ABSTRACT:
The present work aimed to study the current situation of antibiotic resistance of human pathogens caused Urinary tract infection (UTI). 100 urine samples were collected from patients ranging the age from 5 to 70 years. Bacterial pathogens were isolated and identified following the definition of the National Committee of Clinical Laboratory Standards. The obtained results showed that Escherichia coli was the predominant pathogen (48%) causing UTI, followed by Klebsiella pneumoniae (19%), Pseudomonas aeruginosa (6%), Proteus mirabilis (6%), Enterobacter cloacae (4%), Citrobacter koseri (2%), Staphylococcus aureus (1%), Acinetobacter baumannii (1%), Staphylococcus sciuri (1%), Serratia marcescens (1%) and negative samples (5%). Strains isolated from urinary tract infections were examined for susceptibility to antibiotics, few of antibiotics were effective and most of pathogens were resistant and were grouped as multidrug resistant (MDR) strains. Among this E. coli, K. pneumoniae and P. aeruginosa were highly resistant to the antibiotics, whereas Staphylococcus and Serratia marcescens exhibited high sensitivity to cefoxitin, cefepime and aztreonam. The present study evaluated the prevalence of bacteria implicated in UTI and indicated the emerging of multidrug resistance among the isolated bacterial pathogens.

KEY WORDS:
Urinary tract infection, antibiotics, Escherichia coli

INTRODUCTION:
Urinary Tract Infections (UTI) are one of the most prevalent extra-intestinal bacterial infections. Nowadays, it represents one of the most common diseases encountered in medical practice affecting people of all ages from the neonate to the geriatric age group (Kunin, 1994).

Escherichia coli is the most frequently isolated uropathogen in symptomatic UTIs worldwide. The prevalence of other isolated uropathogens, such as Staphylococcus saprophyticus, Klebsiella spp, Proteus mirabilis, Serratia spp, and Enterobacter spp, varies between regions and studies (Gales et al., 2002; Matute et al., 2004; Andrade et al., 2006).

Treatment of UTI cases is often started empirically. Therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens. However, because of the evolving and continuing antibiotic resistance phenomenon, regular monitoring of resistance patterns is necessary to improve guidelines for empirical antibiotic therapy (Grude et al., 2001; Kripke, 2005).

The normal urinary tract is sterile. Uropathogenic bacteria often originate from the fecal flora and the perineal area (Stamey and Sexton, 1975).

Drug resistance of pathogens is a serious medical problem; because of very fast arise and spread of mutant strains that are insusceptible to medical treatment. Microorganisms use varied mechanisms to acquire drug resistance viz. horizontal gene transfer (plasmids, transposons and bacteriophages), recombination of foreign DNA in bacterial chromosome and mutations in different chromosomal locus (Klemm et al., 2006).

The structure of the females urethra and vagina makes it susceptible to trauma during sexual intercourse as well as bacteria been massaged up the urethra and into the bladder during pregnancy and or child birth (Al-Sweih et al., 2008; Kolawale et al., 2009).

Worldwide, about 150 million people are diagnosed with UTI each year (Gupta et al., 2001). Most infections are caused by
retrograde ascent of bacteria from the faecal flora via the urethra to the bladder and kidney especially in the females who have a shorter and wider urethra and are more readily transfer by microorganisms (Jones et al., 2006). Majority of UTIs are not life threatening and do not cause any irreversible damage. However, when the kidneys are involved, there is a risk of irreparable tissue damage with an increased risk of bacteremia (Hvidberg et al., 2000).

Nowadays, drug resistance is a huge growing problem in treating infectious diseases like malaria, tuberculosis (TB), diarrheal diseases, urinary tract infections (UTI) etc. As suggested by Goldman and Huskins (1997) the improper and uncontrolled use of many antibiotics resulted in the occurrence of antimicrobial resistance, which became a major health problem worldwide. In the past decade, many kinds of resistant strains have been discovered. For example, methicillin resistant Staphylococcus aureus (MRSA) (Wagenlehner and Naber, 2004), multidrug resistant Pseudomonas aeruginosa (Linuma, 2007) and Serratia marcescens (Kim et al., 2006) vancomycin resistant enterococci (VRE) (Gold, 2001) and extended spectrum beta lactamase (ESBL) resistant enterococci (Bhattacharya, 2006).

This work aimed to study the current situation of antibiotic resistance of human pathogens caused Urinary tract infection (UTI).

**MATERIAL AND METHODS:**

A total of 100 midstream urine samples were collected from adult patients (aged 5-70 years) having community acquired UTI and who were referred to the Government king Fahd Hospital, Brudy, Alqaseem Saudi Arabia. Each sample was inoculated on both blood agar (with 5% sheep blood) and MacConkey agar plates and incubated at 37°C for 24-48 hours, and a total 73 number of colonies were counted. Significant growth was identified biochemically and serologically in a systematic way according to standard methods (Vandepitte et al., 1996). Susceptibilities of the common isolated bacteria (E. coli, Enterococcus faecalis, Klebsiella pneumoniae, Serratia marcescens, Pseudomonas aeruginosa, S. saprophyticus, Staphylococcus aureus and Proteus mirabilis) to certain antimicrobial agents were examined.

