Occurrence and Distribution of Bacterial Uropathogens among Antiretroviral Therapy Users and Non-Users, Cape Coast Teaching Hospital

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ABSTRACT

Background: Antiretroviral drugs were introduced to help reduce HIV mortality rate by increasing the immunity of the infected persons, to reduce the viral load of the virus and to take advantage of its additional benefits such as its effectiveness against bacteremia and urinary tract infections (UTIs). The purpose of the study is to investigate the prevalence rate of asymptomatic UTIs among ART users and non-users, and to identify the causative agents and their susceptibility to commonly used antimicrobial agents.

Methods: A cross-sectional study was conducted between January and April 2018 at the Cape Coast Teaching Hospital. A single ‘clean catch’ urine was obtained from 240 HIV patients and immediately sent to the laboratory for culture. The isolates were considered significant if there were \(\geq 10^5\) colony forming unit/mL (CFU/mL). Significant isolates were identified by methods, such as Gram staining and biochemical tests. Various descriptive and inferential statistics were carried out using SPSS version 21 and the P-values <0.05 were considered significant.

Results: Out of 240 patients recruited for this study, 177(73.8\%) of them had significant bacteriuria, while \textit{Staphylococcus aureus} (39\%) was the predominant bacterial isolate. There were significant associations between UTIs and age, sex, marital status, and educational level. All bacterial isolates were found among females and mostly among ART users.

Conclusion: Most the recruited patients had asymptomatic urinary tract infections of which many were females and ART users. Considering this, regular screening should be done on HIV patients.

Keywords: Antiretroviral drugs; Urinary tract infections; Prevalence; Antimicrobial agents; HIV-infected patients
INTRODUCTION
About 36.7 million people were living with HIV/AIDS worldwide in 2016 out of which 1 million died from AIDS-related illnesses of which urinary tract infections (UTIs) are not an exception. Most of these individuals are said to be in low- and middle-income countries (UNAID, 2016). People living with Human Immunodeficiency Virus (HIV) are mostly at risk of getting urinary tract infection due to the suppression of their immunity indicated by the decreased levels of the CD4 count. Research has shown that UTIs become more prevalent when CD4 count further reduces (Bigwan & Wakjissa, 2013). Current literature has revealed a significant number of bacteria causing UTIs in HIV-infected patients; Staphylococcus aureus, Escherichia coli, Proteus spp., Enterobacter spp., Klebsiella spp., Pseudomonas aeruginosa, Streptococcus faecalis, and Staphylococcus saprophyticus with the unusual microbes being Serratia spp., Candida spp., Salmonella spp., Providentia spp., Acinetobacter spp., Citrobacter spp., and Cytomegalovirus (Schonwald, Begovac and Skerk., 1999; Bigwan and Wakjissa, 2013; ) Asymptomatic urinary tract infection is defined by the quantity of cultured bacteria isolated from an appropriately collected urine specimen, exceeding 10^5 cfu/ml, obtained from an individual showing no symptoms or signs of the infection (Cheesborough, 2000). Global prevalence rate of UTIs is between 5% and 41%. A higher rate of prevalence rate for UTIs in HIV-infected persons have been reported from Ghana (86%), and Nigeria (94%) (Ifeanyichukwu, et al., 2013; Boaitey, Nkrumah, Idriiss & Tay 2012). Studies have indicated the additional benefits of antiretroviral drugs, such as the reduction in urinary tract infections, bacteremia and bacterial pneumonia (Donati, 2003). However, other studies have revealed contradictory data reporting that the UTI causing bacteria are more prevalent among ART users (Debalke, Cheneke, Tassew & Awol, 2014; Fenta, Legese & Weldearegay, 2016; Alemu, Dagnew, Alem, & Gizachew, 2013). So could this mean therefore that the ART’s do not protect HIV patients against UTI causing bacteria? Bacterial resistance to some commonly used antimicrobial agents has been on the rise and this development has been implicated in the failure of these agents for treating infectious diseases including UTIs (Muratani & Matsumoto, 2004). As far as our literature to date is concerned, there is limited information on the prevalence, causative agents, and the antimicrobial susceptibility pattern of bacterial pathogens among HIV-infected patients in Ghana. Thus, the current study was aimed at determining the prevalence of Asymptomatic UTIs, the causative agent and antimicrobial susceptibility pattern of urinary tract pathogens among ART users and non-users in Cape Coast Teaching Hospital.

