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Bacteraemia in Febrile HIV Patients Hospitalized in a Tertiary Hospital in Abuja, Nigeria

Vivian G. Kwaghe[1], Samuel Ajayi[2], Zaiyad G. Habib[1], Abdulrazaq G. Habib[3]

[1]University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.
[2]University College Hospital, Ibadan, Nigeria.
[3]Aminu Kano Teaching Hospital, Kano, Nigeria.

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ABSTRACT

Background: Bacteraemia is significantly associated with underlying Human Immunodeficiency Virus (HIV) infection and is often life-threatening. Streptococcus pneumoniae, non- typhoidal salmonella (NTS), Staphylococcus aureus and Escherichia coli have been shown in various studies to be common organisms that cause bacteraemia in HIV patients in other parts of Sub Saharan Africa (SSA). **Methods:** The study was a cross sectional analytical study carried out on febrile HIV infected adults who were admitted into the medical wards of the University of Abuja Teaching Hospital (UATH), North Central Nigeria. Blood cultures and other relevant laboratory investigations were carried out on admission. The patients were followed up for a period of one month and outcome thereafter was evaluated. **Results:** A total of 145 HIV positive patients with a mean age of 37.5 years (range 18-75 yrs.) were studied. The prevalence of bacteraemia was found to be 28.3%. The common causative pathogens were Streptococcus pneumoniae, Staphylococcus aureus and Klebsiella pneumonia, with Streptococcus pneumoniae being the most common isolate. Mortality was higher in the bacteremia group (51.2%) compared to the non bacteraemic group (32.7%) [P-value = 0.04] as well as among those with severe immunosuppression (96.4%) compared to those with CD4 cell counts above 200 cells /ml (3.6%)[p-value=0.004]. **Conclusion:** Bacteremia is common among febrile HIV patients presenting at the University of Abuja Teaching Hospital and it is associated with a high mortality rate. Streptococcus pneumoniae is the commonest causative organism.

Keywords: Bacteraemia, Febrile, HIV.

INTRODUCTION

Systemic infections in Acquired Immunodeficiency Syndrome (AIDS) patients frequently have the concomitant presence of pathogens in the blood due to failure to contain these infections at the primary focus by the host defenses.[1] AIDS patients present a disorder of the immune system mainly related to functional abnormalities and quantitative depletion of CD4+ T lymphocytes. In addition, they also have deficiency of B-lymphocytes, macrophages and polymorphonuclear cells. This complex disorder of the immune system leads not only to the increased susceptibility of HIV patients to opportunistic pathogens but also to conventional bacterial agents.[2] Bacteremia is significantly associated with underlying HIV infection and is often life-threatening. High-grade bacterial infections are in general far more common than opportunistic infections in patients infected with HIV who live in SSA.[3] Streptococcus pneumoniae, non- typhoidal salmonella (NTS), Staphylococcus aureus and Escherichia coli have been shown in various studies to be the commonest organisms causing bacteremia in other parts of SSA.[4-7] Paucity of equipped microbiology laboratory services in many hospitals in SSA allows most of these pathogens to go undiagnosed and their roles remain unclear. This study was conducted to characterize the responsible organisms and their role in outcome among hospitalized febrile HIV patients in a teaching hospital in Nigeria.

Name & Address of Corresponding Author
Dr. Vivian G. Kwaghe
Department of Internal Medicine,
University of Abuja Teaching Hospital,
Gwagwalada, Abuja,
Nigeria.

Aim

1. To determine the prevalence and etiology of bacteremia among febrile HIV patients admitted into our medical wards.
2. To evaluate the outcome of these patients after 1 month of follow up.

MATERIALS AND METHODS

Study Design and methodology

The study was carried out on febrile HIV infected adults who were admitted into the medical wards of the University of Abuja Teaching Hospital (UATH)

with axillary temperatures of ≥ 38ºC. It was a cross sectional analytical study carried out over a one year period. HIV infected patients detected to have fever with axillary temperatures of ≥ 38ºC at the time of initial presentation were recruited into the study. Upon admission, venous blood was collected from all consenting patients after disinfecting their skin with 0.5% chlorhexidine followed by 70% isopropyl alcohol. The blood samples were inoculated directly into brain heart infusion and thioglycolate culture media for aerobic and anaerobic cultures respectively prior to commencement of antibiotics. Both cultures were incubated at 37oC and sub-cultured on chocolate and sheep agar.

