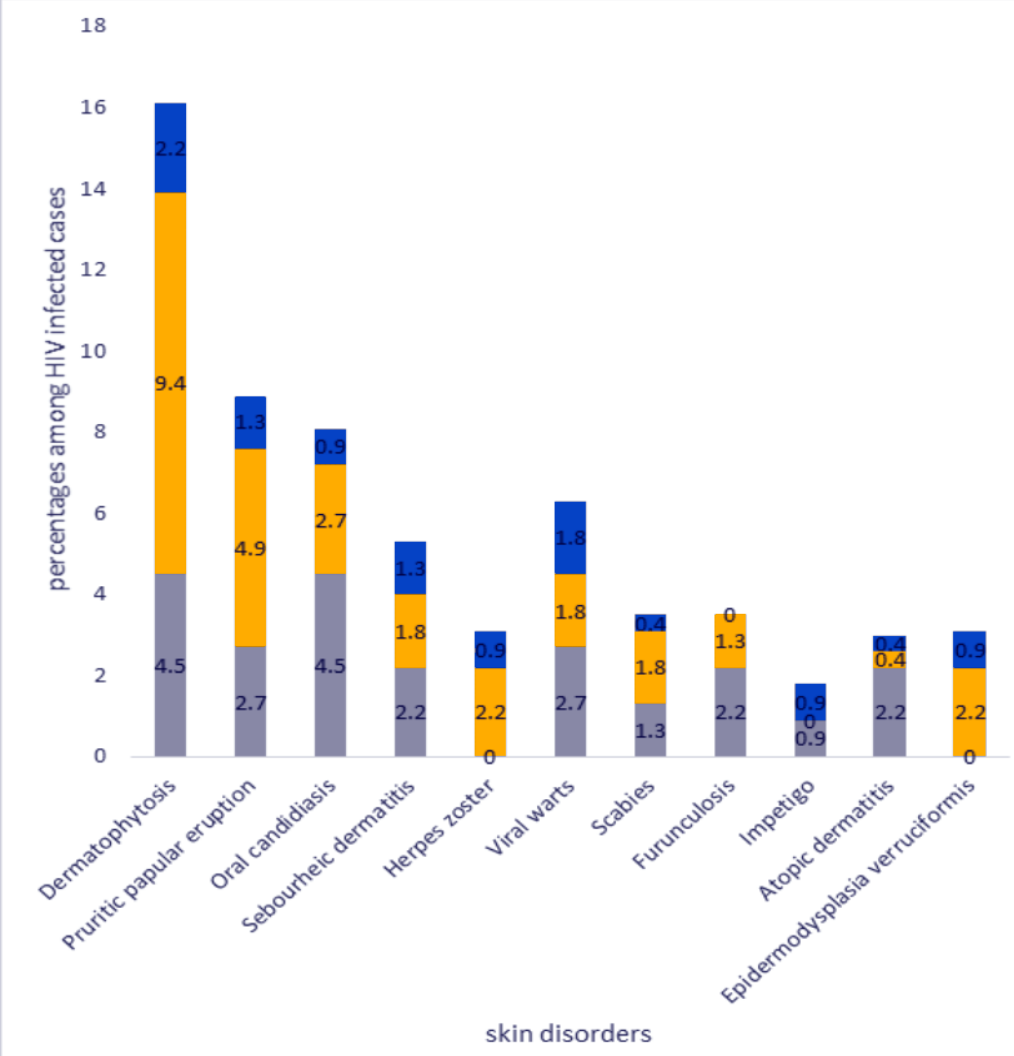

Figure 1: Comparison of types of common skin disorders among different age groups