MATERIALS AND METHODS

Study Area, Design and Population
A prospective and comparative cross-sectional study was conducted between January and June 2018 in the Cape Coast Teaching Hospital (CCTH), Cape Coast, in the Central Region of Ghana. In the study, 240 HIV infected patients attending the ART clinic were recruited based on convenient sampling technique and their respective urine samples were collected and immediately transported to the bacteriology section of the Department of Biomedical Science Laboratory for culturing. HIV infected patients who were ART users and non-users and gave consent were included in the study. Whereas, HIV infected patients with symptomatic UTIs, those below 15 years, pregnant mothers, and those who were on antimicrobial therapy for two years prior to data collection and those who did not give consent were excluded from the study.

Sample Collection and Processing
A structured, pretested questionnaire was used to collect data on sociodemographic characteristics and other independent variables whiles the CD4 counts of the participants were retrieved from their hospital folders. Clean-catch midstream urine was obtained from participants using a sterile wide mouth urine container. The participants were educated on the appropriate urine collection methods. The containers were labelled with the sample identity (ID), time of collection and transported to the laboratory within one hour of collection for culture and antibiotic susceptibility testing.

Culture and antimicrobial susceptibility pattern
A sterile calibrated inoculating loop that delivers 0.01ml is immersed just below the surface of the urine to pick up urine samples. This loop with the urine was streaked on the plates containing Blood agar and MacConkey agar (Oxoid, England) without touching the edge of the plate. After inoculation, the plates were incubated at 37 °C for 24 hours for bacterial growth. The colonies on each plate were counted (isolates ≥ 10^5 colony forming units were considered significant). Bacterial isolates were identified based on colony morphology, Gram
reaction and biochemical tests, such as triple sugar iron (TSI), catalase, coagulase, mannitol fermentation, urease, indole and citrate following standard operating procedures.

Antimicrobial sensitivity test was done to determine the susceptibility patterns of the isolated bacteria to some selected antibiotics (12 for both Gram positive and Gram negative) using Kirby Bauer’s disk diffusion method following Clinical and Laboratory Standard Institute (CLSI) guidelines. A standard inoculum adjusted to 0.5 McFarland was swabbed onto Muller-Hinton agar (Oxoid, England); antibiotic discs were dispensed after drying the plates for 3-5 minutes and incubated at 37°C for 16-18 hours. After incubation, the zones of growth inhibition were determined and then reported as sensitive(S) and resistant (R) by comparing the zones of inhibition with the standard table. The antibiotic disks used were Ampicillin/Sulbactam (AS, 20µg), Co-Trimoxazole (BA, 25µg), Cephalaxin (PR, 30µg), Tetracycline (TE, 30µg), Cefotaxime (CF, 30µg), Ciprofloxacin (CP, 5µg), Prulifloxacin (PF, 5µg), Ofloxacin (OF, 5µg), Cloxacillin (CX, 5µg), Roxithromycin (RF, 15µg), Linomycin (LM, 2µg), Gentamicin (GM, 10µg), Tazobactam/piperacillin (TZP, 100/10µg), Chloramphenicol (CH, 30µg), Cefotaxime (CI, 30µg), Amikacin (AK, 30µg), and Levofloxacin (LEV, 5µg).

Quality Control
Culture media used in the study were tested for sterility and quality following the Standard Operating Procedures. Standard strains of Escherichia coli ATCC 25922 and Staphylococcus aureus ATCC 25923 were used during culture and antimicrobial susceptibility testing.

DATA ANALYSIS AND INTERPRETATION
Descriptive analyses (frequency and percentage) were performed on sociodemographic using statistical package for social science (SPSS) version 21 software. Chi-square analysis was done to determine the presence of significant associations between the dependent variables and independent variables. P value of < 0.05 was considered statistically significant.

Ethical Considerations
Ethical approval for the study was obtained from the Department of Biomedical Science, University of Cape Coast and an official permission was also obtained from the ethics committee of the Cape Coast Teaching Hospital. Informed consent of each patient was obtained. All information from the participants were held strictly confidential.

RESULTS
In this study, 240 HIV patients visiting the HIV clinic were examined. Out of these, 222 (92.5%) were ART users whereas 18 (7.5%) were ART naive patients. From the 240 samples obtained, 9 (3.8%) had no bacterial growth after culturing whiles 177 (73.8%) had significant bacterial growth of which 165 (68.8%) were ART users and 12 (5%) were not (Table 1).

