Prevalence of Urinary Tract Infections among HIV Patients Attending a Non-Governmental Health Facility in Jos, Plateau State, Nigeria.

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Abstract

Introduction: The advent of HIV/AIDS has resulted in many microbial agents becoming opportunistic infections among individuals whose immune status has been suppressed by the infection.

Objective: This study is designed to determine the prevalence of Urinary tract infections (UTIs) in Jos and its environs among HIV cohort. This is aimed at providing improved patient care and management.

Methods: 260 mid-stream urine samples were collected from HIV Sero-positive patients. Samples were cultured, isolates identified and antibiogram was carried out according to standard microbiological protocols.

Results: Of the 260 samples screened, 61 (23.5%) had UTIs. The distributions of the isolates were as follows: Escherichia coli 25 (9.6%), Staphylococcus aureus 17 (6.5%), Proteus mirabilis 7 (2.7%), Pseudomonas aeruginosa 7 (2.7%) and Klebsiella species 5 (1.9%). The study showed the presence of UTIs in all the age groups and the age group 46 and above had the highest prevalence. The study showed that females had a higher prevalence than males. UTIs were recorded in all the occupational groups considered, of which civil servants and business people had the highest with 35.3% and 22.0% respectively. Marital status showed that the widowed had the highest rate with 41.7%, followed by the married with 22.7% and then the singles had the least with 22.2%. The antibiogram showed that the antibiotics of choice were Gentamicin, Nitrofurantoin and Augmentin.

Conclusion: This study showed a higher prevalence of bacterial uropathogens among the HIV/AIDS patients as compared to other findings on HIV negative patients. The antibiogram showed that the antibiotics of choice were Gentamicin, Nitrofurantoin and Augmentin.

Keywords: Urinary tract infections in HIV/AIDS patients

1. Introduction

People living with Human Immunodeficiency Virus (HIV) are likely to be more predisposed to urinary tract infection due to the suppression of their immunity and women in this category tend to get them more often due to the nature of their anatomy1,2,3.

Bacterial infections are a common cause of morbidity and mortality in HIV positive individuals. Recent reports suggest that the incidence of urinary tract infection is increased in HIV positive patients4,5. Furthermore, there is evidence that bacteriuria is more common as HIV disease progresses6,7.

Recent studies demonstrated a broad range of bacteria causing UTIs in HIV-infected patients, including the
common uropathogens *E. coli*, *Proteus spp.*, *Enterobacter spp.*, and *Klebsiella spp.*, nosocomial organisms, such as *Pseudomonas aeruginosa*, *Streptococcus faecalis*, and *Staphylococcus aureus* and unusual microorganisms including *Candida spp.*, *Salmonella spp.*, *Acinetobacter spp.*, and Cytomegalovirus.

UTIs are an important health problem in HIV-infected persons, where the incidence is between 5% and 20%.

Studies have shown that the incidence of UTIs is greater among men and women infected with HIV than among men and women who are sero-negative for HIV. This increased risk of bacteriuria correlates with the degree of immunosuppression, as reflected by the CD4 count. Most studies have demonstrated increased susceptibility to UTIs in HIV-infected patients with CD4 count of <200 lymphocytes/mm³. Some studies have indicated that the risk of bacteriuria and UTI may be increased in HIV-infected patients and is inversely related to CD4+ lymphocyte counts. UTI in HIV-positive patients tends to recur, requiring longer treatment and it is suggested that treatment should be culture-specific.

This study aimed at determining the prevalence of urinary tract pathogens in HIV/AIDS patients and their antibiotic susceptibility pattern in the study area.