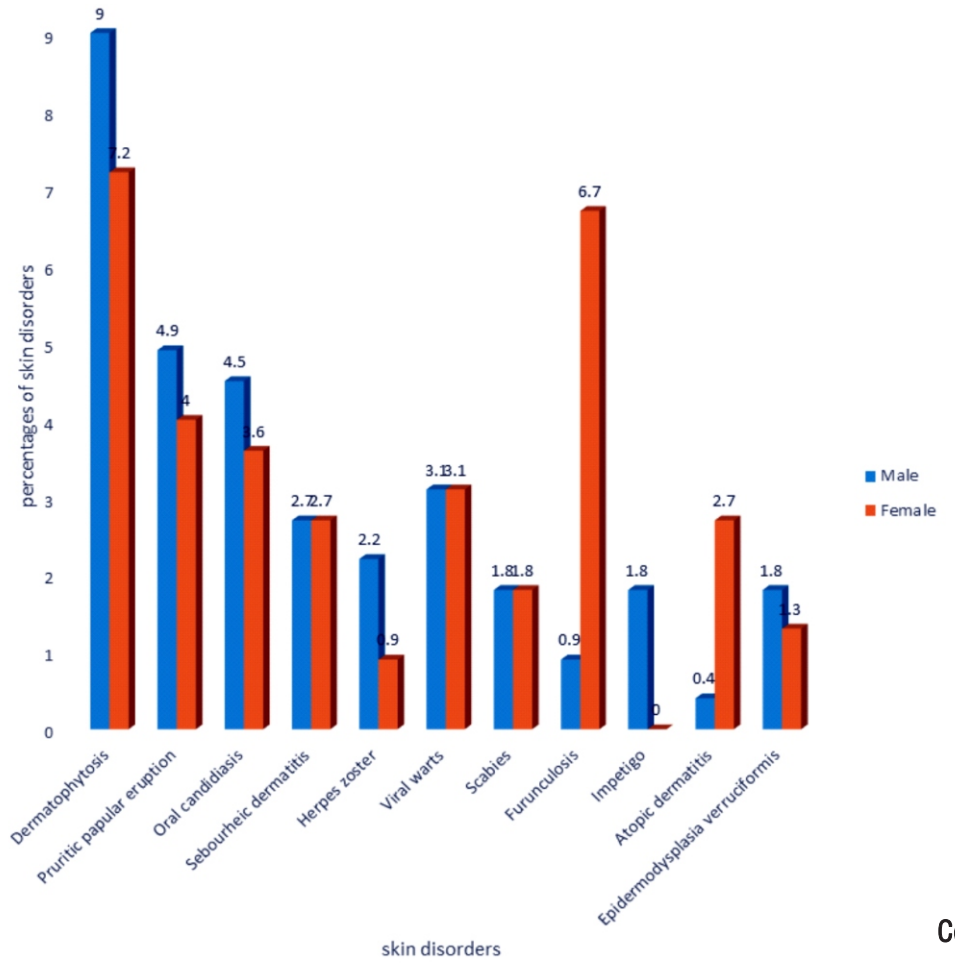

Figure 2
Comparison of types of common skin disorders with gender

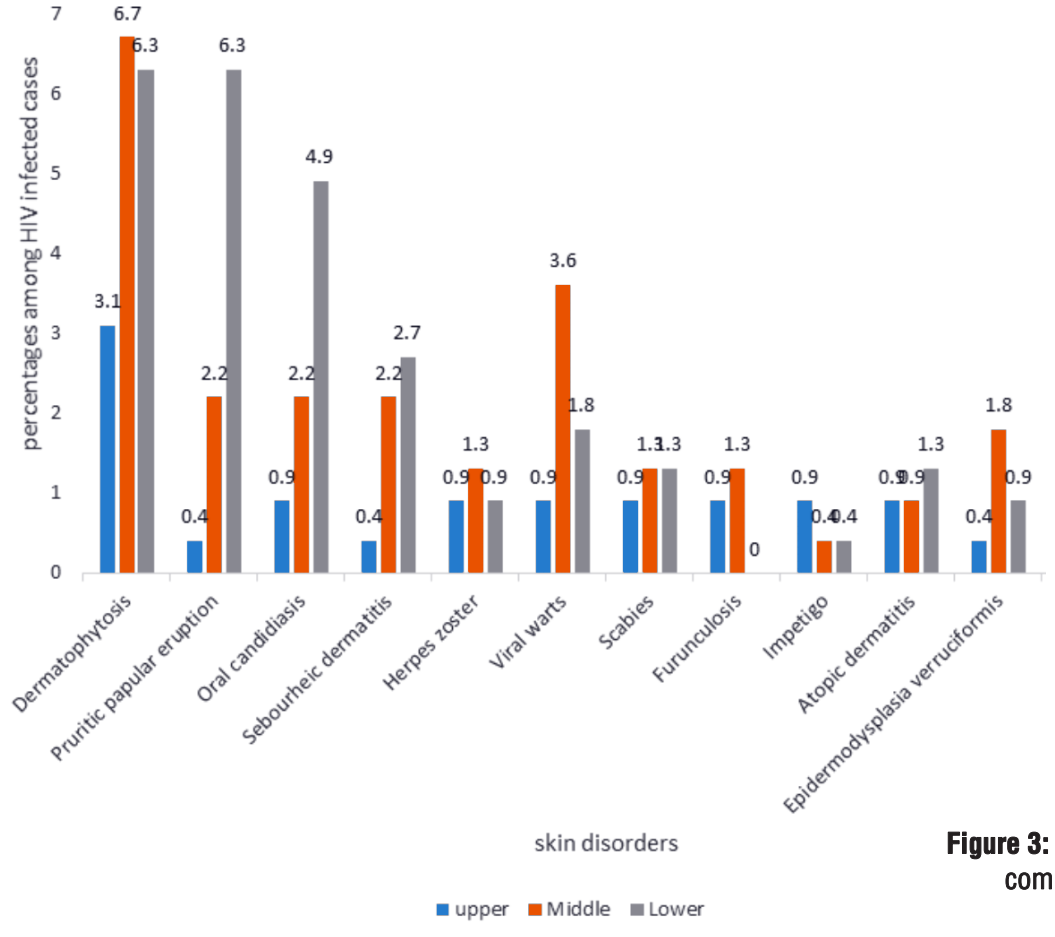

Figure 3: Comparison of types of common skin disorders and socioeconomic class

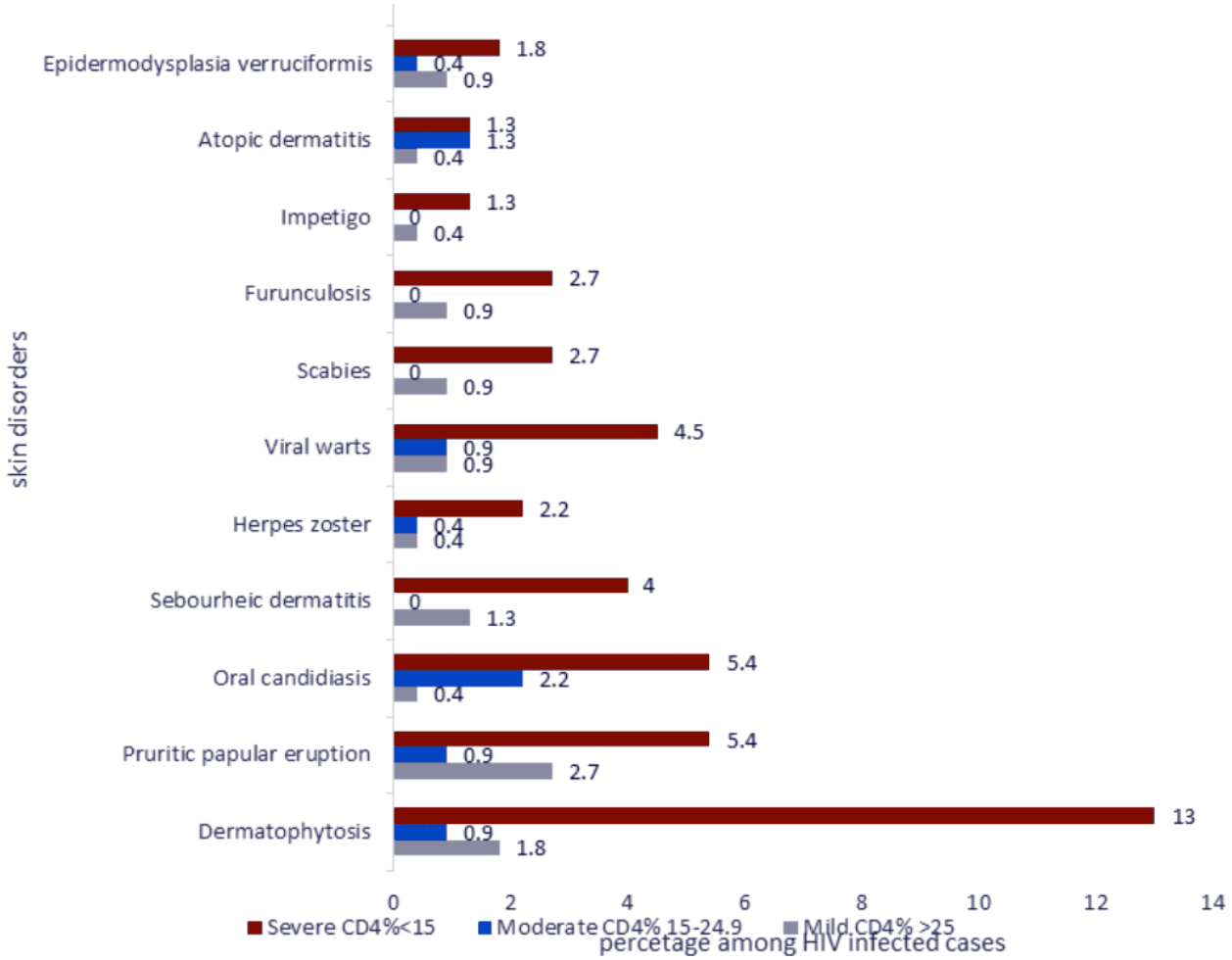

Figure 4: Comparison of types of common skin disorders by immune status

Discussion

This study showed no significant difference in the types of skin disorders among HIV-infected children of different ages or gender, but there was significant association observed between infections and infestations and low-socioeconomic status. There is pausity of studies on HIV infected children comparing social class to presence of different skin diseases. Several studies conducted among children whose HIV status were not considered have linked low socioeconomic status with the increased prevalence of certain skin disorders. Low socioeconomic class was found to be significantly associated with the occurrence of some skin disorders, especially infections and infestations. This was attributed to poor skin hygiene and sharing of personal items more common among lower socioeconomic class.[12,13]

Dermatophytoses were common in males (p value= 0.02), those aged 5-9years, those from low socioeconomic class and those with severe immunodeficiency in this study. This is similar to findings by Katibi *et al* [14] in Ibadan, Nigeria who studied children in similar age range. Dermatophytoses are frequently seen in HIV infected children especially those with low CD4 cell counts.