The sociodemographic characteristics of the HIV patients as indicated in Table 2 shows that 177 (76.6%) of the participants were females, 117 (50.6%) were above 44 years, 102 (44.2%) were married, 207 (89.6%) were Christians, 93 (40.3%) were illiterates and 169 (69.3%) were into unskilled labour. There was a strong association between UTI and some characteristics such as age (P=0.001), sex (P=0.016), marital status (P=0.04) and educational level (P<0.001) while there were no significant associations between UTI and factors such as religion, occupation, CD4 count and antiretroviral (ART) use. The correlation between therapy length and colony count and immune status and colony count is shown in Table 3. There is a weak correlation (r=0.28) between length of therapy and colony count. Similarly, there was a weak correlation (r=0.16) between CD4 count and colony count (P=0.007).

We isolated eight different types of bacteria from the urine culture of which Staphylococcus aureus (39.0%) was the predominant amongst them followed by Staphylococcus saprophyticus (23.7%), Citrobacter spp (10.2%), Escherichia coli (8.5%), Proteus spp (6.8%), Serratia sp (5.1%), Providentia sp (3.4%) and Streptococcus (3.4%) (Figure 1). With Figure 2 illustrating the distribution of uropathogens by gender, S. aureus being the most predominant was found to be mostly associated with females (44.2%) as compared to males (25.0%) whiles S. saprophyticus was common among males (31.3%) than females (20.9%). Even though this study had more females recruited, most of the bacteria identified were associated with the males, most of them being Gram-negative bacteria. Streptococcus was only found in females and Citrobacter also predominant in females. Comparing uropathogens among ART users and non-users, Citrobacter (25%), S. aureus (25%) and S. saprophyticus (50%) were the only bacteria common among Non-ART users whiles the rest were mostly associated with ART users (Figure 3).
Tables 6 and 7 shows the susceptibility patterns of Gram-positive and Gram-negative bacteria isolated form the urine cultures of ART and non-ART users. Most (58%) of the Gram-positive isolated from ART users were resistant to the antimicrobial used; co-trimoxazole (94.4%), tetracycline (94.4%), cefotaxime (94.4%), linomycin (88.9%), cephalxin (91.9%), roxithromycin (69.4%) and cloxacillin (100%) while the rest (42%) were sensitive to ampicillin (94.4%), gentamicin (86.1%), ciprofloxacin (86.1%), prulifloxacin (58.3%) and ofloxacin (77.8%). Likewise, 83% of the gram-positive bacteria isolated from non-ART users were resistant to ampicillin (100%), co-trimoxazole (66.7%), tetracycline (66.7%), cefotaxime (100%), linomycin (100%), cephalxin (66.7%), prulifloxacin (66.7%), roxithromycin (100%), ofloxacin (66.7%) and cloxacillin (100%) with the rest being sensitive to gentamicin (66.7%) and ciprofloxacin (66.7%).

For the Gram-negative bacteria, most were resistant to ampicillin (52.6%), co-trimoxazole (84.2%), tetracycline (94.7%), cefotaxime (73.7%), ciprofloxacin (52.6%), ofloxacin (63.2%), chloramphenicol (94.7%) and cefitoxime (85%) while the rest were sensitive to gentamicin (68.4%), tazobactam/piperacillin (94.7%), amikacin (68.4%) and levofloxacin (89.5%). Citrobacter isolated from non-ART users was 100% resistant to tetracycline and cefitoxime while sensitive to ampicillin, co-trimoxazole, gentamicin, cefotaxime, ciprofloxacin, ofloxacin, tazobactam, chloramphenicol, amikacin and levofloxacin.

### Table 1: Prevalence of urinary tract infection among ART and non-ART users in University of Cape Coast Teaching Hospital (CCTH).