Other relevant investigations including full blood count (FBC), CD4+ cell count, liver function tests (LFTs), serum electrolytes, urea and creatinine (E/U/CR) and chest X-rays were conducted. Empirical treatment with intravenous ceftriaxone 1g 12 hourly and other adjunctive therapies were initially commenced and subsequently changed to susceptible antibiotics after culture results were obtained. Every patient was followed up for a period of one month at the end of which outcome measures (being dead or alive) were evaluated.

Data Analysis

Data was double-entered into EPI-INFO version 6.04b, validated and analyzed using SPSS 16. The patients' demographics and characteristics were summarized using frequencies, percentages, mean with standard deviations. Chi-square test was used to explore relationship between categorical variables and a P value < 0.05 was regarded as significant.

Ethical Clearance

Ethical approval was obtained from the medical ethics and research committee of the university of Abuja teaching hospital. An informed consent was obtained from each participant before been included in the study.

RESULTS

A total of 145 HIV positive patients with temperatures of ≥380C were admitted into the medical wards during the study period and enrolled into the study. The mean age was 37.5yrs (range 18-75 years). The sex distribution was 73:72 for females and males respectively [Figure 1]. A total of 41 positive blood cultures were identified, giving a prevalence of bacteremia of 28.3%. Cultured bacterial isolates consisted of 14 (34.1%) Streptococcus pneumoniae, 11 (26.8%) Staphylococcus aureus, 9 (22.0%) Klebsiella pneumonia, 3 (7.3%) E. coli, 2 (4.9%) Salmonella typhi, 1 (2.4%) Proteus spp and 1 (2.4%) Pseudomonas aeruginosa [Table 1].

The study population was divided into two groups based on their CD4 cell count, those with counts ≤ 200cells/ml and those with counts above 200 cells/ml. Those with counts ≤ 200 cells/ml were considered to have severe immunosuppression. Most of the study population (126)[86.9%] had severe immunosuppression, only 19 patients (13.1%) had CD4 cell counts above 200 cells/ml. Anemia defined as PCV ≤ 30% was a common finding as seen in 72.4% of the patients.

Outcome after one month of follow up showed that 55 out of the 145 patients had died, giving a mortality rate of 37.9%. Out of the 55 cases that died, 21 (51.2%) had bacteremia while 34 (32.7%) were those without bacteremia. The mortality was significantly higher in the bacteraemic group (51.2%) compared to the non bacteraemic group (32.7%) (P-value = 0.04) [Table 2]. Out of the 55 patients that died 53 (96.4%) had severe immunosuppression, while only 2 patients (10.5%) with CD4 cell count above 200 cells/ml died (p-value 0.004) [Table 3].

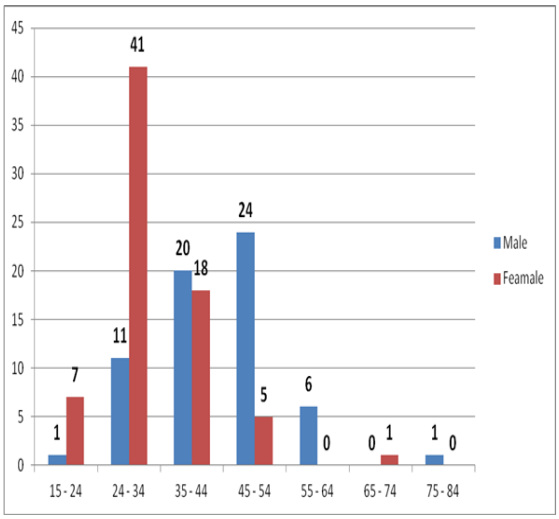

Figure 1: Shows Age and Sex Distribution Of The Patients

Table 1: Shows Frequency Of The Different Isolates.

Isolate	Frequency	Percent
Streptococcus pneumoniae	14	34.1
Staphylococcus aureus	11	26.8
Klebsiella pneumoniae	9	22.0
E. coli	3	7.3
Salmonella typhi	2	4.9
Proteus spp	1	2.4
Pseudomonas aeroginosa	1	2.4
Total	41	100.0

Table 2: shows relationship between outcome and bacteremia.