[15] Pruritic papular eruption was significantly more common among children aged 5-9 years (p value= 0.01), males (p value=0.03), those from low socioeconomic status and those with severe immunosuppression (p value= 0.03). Panya *et al* [16] in Tanzania, reported PPE to be equally common in all ages and both sexes and more common among those with severe immuno suppression. Okechukwu *et al* [17] in Abuja, Nigeria found PPE to be most common among the severely immunosuppressed. This difference may represent differing environmental conditions of the study sites. Pruritic papular eruption is believed to be a form of hypersensitivity reaction of the skin to demodex folliculorum mite which is a normal commensal of

the hair follicle. The distortion of the immune system is also responsible for it being frequently encountered among HIV infected people along with other non-infectious dermatoses.[18]

Oral candidiasis was found to be more common among HIV infected children 0-5years (p value=0.01, males, those from low socioeconomic class (p value =0.03) and those with severe immunosuppression (p value =0.01) were more affected. Umoru *et al*[8] in Benin city, Nigeria found oral candidiasis to be more common among males aged 5-9years, and those with severe immunosuppresion. This study enrolled both old and new cases most of whom were on ART, while Umoru *et al*[8] recruited only new cases who had not started any treatment which perhaps resulted in the differences observed in the two studies.The duration of ART theraphy among the HIV infected children in this study (48% of the subjects were on ART for six to twelve months) may also be a contributing factor to the differences observed. Oral candidiasis may represent onset of severe immunosuppression among HIV infected subjects and can progress to involve the oesophagus or even become systemic.[19]