<table>
<thead>
<tr>
<th>ART use</th>
<th>Positive number (%)</th>
<th>Negative number (%)</th>
<th>No bacterial growth (%)</th>
<th>Total number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>165 (68.8)</td>
<td>31 (21.3)</td>
<td>6 (2.5)</td>
<td>222 (89.3)</td>
</tr>
<tr>
<td>No</td>
<td>12 (5.0)</td>
<td>3 (1.2)</td>
<td>3 (1.3)</td>
<td>18 (7.0)</td>
</tr>
<tr>
<td>Total</td>
<td>177 (73.8)</td>
<td>34 (22.5)</td>
<td>9 (3.9)</td>
<td>240 (100)</td>
</tr>
</tbody>
</table>

### Table 2: Prevalence of Asymptomatic UTI by sociodemographic characteristics among HIV patients, CCTH.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Contamination No. (%)</th>
<th>Infection No. (%)</th>
<th>Total No. (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>9 (3.9)</td>
<td>12 (5.2)</td>
<td>21 (9.1)</td>
<td></td>
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<tr>
<td>25-34</td>
<td>15 (6.3)</td>
<td>21 (9.1)</td>
<td>36 (15.9)</td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td>6 (2.6)</td>
<td>51 (22.3)</td>
<td>57 (24.7)</td>
<td></td>
</tr>
<tr>
<td>&gt;45</td>
<td>24 (10.4)</td>
<td>93 (40.3)</td>
<td>117 (52.6)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td>0.016</td>
</tr>
<tr>
<td>Male</td>
<td>6 (2.6)</td>
<td>48 (20.8)</td>
<td>54 (23.8)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>48 (20.8)</td>
<td>129 (55.3)</td>
<td>177 (78.6)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>0.049</td>
</tr>
<tr>
<td>Single</td>
<td>24 (10.4)</td>
<td>57 (24.7)</td>
<td>81 (35.1)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>21 (9.1)</td>
<td>81 (35.3)</td>
<td>102 (44.2)</td>
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</tr>
<tr>
<td>Divorced</td>
<td>6 (2.6)</td>
<td>9 (3.9)</td>
<td>15 (6.3)</td>
<td></td>
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<tr>
<td>Widowed</td>
<td>3 (1.3)</td>
<td>30 (13.0)</td>
<td>33 (14.3)</td>
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<tr>
<td>Religion</td>
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<td></td>
<td></td>
<td>0.123</td>
</tr>
<tr>
<td>Christian</td>
<td>45 (19.5)</td>
<td>162 (70.1)</td>
<td>207 (90.8)</td>
<td></td>
</tr>
<tr>
<td>Muslim</td>
<td>9 (3.9)</td>
<td>15 (6.5)</td>
<td>24 (10.4)</td>
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<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>None</td>
<td>21 (9.1)</td>
<td>72 (31.2)</td>
<td>93 (40.3)</td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>12 (2.2)</td>
<td>48 (20.8)</td>
<td>60 (26.0)</td>
<td></td>
</tr>
<tr>
<td>JHS</td>
<td>15 (6.5)</td>
<td>57 (24.7)</td>
<td>72 (31.2)</td>
<td></td>
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<tr>
<td>SHS</td>
<td>6 (2.6)</td>
<td>0 (0.0)</td>
<td>6 (2.6)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td>0.097</td>
</tr>
<tr>
<td>Unemployed</td>
<td>6 (2.6)</td>
<td>15 (6.5)</td>
<td>21 (9.1)</td>
<td></td>
</tr>
<tr>
<td>Skilled labour</td>
<td>6 (2.6)</td>
<td>44 (19.0)</td>
<td>50 (21.6)</td>
<td></td>
</tr>
<tr>
<td>Unskilled labour</td>
<td>42 (18.2)</td>
<td>118 (51.1)</td>
<td>160 (69.3)</td>
<td></td>
</tr>
<tr>
<td>CD4 count</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;200</td>
<td>21 (9.1)</td>
<td>62 (27.3)</td>
<td>83 (40.3)</td>
<td>0.169</td>
</tr>
<tr>
<td>200-400</td>
<td>12 (2.2)</td>
<td>21 (9.1)</td>
<td>33 (14.3)</td>
<td></td>
</tr>
<tr>
<td>400-800</td>
<td>6 (2.6)</td>
<td>30 (13.0)</td>
<td>36 (15.6)</td>
<td></td>
</tr>
<tr>
<td>&gt;800</td>
<td>16 (6.5)</td>
<td>69 (31.2)</td>
<td>85 (37.3)</td>
<td></td>
</tr>
<tr>
<td>ART</td>
<td></td>
<td></td>
<td></td>
<td>1.009</td>
</tr>
<tr>
<td>Yes</td>
<td>31 (12.2)</td>
<td>165 (71.4)</td>
<td>216 (93.5)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3 (1.3)</td>
<td>12 (5.2)</td>
<td>18 (7.5)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Influence of length of therapy and immune status (CD4 count) on colony count