Outcome	Bacteremia		Total
	YES	NO	
Died	21 (51.2%)	34 (32.7%)	55
Alive	20 (48.8%)	70 (67.3%)	90
Total	41	104	145

Table 3: relationship between outcome and CD4+ cell count

OUTCOME	CD4 > 200 CELLS/ML	CD4 ≤ 200 CELLS/ML	TOTAL
DIED	2 (3.6%)	53 (96.4%)	55
ALIVE	17 (18.9%)	73 (81.1%)	90
TOTAL	19	126	145

DISCUSSION

Bacteremia represents an important cause of morbidity and mortality in HIV/AIDS patients. In SSA where the burden of HIV/AIDS is high most cases of bacteremia are not diagnosed due to paucity of equipped laboratory and microbiology services in most health centers. This study identifies the main causes and clinical outcome of bacteremia in febrile adult HIV patients as observed in a tertiary hospital.

We showed a prevalence of bacteremia of 28.3% among hospitalized adult HIV patients presenting with fever of ≥ 38ºC. This high prevalence of bacteremia among HIV patients has been reported in other studies in SSA.[6,8] We isolated Streptococcus pneumoniae (34.1%), Staphylococcus aureus (26.8%), Klebsiella pneumoniae (22%), E. coli (7.3%), Salmonella typhi (4.9%), Proteus specie (2.4%) and Pseudomonas aeruginosa (2.4%).

Streptococcus pneumoniae was the commonest cause of bacteremia in this study being responsible for 34.1% of the isolates. The high burden of pneumococcal infection in Nigeria and SSA in general may partly explain this finding.[9] HIV patients have been shown to be particularly prone to infections with encapsulated organisms, and have more than 20 times increased risk of infection and re-infection with Streptococcus pneumonia.[10] The association between invasive pneumococcal disease and HIV has been recognized world-wide.[11] The prevalence of pneumococcal infection in adults has even been used as a surrogate marker of HIV prevalence. Pneumococcal infection may be the earliest serious infection to occur in patients with HIV disease. Ssali et al from Uganda and Philip et al from the Gambia also found Streptococcus pneumoniae to be the commonest cause of bacteremia in similar studies.[7,12] Archibald et al working in Malawi reported that S. pneumoniae accounted for 33% of the isolates found in febrile adults admitted in a hospital.[13] Non-Typhoidal Salmonella (NTS) has been reported in other studies to be the dominant isolate causing bacteremia in HIV patients. Ogunsola et al from Lagos, Nigeria, found NTS to be the commonest cause of bacteremia in a similar cohort of patients, accounting for 45.5% of the isolates:[5] while Gordon MA et al in Malawi isolated NTS in 37% of the bacteraemic cases.[14] Salmonella species accounted for only 4.9% of the isolates in this study. Variability in the geographical spread of NTS may account for this disparity.

Mortality has been shown to be high in HIV patients with bacteremia.[1,7,15] In this study, the mortality rate among the bacteraemic cases was 51.2%, compared to 37.4% among the non bacteraemic cases. This relationship was statistically significant (p-value=0.04). Philip C. et al also reported that in the Gambia patients with bacteremia were more likely to die in the hospital than patients without bacteremia.[8] Gordon MA et al reporting from Malawi found a mortality rate of 38% among bacteraemic patients compared to 18% among general medical admissions.[14]

An association between outcome and degree of immunosuppression in HIV patients has been a subject of controversy. Tumbarello et al,[2] and Turett et al,[15] had earlier established that outcome in HIV patients was significantly associated with the degree of immunosuppression, with mortality being higher among those with severe immunosuppression. Omenaca et al,[16] however found no such relationship. In this study, the degree of immunosuppression as evidenced by the CD4 cell count was shown to have a significant relationship with clinical outcome as mortality was higher among those with severe immunosuppression (42.1%) compared to those who did not have severe immunosuppression (10.5%) (P-value = 0.004).

Studies have shown that Anemia is the most common hematological abnormality in HIV-infected patients.[17] Anemia affects 60% to 80% of HIV patients in late-stage disease.[18,19] Causes of anemia in HIV patients are multifactorial ranging from bone marrow infiltration by infectious agents, drugs, neoplasms, decreased production of endogenous erythropoietin and hemolysis. Nutritional deficiencies like vitamin B12 deficiency may also lead to anemia. Most of the patients (72.4%) in this study were anemic with PCV ≤ 30%.

CONCLUSION

Bacteremia is a common finding in patients with HIV/AIDS in SSA. Streptococcus pneumoniae is the commonest organism causing bacteremia in HIV patients in the University of Abuja Teaching Hospital, Nigeria. HIV patients with bacteremia and severe immunosuppression have a high in- patient mortality rate. Introducing the7-valent pneumococcal vaccine into HIV care in Nigeria could protect a substantial proportion of them from invasive pneumococcal disease.

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