2. Materials and Methods

2.1 Study area: Plateau State of Nigeria which covers an area of 26,890 sq kms is located in the Middle Belt zone. Plateau gets its name from the Jos Plateau. The State is also known as the Home of Peace and Tourism. It enjoys a relatively temperate climate, with average temperatures between 18°C and 22°C. Based on the 2006 population census figures, Plateau state had an estimated population of 3,178,712 people with a population density of 103 per square kilometers. The main occupation in the rural areas is farming, while those in urban areas are civil servants, traders and students. The state has several tourist sites, institutions, hospitals, hotels and brothels cut across the state. All these attract people from different parts of the country or the world to the state and this can contribute to the spread of the infection in the area. Jos is the capital city of the state where Faith Alive Foundation is situated. Faith Alive is a non governmental health facility that provides full health services with much focus on counseling, diagnosis and management of HIV/AIDS patients. The centre received patients from all over the state as well as some neighboring states. Approval and permission was granted by the authority of the Centre before the commencement of the study.

2.2 Study population: The study population focused on confirmed HIV positive patients attending Faith Alive Foundation, Jos. The sample population comprised of 260 HIV positive male and female patients attending the health facility.

2.3 Specimen collection and processing: A semi structured questionnaires were randomly administered to the patients who consented to obtain some useful data. Clean–catch midstream urine was collected from each patient into a sterile screw–capped universal container. The specimens were labeled and transported to the laboratory for processing. Macroscopic examination was carried out on the samples. A loop-full (0.002 ml) of well mixed un-centrifuged urine was streaked onto the surface of blood agar and cystine lactose electrolyte deficient (CLED) medium. The plates were incubated aerobically at 37°C for 24 hours and counts were expressed in colony forming units (CFU) per milliliter (ml). A count of up to 100,000CFU/mL was considered significant to indicate bacteriuria. Ten (10) mls of each well-mixed urine sample was centrifuged at 2000g for 5 minutes. The supernatant was discarded and a drop of the deposit was examined microscopically for urine deposits such as pus cells, red blood cells, epithelial cells, casts, crystals yeast-like cells and Trichomonas vaginalis. Pus cells ≥ 5 per high power field were considered significant to indicate infection. The isolates were identified based on gram reaction, morphology, and biochemical characteristics and antimicrobial susceptibility carried out via the disc diffusion technique using antibiotic discs in accordance to standard microbiological methods. The results obtained was Statistical analyzed using Chi-Square test. Values of P < 0.05 were considered statistically significant while values of P > 0.05 were non-significant.

3. Results

Two hundred and sixty (260) midstream urine samples were collected of which 130 samples were from males while 130 from females. Of the 260 samples processed, 61 (23.5%) had urinary tract infections. *Escherichia coli* had 25 (9.6%), *Staphylococcus aureus* 17 (6.5%), *Proteus mirabilis* 7 (2.7%), *Pseudomonas aeruginosa* 7 (2.7%) and *Klebsiella species* 5 (1.9%) as shown in Table 1.

The prevalence of UTI in relation to demographic characteristics as shown in Table 2 indicates that age group ≥ 46
years had the highest prevalence 8 (38.1%), followed by age groups 16 – 25 years, 26 – 35 years, 36 – 45 years and 5 – 15 years with prevalence of 8 (36.4%), 29 (25.2%), 12 (16.0%) and 4 (15.4%) respectively. The prevalence of UTI in relation to gender reveals that the female patients had a higher prevalence of 35 (27.0%) while the males had 26 (20.0%). The prevalence of UTI in relation to marital status reveals that the widowed had the highest prevalence of UTI with 5 (41.7%), followed by the married and singles with 42 (27.0%) and 14 (22.2%) respectively. The prevalence of UTI in relation to occupational groups shows that civil servants had the highest prevalence of 30 (35.3%), followed by business people, other minor groups, students and farmers with 14 (22.0%), 6 (15.8%), 7 (15.6%) and 4 (14.3%) respectively.

Table 3 indicates that the isolates are most susceptible to Gentamicin with 49.2%, followed by Nitrofurantoin, Augumentin, Chloramphenicol, Nalidixic acid, Ampicillin and Cotrimoxazole, with 32.8%, 32.8%, 26.2%, 21.3%, 16.4%, 9.8% and 6.6% respectively.