<table>
<thead>
<tr>
<th>Colony count</th>
<th>Pearson coefficient (r)</th>
<th>R²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD4 count</td>
<td>0.160</td>
<td>0.03</td>
<td>0.007</td>
</tr>
</tbody>
</table>

**Figure 1:** Prevalence of isolated organisms among HIV patients in Cape Coast Teaching Hospital

**Figure 2:** Distribution of etiological agents of UTI among gender at Cape Coast Teaching Hospital.
DISCUSSION
This study shows the occurrence and distribution of asymptomatic urinary tract infection (UTI) among ART users and non-users, and the antibiotic susceptibility patterns of bacteria isolated from the urine cultures of HIV-positive persons visiting the HIV clinic of the Cape Coast Teaching Hospital. From our study, the prevalence rate of asymptomatic UTI among HIV/AIDS patients was 177/240 (73.8%) as shown in Table 1. This prevalence rate is higher than the prevalence rate reported in other studies (Debalke, Cheneke, Tassew & Awol, 2014; Bigwan and Wajjissa, 2013; Getu, Ali, Lema, Belay & Yeshetela, 2017; Fenta, Legese & Weldearegay, 2016; Dielubanza & Schaeffer, 2011; Inyang-Etoh, Udofia, Alaribe & Udonwa, 2009). The high prevalence rate could be due to the immune status of most of the participants in the study (36.4%) as shown in Table 2 even though no significance difference was recorded (P=0.180). A previous study reported of the increased risk of UTI with reduction in CD4 count (Bigwan and Wajjissa, 2013) which is in agreement with the results shown in Table 3; the weak correlation (r= -0.16) between CD4 count and the colony count (P= 0.007) where R² (0.03) indicates that 0.03% of the variation in UTI as represented by colony count is explained by immune status (CD4 count). However, a study conducted in Ghana and Nigeria revealed that 86% (60/70) and 94% (75/80) respectively, of the HIV seropositive patients had asymptomatic UTI (Boaitey, Nkrumah, Idriess & Tay 2012; Ifeanyichukwu, et al., 2013) which is much higher than the prevalence rate found in our study. This could be accounted for by the higher number of HIV positive patients with < 200 cells per mm² CD4 count which were not indicated in their study. The study also found the prevalence of no significance growth (<10⁸ colony forming units (cfu/ml)) and no growth to be 22.5% (54/240) and 3.8% (9/240) respectively. The percentage of no growth on culture plates could be associated to possible prior use of antibiotics before sampling (Frank-Peterside, Okerentugba, Nwodo & Onkonko, 2013) or the patients could be suffering from acute urethral syndrome which is used to describe acute cystitis accompanied by pyuria and no detection of bacteria after urine culture (Cheeseborough, 2000). There was a weak correlation (r= 0.28) between length of ART therapy and colony count (P<0.001) with R² (0.08) indicating that how long a person stays on ART therapy has a 0.08% influence on increasing colony counts. Meanwhile, there was no statistically significant (P= 1.00) association between ART use (68.8%) or not (5%) and asymptomatic UTI. The insignificance could be associated with the smaller sample size of the non-ART user. Similarly, other studies have shown a higher prevalence of UTI in ART users as compared to non-ART users even though some were significant (Debalke, Cheneke, Tassew & Awol, 2014; Inyang-Etoh, Udofia, Alaribe & Udonwa, 2009). In contrast, another study conducted in Italy revealed that there was a reduction in UTI among ART users (de Gaetano et al., 2003).

The prevalence of UTI among female patients (55.8%) were significantly higher than male patients (20.8%) as shown in Table 2 (P= 0.016) like other studies (Getu, Ali, Lema, Belay & Yeshetela, 2017; Fenta, Legese & Weldearegay, 2016; Dielubanza & Schaeffer, 2011). This is because of the anatomy of the female genitourinary tract. The female genital tract enables the easy passage of uropathogens to the bladder, and the urethra has proximity to the anal region thereby facilitating the colonisation of the microbes. However, considering the bacterial isolates distribution among the female and male patients, most of the bacterial isolates, S. saprophyticus (31.3%), Proteus sp. (12.5%), E. coli (12.5%), Providentia (6.3%) and Serratia (6.3%), were more prevalent in male patients as compared to female patients with only Staphylococcus aureus (44.2%), Citrobacter (11.6%) and Streptococcus (4.7%) being more prevalent. Infections caused by S. saprophyticus are mostly associated with sexually active young males (Cheeseborough, 2000).

