Urinary Bacterial Pathogens and their Antimicrobial Susceptibility Profile for the years 2005–2007 in St Kitts
J Hanley¹, I Branford¹, HC Gugnani², C Wilkinson¹, T Uhrin¹

ABSTRACT

Objective: The purpose of this study is to review bacterial isolates from cases of urinary tract infection (UTI) and their antimicrobial susceptibility pattern for the years 2005–2007 in St Kitts. It is hoped that the study will be of use in the treatment of cases of UTI in St Kitts.

Methods: The laboratory records at St Francis Hospital, Basseterre, St Kitts, for bacterial isolates from cases of urinary tract infection and their susceptibility profiles for three years, 2005–2007, were retrospectively reviewed and compared.

Results: A total of 595 isolates of 13 species of pathogenic bacteria were recovered from cases of UTI. Escherichia coli was the predominant species recovered each year. Among the other species frequently recovered were Citrobacter spp, Enterobacter spp, Klebsiella pneumoniae and Pseudomonas aeruginosa.

Conclusion: This study, the first of its kind from St Kitts serves to emphasize that treatment of UTI should be instituted generally on the basis of antimicrobial susceptibility tests.

INTRODUCTION

Urinary tract infection (UTI) is one of the commonest infections worldwide. It is responsible for significant morbidity in both hospitalized and community patients. Despite the widespread availability of antibiotics, it remains the most common bacterial infection in humans. The pattern of aetiological agents and antimicrobial susceptibility varies from region to region. It has been advocated that there should be surveillance of the bacterial spectrum of aetiological agents of UTI, and their antimicrobial resistance pattern on both a global and local level (1–3). Antibiotics are usually given empirically before the laboratory results of urine.

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Patógenos Bacterianos Urinarios y Su perfil de Susceptibilidad Antimicrobiana Durante los Años 2003-2007 en Saint Kitts
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RESUMEN

Objetivo: El propósito de este estudio es examinar los aislados bacterianos de casos de infección del tracto urinario (ITU) y su modelo de susceptibilidad antimicrobiana durante los años 2003–2007 en Saint Kitts. Se espera que el estudio sea de utilidad en el tratamiento de casos de ITU en Saint Kitts.

Métodos: Los archivos de laboratorio del Hospital Saint Francis, Basseterre, Saint Kitts, sobre los aislados bacterianos de los casos de infección del tracto urinario y sus perfiles de susceptibilidad durante tres años, 2005–2007, fueron examinados y comparados retrospectivamente.

Resultados: Un total de 595 aislados de 13 especies de bacterias patógenas fueron recuperadas de casos de ITU. Escherichia coli fue la especie predominante recuperada cada año. Entre las otras especies frecuentemente recuperadas se hallan: Citrobacter spp, Enterobacter spp, Klebsiella pneumoniae y Pseudomonas aeruginosa.

Conclusión: Este estudio – el primero de su tipo en Saint Kitts – sirve para enfatizar que el tratamiento de la ITU generalmente debe establecerse sobre la base de pruebas de susceptibilidad antimicrobiana.
Urinary Bacterial Pathogens

A mid-stream (“clean catch”) urine specimen was collected from each patient. Quantitative bacteriological cultures were performed according to standard laboratory procedures (4). A standard calibrated loop delivering 0.001 ml of urine was used to inoculate plates of cysteine lactose electrolyte deficient (CLED) agar and MacConkey agar. The inoculated plates were incubated aerobically at 37ºC for 18–24 hours from each patient. Quantitative bacteriological cultures were performed according to standard laboratory procedures (4). A standard calibrated loop delivering 0.001 ml of urine was used to inoculate plates of cysteine lactose electrolyte deficient (CLED) agar and MacConkey agar. The inoculated plates were incubated aerobically at 37ºC for 18–24 hours and colony counts were expressed in colony–forming units (CFU) per millilitre (ml) of urine. A count of 10^5 or more CFU per ml was considered as significant bacteriuria. Species identification of bacteria was based on colony morphology and biochemical characterization. Isolates of Citrobacter, Enterobacter and Acinetobacter were not identified to species level due to limitations of time and lack of some reagents. Isolates were tested for antimicrobial susceptibilities on Mueller-Hinton agar by the Kirby-Bauer disk diffusion technique (5) using the following discs and concentrations (mentioned in parenthesis): amikacin (10 µg), ampicillin (10 µg), augmentin [amoxicillin and clavulanic acid] (30 µg), cefozolin (30 µg), cephalothin (30 µg), ciprofloxacin (5 µg), sulfamethoxazole (25 µg), and norfloxacin (10 µg). The isolates of Morganella morgani were not tested for antimicrobial susceptibility due to shortage of antibiotic disks.

