

RESPIRATORY TRACT INFECTIONS IN CHILDREN INFECTED WITH HIV/AIDS IN MINNA, NIGER STATE, NIGERIA.

Abstract

Children with HIV/AIDS compared to immune competent ones develop respiratory tract infections in a pattern that are different in nature, severity and/or frequency. 50 children with laboratory confirmed HIV infection and 80 children with laboratory confirmation of HIV negative status were included in this study. Their ages ranged from 6 years to 14 years. All the patients were from urban areas. The study was aimed at determine the spectrum of bacterial agent that cause respiratory infection among HIV infected children as well as HIV uninfected children in Minna, Niger State and comparing the prevalence rate within different CD4 count. Sputum culture **Sample** was taken to determine the profile of bacterial infection. All isolates from the cultures were identified **using microbact identification kit** and their antimicrobial susceptibility were examined, all confirmed *S. aureus* isolates examined to check for all oxacillin resistance isolates. *Streptococcus pneumoneae* 15(89) and *Klebsiella pneumonia* 20(89) was the most common bacteria identified. 30% of the studied children were positive for at least one pathogenic bacterium. There was no significant different between the prevalence rate of infection among HIV infected children and uninfected children and the rate of infection among children with lower CD4 count was found to be significantly higher than those with higher CD4 counts.

Keywords: Respiratory, Children, infection, Immunosuppression and HIV.

INTRODUCTION

Respiratory tract infections in children infected with the human immunodeficiency virus (HIV) is common among HIV infected and uninfected children and in Niger state, **data on this problem are limited.** Although bacterial pneumococcal infections can occur throughout the course of HIV infection, they tend to develop more frequently in individuals with advanced immunosuppression (Hirschtick, et al., 1994). Bacterial respiratory tract infections occur commonly in persons infected with the human immunodeficiency virus (HIV) (Hull, et al., 2008) both more severe in children with HIV infection. The annual incidence of bacterial pneumonia in HIV-seropositive patients ranges from 5.5 to 29 per 100, compared with 0.7 to 10 per 100 in HIV-seronegative patients (Craiffa, et al., 1993). In developing countries, bacterial pathogens account for a majority of respiratory infections in HIV-infected individuals (Afessa, et al., 1998). Previous studies have shown variable distributions of organisms causing respiratory tract infection. The most common pathogens described have been *Staphylococcus aureus*, *Streptococcus pneumoniae*, and especially ***Salmonella spp*** (Hull, et al., 2008). Bacterial infections in both immunocompromise and immunocompitent children have always important causes of morbidity and

mortality in developing countries, as well as developed countries. In developed countries, as a result of improvements in socio-economic status, accessible and good quality medical services and highly effective and accessible antimicrobial therapy, bacterial infections is no more a problem as it is in developing countries (WHO/UNAID, 2006). Respiratory tract infection is a frequent complication found in children and in HIV-infected patients, which is usually associated with a poor prognosis.

MATERIALS AND METHODS

Hospital settings:

The hospital situated in Minna, North-central geopolitical zone of Nigeria. It serves as a referral center for HIV care in Niger state, in which it is situated, and neighbouring communities. The clinic provides care including antiretroviral therapy for HIV-infected children and is sponsored by the Government of Niger State. Ethical approval was obtained from the hospital research board and informed consent from the parent of the participants.

Participants

Participants of this study were children (both inpatient and outpatient) between two and sixteen years of age. The children and young adult will be in three groups,

- (i) Group one comprises of children that are not infected with HIV attending the selected hospital.
- (ii) Group two children were confirmed or present with history of HIV-infection.
- (iii) Group three comprises of exposed children that are not infected with HIV infection but either of thee

Study procedure

Samples that are coughed up are expelled into a clean, dry, sterile, wide-necked and Leak-proof container and were transported to Microbiology laboratory in an ice pack. All samples were examined macroscopically, processed and the appearances, consistency and colour were described according to the guidelines provided by Cheesbrough (2010). All samples were processed, cultured following standard microbiological procedure and identified using microbact identification kit. The isolates were grouped according to the type of heamolysis.

Result Presentation and Discussion

A total of 130 children were enrolled in this study, comprising 87 (66.9 %) males and 43 (33.1 %) females. Their ages ranged from 6 years to 14 years. The pathogenic bacteria isolated include *Klebsiella pneumonia*, *Klebsiella oxytoca*, *Proteus mirabilis*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Heamophilus influenzae*, *Staphylococcus aureus*, *Streptococcus pneumoneae*, *Streptococcus pyogenes*, *Viridans Streptococcus*, *Anaeareobics Streptococcus*. *Streptococcus pneumoneae* 15(89) and *Klebsiella pneumonia* 20(89) was the most common bacteria identified. Table 1 shows the frequency of occurrence of different bacterial identified.