The distribution of the bacterial isolates associated with UTI among the HIV positive patients showed Staphylococcus aureus (39%) to be the most prevalent among the causative agents, followed by S. saprophyticus (23.7%), Citrobacter (10.2%) and Escherichia coli (8.5%). Proteus and S. aureus are mostly associated with hospital acquired infections (Cheeseborough, 2000). Our study showing Staphylococcus aureus to be most common uropathogen is supported by other studies (Ifeanyichukwu, et al., 2013; Frank-Peterside,
Okerentugba, Nwodo & Okonko, 2013; Omorogie and Eghafonza, 2009). In contrast, other studies have identified Escherichia coli as the most prevalent (Getu, Ali, Lema, Belay & Yeshetela, 2017; Alemu, Dagnew, Alem, & Gizachew, 2013; Akinbami, Bode-Shojobi, Ajibola, Oshinaike, & Adediran, 2013). Considering the distribution among ART users and non-ART users, all 8 species of bacterial isolates were associated with ART users while only three were associated with the non-ART users. This finding is similar to a study in Benin where there was a significantly higher prevalence of asymptomatic UTI among HAART users as compared to non-users (Omorogie and Eghafonza, 2009). In contrast to other studies conducted in Ethiopia (Fenta, Legese & Weldearegay, 2016; Debalkie, Cheneke, Tassew & Awol, 2014), Gram-positive isolates (66.1%) were more prevalent than Gram-negative isolates (33.9%).

The Gram-positive bacteria isolated from both ART users and non-users were susceptible to only Gentamicin and Ciprofloxacin whiles being resistant to Co-Trimoxazole, Tetracycline, Cefotaxime, Linomycin, Cephalexin and Cloxacillin. Variably, bacteria isolated from ART users were also susceptible to Ampicillin (94.4%), Prulifloxacin (58.3%) and Ofloxacin (77.8%), whiles those isolated from the non-users were resistant. The Gram-negative bacteria isolated from both ART users and non-users were susceptible to Gentamicin, Tazobactam, Amikacin, and Levofloxacin whiles being resistant to Tetracycline and Ceftriaxime. This finding is similar to other studies conducted in Ethiopia where the Gram-negative bacteria were resistant to Tetracycline, Ampicillin and Sulfamethoxazole-Trimethoprim (Getu, Ali, Lema, Belay & Yeshetela, 2017; Alemu, Dagnew, Alem, & Gizachew, 2013). Variably, bacteria isolated from ART users were resistant to Ampicillin (52.6%), Co-Trimoxazole (84.2%), Cefotaxime (73.7%), Ciprofloxacin (52.6%), Ofloxacin (63.2%) and Chloramphenicol (94.7%). The varying degrees of susceptibility and resistance to antimicrobial agents is mostly due to the easy access to over-the-counter drugs and the excessive use the drugs for animal rearing and other animal husbandry activities; thereby imposing some selective pressure on the bacteria to develop resistance (Ifeanyichukwu, et al., 2013). Generally, Gentamicin is the only antimicrobial agent which is effective to both Gram-positive and Gram-negative bacterial isolates while Tetracycline is the least effective. Gentamicin seems to be the most effective because of its route of administration which makes it undesirable for people to abuse.

CONCLUSION
In conclusion, our study found the prevalence of asymptomatic UTI to be 73.8% which is above the mostly reported range of 5%-41% worldwide. The most prevalent isolated uropathogens are Staphylococcus aureus, followed by Staphylococcus saprophyticus, Citrobacter, Escherichia coli, Proteus, Serratia, Providentia and Streptococcus sp. Bacteria isolated from ART users were more as compared to ART non-users. Moreover, with the varying degrees of antibiotic susceptibility, gentamicin was found to be effective against all the organism tested irrespective of the ART status. It is therefore recommended that urinary tract infections in both ART users and non-users should be managed with gentamicin until results from urine culture reveals the predominant uropathogens and its susceptibility to commonly used antibiotics. Regular screening for UTIs and monitoring of ART adherence should be conducted for HIV patients visiting the clinics. Also, further studies should be conducted to investigate the risk factors associated with the increased prevalence of urinary tract infections.

REFERENCES