SUBJECTS AND METHODS

A total of 595 isolates belonging to 10 genera of pathogenic bacteria were recovered from cases of UTI with significant bacteriuria ie a count of 10^5 or greater than 10^5 CFU/ml of the suspected aetiologic agent. The specifically identified isolates represented 10 distinct species; the isolates of Citrobacter, Enterobacter and Acinetobacter were not identified to species level. The patients with UTI had dysuria, polyuria, urgency to urinate, abdominal or flank pain, and, at times, fever. From the scanty clinical data provided by the referring physicians, no difference could be made between upper and lower UTI; such differentiation is also not considered relevant to this study. The number of isolates for the respective years was as follows: 2005 –2007 244 isolates. The distribution of cases of UTI according to outpatients and inpatients, gender and amongst adults and children is given in Table 1. The percentage breakdown of outpatients and inpatients in the period of study was 78–91% and 9–22% respectively. As can be seen, females contributed to a much greater number of cases (63–71%) than males (29–37%). None of the inpatients had any functional or anatomic abnormalities of the urinary tract nor had any of them been on urinary catheters. Escherichia coli was by far the predominant species recovered each year (Table 2).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of cases</th>
<th>% of cases in:</th>
<th>% of cases in:</th>
<th>% of cases in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>out-pts</td>
<td>in-pts</td>
<td>M</td>
</tr>
<tr>
<td>2005</td>
<td>176</td>
<td>78</td>
<td>22</td>
<td>37</td>
</tr>
<tr>
<td>2006</td>
<td>175</td>
<td>87.5</td>
<td>12.5</td>
<td>34</td>
</tr>
<tr>
<td>2007</td>
<td>244</td>
<td>91</td>
<td>9</td>
<td>29</td>
</tr>
</tbody>
</table>

in-pts = inpatients, out-pts = outpatients

Among other bacterial agents recovered were Citrobacter spp, Enterobacter spp, Klebsiella pneumonae, Klebsiella oxyxtoxa, Proteus mirabilis, Proteus vulgaris, Pseudomonas aeruginosa, Acinetobacter, Hafnia alvei, Staphylococcus saprophyticus and Staphylococcus aureus.

In-vitro susceptibility pattern of the bacterial species is given in Table 3. As is evident, the isolates of principal agents, Escherichia coli, Citrobacter spp, Enterobacter spp and Klebsiella pneumonaeae, exhibited a low degree of resistance (8.7 to 17.8%) to co-trimoxazole, the antimicrobial most commonly employed in treatment of UTI in St Kitts. The rate of resistance of these bacteria was much higher for other antimicrobials used in the therapy of UTI, viz, norfloxacin (17.8–82.1%) and ciprofloxacin (15.4–100%). The rate of resistance of nitrofurantoin, another antimicrobial occasionally employed in the treatment of UTI in St Kitts was relatively low for E coli (25.1%) and Citrobacter spp (12.8%). The isolates of Escherichia coli, Citrobacter spp, Enterobacter spp and Klebsiella pneumonaeae showed a high degree of resistance to augmentin (21.2–91.0%), cefazoline (14.8–50.0%) and cephalothin (36.7–85.7%).
isolates in this study, is frequently recovered from young female outpatients presenting with uncomplicated urinary tract infections (3, 9, 10). The isolates of most of the species also exhibited a high rate of resistance to nalidixic acid (Table 3). This is in close agreement with a previous study with a low overall resistance rate for norfloxacin for *Escherichia coli* reported from Trinidad and Tobago (6). A relatively high rate of resistance to augmentin (amoxicillin-clavulanic acid) for the principal uropathogenic bacteria observed in the present study is in agreement with the said report from Trinidad and Tobago (6). The isolates of most of the species also exhibited a high rate of resistance to amoxicillin, co-trimoxazole, ceftazidime and cefpodoxime. The pattern of antimicrobial susceptibility of uropathogenic bacteria may vary greatly in different geographic locales. For instance, a report from India (7) mentioned that 70–80% of *Escherichia coli* isolates from outpatients with UTI showed resistance to co-trimoxazole and ampicillin. Another report from India (12) reported maximum resistance of common uropathogenic bacteria to amoxicillin (79.6%), co-trimoxazole (82%) and nalidixic acid (73.8%). A study from Port-Harcourt, Nigeria...
(13) recorded resistance to ampicillin (71.0%), co-trimoxazole (65.3%) and nalidixic acid (76.6%) in a majority of the urinary isolates. Another study from Sudan (14) reported the high rates of resistance of urinary Escherichia coli, Klebsiella pneumoniae and Proteus mirabilis to ampicillin (75%), ciprofloxacin (90%), nitrofurantoin (90%), amoxicillin and amoxicillin-clavulanic acid (34.7%) has been reported from Senegal (15). In the present study, ciprofloxacin was the least effective antibiotic from in vitro susceptibility tests, in contrast to a low rate of resistance observed in Trinidad and Tobago (6). These variations in antimicrobial susceptibility in different countries may depend on the antimicrobials used empirically in a particular area and the easy availability of antimicrobial drugs over the counter in some countries eg India and Nigeria. In view of these findings, except for co-trimoxazole, no other single antimicrobial agent can be suggested for empirical therapy of UTI, as also reported elsewhere (2, 8). The present study emphasizes the need for periodic reassessment of in vitro susceptibility pattern of urinary pathogens to serve as a guide for antibiotic therapy of UTIs in St Kitts since these organisms exhibit resistance to first-line drugs used for UTI infection. In order to prevent or decrease resistance to antibiotics, the use of antibiotics should be kept under supervision, should be given in appropriate doses for an appropriate period of time. Further treatment of UTI should be instituted generally on the basis of antimicrobial susceptibility tests.

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REFERENCES