Table 1: Frequency of Occurrence Pathogenic Bacteria Isolated from Sputum

Organism	Minna	
	Frequency	Percentage
<i>Klebsiella pneumoniae</i>	20	22.48
<i>Klebsiella oxytoca</i>	6	6.74
<i>Proteus mirabilis</i>	7	7.87
<i>Proteus vulgaris</i>	8	8.99
<i>Pseudomonas aeruginosa</i>	5	5.62
<i>Heamophilus influenza</i>	4	4.49
<i>Staphylococcus aureus</i>	11	12.36
<i>Streptococcus pneumoneae</i>	15	14.00
<i>Streptococcus pyogenes</i>	4	4.49
<i>Viridans Streptococcus</i>	5	5.62
<i>Anaearobics Streptococcus</i>	4	4.49
Total	89	

Klebsiella pneumoniae was the most commonly indentified gram-negative bacteria. The frequency of *Klebsiella oxytoca*, *Proteus mirabilis*, *Proteus vulgaris* and *Pseudomonas aeruginosa* varies. *Streptococcus pneumoneae* was the most common gram-negative bacteria followed closely by *Staphylococcus aureus*

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Table 2: Prevalence of Respiratory Infections among Different Age Group in Minna.

Age group (Years)	Minna		
	No. Examined	No. Positive	% Positive
6 < 8	19	7	36.84
8 < 10	16	9	56.25
10 < 12	25	6	24.00
12 < 14	29	19	65.52
Total	89	42	47.19

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108 Table 2 shows the Prevalence of Respiratory Infections among Different Age Group in
109 Minna. The highest prevalence rate was found among age group 12 < 14 (66%) and the
110 lowest prevalence rate was found among 10 < 12 (24).

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Table 3: Distribution of Respiratory Infections in Relation to CD4 Count in HIV Positive Samples in Minna.

CD4 Count (cell/ul)	Minna		
	No. Examined	No. Positive	% Positive
<100	3	3	100.00
100 – 200	10	6	60.00
201 – 400	3	0	0.00
401 – 600	10	2	20.00

> 600	24	8	33.33
Total	50	19	

Discussion

Despite major efforts in scientific understanding of effective interventions that reduce complications due to children's HIV infection, over the last year, global estimates for newly acquired HIV infections in this population remain high (Luo, 2000). The respiratory tract infection plays a key role in HIV/AIDS pathogenesis and mortality, because of suppressed immunologic responses. In the infantile population, the resultant respiratory infections complications from HIV infections can contribute to nutritional deficiency with consequent aggravation of the immunologic conditions (Gassama et al., 2001). In developing countries, the most common causes of respiratory infections could be as a result of huge geographical variation, overcrowded settlement and unhygienic personal hygiene.

In this study of HIV-infected children, *streptococcus pneumoniae* and *Klebsiella pneumoniae* was the most common respiratory tract infection resulting in high mortality rate of HIV infected children. There was a frequent coincident respiratory infection among the studied group as shown in table 1. There are higher frequency of *streptococcus pneumoniae* and *Klebsiella pneumoniae* because the participants were from out-patient department of the hospital and these organisms were always considered as community acquired organisms. This is consistent with other HIV-infected paediatric cohorts described from both developing and developed settings (Mulenga, et al., 2007), (Gona, et al., 2006). The relative prevalence of most bacterial pathogens is similar to that of HIV-uninfected children. In a large Kenyan study *S. Pneumoniae* and *H. influenzae* were more common in HIV-infected children (Berkey, et al., 2005). These organisms were commonly seen in malnourished children in the pre-HIV era. *S. pneumoniae* is the most common organism in other cohorts, with *S. Aureus* and *Viridian Streptococcus* occurring frequently (Spector, et al., 1994), (McNally, et al., 2007), (Madhi et al., 2000), (Cotton, et al., 2008). *P. aeruginosa* is also seen occasionally. The proportion of *H influenzae* is influenced by the introduction of the *H. influenzae* type B (Hib) vaccine, in 1999 in South Africa.

Table 2 shows the prevalence of respiratory tract infection in relation to age group. The older participants had higher prevalence of respiratory infection because most of them are highly exposed to the bacteria in their schools and among their peer groups. At this period, children are rarely under the parental control, they play around with their friends both at home and in the school and they are at higher risk of being exposed to this pathogen (Mulenga, et al., 2007). Poor overcrowded settlements and inadequate sanitation can also contribute to the high infection rate. Younger children are protected and enjoy parental care which can prevent them from being exposed to the bacteria.

When comparing the prevalence rate within the ranges of CD4 counts, participants whose CD4 counts are below 100 cells/ul had highest prevalence rate in all the selected local

government, follow strictly by participants whose CD4 counts are within the ranges of 101cells/ul – 200cells/ul. Although according to CDC in 2014, HIV seropositive individual with CD4 count lesser than 200 are progressing rapidly to AIDS disease and are at higher risk of acquiring opportunistic infection which agrees with the result of this study. Participants from hospital a slight higher prevalence rate which could be attributed to the fact that Chanchaga is a referrer hospital and attends to a wider range of clinical infections and complicated situation than all other selected hospitals. The presence of higher prevalence of infections among children with lower Cd4 counts could be as a result of compromised immune system. However, severe immunosuppression, established according TCD4+cell count, showed to be an important factor related to this respiratory tract infection (Brenchley, etal., 2004).

Conclusion: The number of potential pathogenic agents identified in sputum of the asymptomatic HIV-sero positive children is high, and the frequency of pathogen bacteria observed was similar to that one observed for the non-H IV-infected children in south western part of the country. The percentage prevalence of respiratory infection among children with low CD4 count is relatively high. These data raise the pressing necessity of additional studies in different regions of the country, aiming at the clarification of the importance of each of these agents in the etiology of the respiratory tract infection in the sero-positive children population.

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