**Table 1: Frequency Distribution of Bacterial Isolates (N=260)**

| Isolates             | Frequency of occurrence (%) |
|----------------------|----------------------------|
| *Escherichia coli*   | 25 (9.6)                   |
| *Staphylococcus aureus* | 17 (6.5)                   |
| *Proteus mirabilis*  | 7 (2.7)                    |
| *Pseudomonas aeruginosa* | 7 (2.7)                    |
| *Klebsiella species* | 5 (1.9)                    |
| **Total (%)**        | **61 (23.5)**              |

KEY: N- number of samples

**Table 2: Prevalence of Urinary Tract Infection in relation to demographic characteristics**

| Characters       | No. Screened | No. positive (%) | X²/P-Values |
|------------------|--------------|------------------|-------------|
| **Age**          |              |                  |             |
| 05-15            | 26           | 4 (15.4)         | X² = 31.53; DF = 4 P < 0.05 |
| 16-25            | 22           | 8 (36.4)         |             |
| 26-35            | 115          | 29 (25.2)        |             |
| 36-45            | 76           | 12 (15.8)        |             |
| ≥ 46             | 21           | 8 (38.1)         |             |
| **Gender**       |              |                  |             |
| Male             | 130          | 26 (20.0)        | X² = 1.34; DF = 1 P > 0.05 |
| Female           | 130          | 35 (27.0)        |             |
| **Marital status** |            |                  |             |
| Single           | 63           | 14 (22.2)        | X² = 36.63; DF = 2 P < 0.05 |
| Married          | 185          | 42 (22.7)        |             |
| Widowed          | 12           | 5 (41.7)         |             |
| **Occupation**   |              |                  |             |
| Civil servants   | 85           | 30 (35.3)        | X² = 37.12; DF = 4 P < 0.05 |
| Business         | 64           | 14 (22.0)        |             |
| Students         | 45           | 7 (15.6)         |             |
| Farmers          | 28           | 4 (14.3)         |             |
| Others           | 38           | 6 (15.8)         |             |
| **Total**        | 260          | 61 (23.5)        |             |
Table 3: Antimicrobial susceptibility pattern of bacteria isolates

| Organisms                | No. tested | GN    | OFL | NIT | NAL | AUG | COT | CHL | AMP |
|--------------------------|------------|-------|-----|-----|-----|-----|-----|-----|-----|
| *Escherichia coli*       | 25         | 12(48.0) | 4 (16.0) | 8 (32.0) | 3 (12.0) | 6 (24.0) | 3(12.0) | NA  | NA  |
| *Proteus mirabilis*      | 7          | 2 (28.6) | 2 (28.6) | 3 (42.8) | 2 (28.6) | 4 (57.1) | 1(14.3) | R   | 2(28.6) |
| *Pseudomonas aeruginosa* | 7          | 2 (28.6) | 2 (28.6) | 3 (42.8) | 2 (28.6) | 4 (57.1) | R   | R   | 2 (28.6) |
| *Klebsiella species*     | 5          | 4 (80.0) | 2 (40.0) | 3 (60.0) | 3 (60.0) | 3 (60.0) | R   | NA  | NA  |
| *Staphylococcus aureus*  | 17         | 10 (58.8) | 0 (0.0) | 3 (17.6) | 3 (17.6) | 3 (17.6) | R   | 16(94.1) | 2 (11.8) |
| **Total (%)**            | **61**    | **30(49.2)** | **10(16.2)** | **20(32.8)** | **13(21.3)** | **20(32.8)** | **4(6.6)** | **16(26.2)** | **6(9.8)** |

KEY: GN – Gentamicin; OFL – Ofloxacin; NIT – Nitrofurantoin; NAL - Nalidixic acid; AUG – Augmentin; COT – Cotrimoxazole; CHL – Chloramphenicol; AMP – Ampicillin; R – Resistant; NA - Not Applicable; 0 – Not tested.