Viral wart was found to be more common among children aged 0-5years, among those from middle socioeconomic class and those with severe immunosuppression. No gender difference in frequency of its occurrence was observed. Smith *et al* [20] found viral warts to be associated with early stages of HIV disease different from what was found in this study. The difference may be because this study was among HIV infected children while Smith *et al* [20] recruited both children and adults in their study. Plane warts, and mucosal warts were the forms found in this study. Extensive plane warts have previously been described in the context of HIV.[21] However, reports have demostrated that viral warts can be seen in all stages of the HIV disease and is not associated with disease progression.[21]

Most of the skin disorders were associated with severe immunosuppression suggesting that they will present at low CD4 counts. This implies that infections and infestations (Figure 4) and dermatoses such as PPE and Seborrheic dermatitis can be used as makers of severity of HIV infection in children affected. It further suggests that use of ART which should improve the cell mediated immunity can improve response to treatment of the skin diseases.[4,22]

In conclusion, there was an association between the type of skin disorders among HIV infected children with their socioeconomic class and degree of immunosuppression. The findings from this study can be used as a baseline for further studies and for plan of control measures of HIV and associated skin diseases. These findings suggest that the skin diseases in HIV infected children can be controlled with improving the economic status and immunity of the affected.

Conflict of interest: None

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