4. Discussion

The study showed that of the two hundred and sixty (260) midstream urine samples of HIV positive patients screened, 61 (23.5%) had urinary tract infections. The result of this finding was in consonance with a similar study carried out in Calaber, Nigeria which recorded a prevalence of 25.3% while a much higher prevalence of 48.7% was recorded in South Africa. These findings agreed that uropathogens causing UTIs are higher in HIV positive individuals than HIV negative individuals.

The distribution of the bacterial isolates in this study indicates that *Escherichia coli* had the highest prevalence with 25(9.62%), followed by *Staphylococcus aureus* with 17(6.54%). This is in agreement with most previous studies on community acquired UTI. Urinary tract infections due to *Escherichia coli* is a common finding in women and it is associated with microorganisms ascending from the periurethral areas contaminated by fecal flora due to the close proximity to the anus and warm, moist environment thereby. *Staphylococcus aureus* which is the second highest isolate has a high propensity for causing infections especially in young sexually active women.

The prevalence of UTI in relation to age groups indicates that age group ≥ 46 years had the highest prevalence 8 (38.1%) while the least was recorded within the age group 5 - 15 years with a prevalence of 4 (15.4%) as shown in Table 1. This indicates that UTI is distributed in all the age groups with a significant relationship (p < 0.05). The occurrences of the infection in all the age groups may be attributed to their exposure to HIV/AIDS being the major predisposing risk factor and probably other risk factors such as diabetes, pregnancy, increased sexual activity and contamination from anus after defecation.

The prevalence of UTI in relation to gender reveals that the female patients had a higher prevalence of 35 (27.0%) while the males had 26 (20.0%). The finding that females had higher prevalence of UTI than males agrees with earlier studies. However, in this study, a statistically non significant association was observed in the prevalence of UTI between the males and the females (p > 0.05). Close proximity of the female urethral meatus to the anus, shorter urethra, and sexual intercourse, incontinence, bad toilet habits have all been reported as factors that influence the higher prevalence in females.

The prevalence of UTI in relation to occupation indicates that civil servants had the highest prevalence of 30 (35.3%) followed by business people, other minor groups, students and farmers with 14 (22.0%), 6 (15.8%), 7 (15.6%) and 4 (14.3%) respectively. A statistically significant relationship was observed (p < 0.05). The higher frequencies of occurrence among civil servants and business people may be due to several possibilities such as: advanced stage of HIV, increased sexual activity, bad toilet habits or sharing of bad public toilet facilities among these groups.

The prevalence of UTI in relation to marital status reveals that the widowed had the highest prevalence of UTI with 5 (41.7%), followed by the married and singles with 42 (22.7%) and 14 (22.2%) respectively. Statistically there was a
significant differences among the different groups (p < 0.05). The differences in the prevalence in the groups may be linked to the immune status of the individuals, increased multiple sexual activities and other possible risks factors.

This study revealed that Gentamicin, Nitrofurantoin and Augmentin were more effective against most of the urinary isolates while Nalidixic acid, Chloramphenicol, Ofloxacin, Ampicillin and Cotrimoxazole were less effective or more resistant. The upsurge in antibiotic resistance pattern seen in this study could be due to antibiotic abuse and self medication being practiced in many developing countries including Nigeria. Also low cost and availability of these drugs could be another contributing factor for antibiotic resistance in this locality.

There is an increasing trend of resistance by common uropathogens to routine antibiotics as being noted in this study. The common practice of self medication, use of fake, adulterated and substandard drugs and drug abuse could explain this unfortunate trend.

5. Conclusion

This study reveals that bacterial uropathogens causing UTIs are commonly recorded among HIV/AIDS patients. The uropathogens recovered in the study were Escherichia coli, Proteus mirabilis, Pseudomonas aeruginosa, Klebsiella species and Staphylococcus aureus. This study shows that Gentamicin, Nitrofurantoin and Augmentin were more effective against most of the urinary isolates while Nalidixic acid, Chloramphenicol, Ofloxacin, Ampicillin and Cotrimoxazole were less effective or more resistant. It is hoped that these findings will be very useful when considering the management of HIV/AIDS patients from bacterial opportunistic urinary tract infections in the area.

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