Antimicrobial sensitivity testing of all isolates was performed on diagnostic sensitivity test plates according to Bauer method (Bauer et al., 1966). Bacterial inoculums were prepared by suspending the freshly-grown bacteria in 25 ml sterile nutrient broth. For each bacterial isolate, 4 drops of the bacterial culture were added into a PBS tube. The mixture was gently swirled with keeping adding another 4 drops of the culture into the tube until the turbidity is comparable to that of the standard 0.5 McFarland. Using a swab an enough amount from the bacterial culture was streaked onto the agar plate. The antimicrobial disks were applied to the plate whereas; a blank paper disk was applied in the center of the agar plate. After incubation the plates for 16-18 hours, the inhibition zones were observed.

UTI pathogens were identified according to the definition of the National Committee of Clinical Laboratory Standards (NCCLS, 1999).

**RESULTS:**

The factors that cause diseases of the urinary system are many, but the most important are the different types of bacteria, for example *E. coli* and *Proteus mirabilis*, and because these types of bacterial multi-cause diseases of the urinary system in humans has been interest in these factors saluting isolate, diagnose, and their impact on health and ways to spread and resistance to various treatments hence our interest in this aspect and has this study in the area of Buraydah, Saudi Arabia, and the multiple aspects of the most important to isolate and diagnose the bacteria that cause urinary tract diseases with emphasis on the therapeutic aspects where screening was performed on the sensitivity of bacteria to various treatments (sensitivity test), and the attached tables 1 & 2 show the bacterial species that have been isolated and their antibiotic sensitivity test.

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>48%</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>19%</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>6%</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>4%</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>6%</td>
</tr>
<tr>
<td><em>Actinobacter beun</em></td>
<td>1%</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>1%</td>
</tr>
<tr>
<td><em>Serratia marcescens</em></td>
<td>1%</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>4%</td>
</tr>
<tr>
<td><em>Staphylococcus sciuri</em></td>
<td>1%</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>2%</td>
</tr>
<tr>
<td><em>Citrobacter koseri</em></td>
<td>2%</td>
</tr>
<tr>
<td>Negative samples</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 1. Frequency of isolated bacteria from urine samples.
A summary of the different microorganisms isolated during the study period was shown in Table 1. It is clear that *E. coli* was the predominant uropathogen (48%) causing UTI, followed by *Klebsiella pneumonia* (19%), *Proteus mirabilis* and *Pseudomonas aeruginosa* (6%), *Enterobacter cloacae* and *Enterococcus faecalis* (4%), *Enterobacter cloacae* and *Citrobacter koseri* (2%). However, *Actinobacter beun*, *Serratia marcescens*, *Staphylococcus aureus* and *Staphylococcus sciuri* were the least dominant uropathogen causing UTI strains (1%).

The multi drug resistance profile for different isolates to the routinely used antibiotics in laboratory tests is in Table 2. Among the isolated UTI strains were tested for susceptibility against antibiotics, *E. coli* and *Enterobacter cloacae* were highly resistance to most of the antibiotics followed by *Proteus mirabilis* and *Pseudomonas aeruginosa*. Whereas, the lowest TUI pathogens showed antibiotic resistance were *Klebsiella pneumoniae* and *Citrobacter koseri*. On the other hand, most the UTI strains were highly resistance to *Cephaleolin, Ertapenem* and *Gentamicin*; while, UTI strains showed any no resistance against the antibiotics *Piperacillin-Tazobactam, Ciprofloxacin, Levofloxacin*, or Tigecycline.

**DISCUSSION:**

The urinary system is very important for humans where excretion device is most fluids and salts harmful to human health and any defect in the device leads to an imbalance in the general human health, hence the great interest and wide in this device health. The factors that cause diseases of the urinary system are many, but the most important are the different types of bacteria, for example *E. coli* and *Proteus mirabilis*. This study was carried out in the area of Buraidah, Saudi Arabia, to isolate and to screen sensitivity of bacteria to various antibiotics.

The data showed the prevalence of bacterial species that have been isolated from pursuing many of the cases in different hospitals Buraydah City. One of the bacterial species that have been isolated in abundance is the bacteria *E. coli* (Garofalo et al., 2007), and these bacteria when isolated provide an indication of many aspects: The first - the presence of contamination in the surrounding environment (Zhao et al., 2001; Natvig et al., 2002).
Since these bacteria are considered an indicator of pollution of the environment, including fruits and vegetables (Black et al., 1982) in addition to nearby water systems of the sewage networks (Solomon, 2002). Second - weak immune originally situation when an infected person (Marks et al., 1982). Since this type of bacteria is one of the opportunistic bacteria (Greenwood et al., 2002) and therefore must search for the circumstances that led to the patient’s immune weakness and processed. Klebsiella pneumonia was isolated from urine samples studied. This bacterium was previously recorded as a common microbe in the urinary tract (Liu et al., 1986; Satlin et al., 2011). The importance of this type of infection is due to the spread of bacteria in hospitals (Su et al., 2011). Among the bacterial species that have been isolated are Enterobacter cloacare (Finnström et al., 1998) with the knowledge that these bacteria cause some kind of injury in the hospitals (Modi, 1987). Pseudomonas aeruginosa was also isolated. This organism causes injury in hospitals especially urinary tract infection (Landman et al., 2002). The bacterium Proteus mirabilis isolated from the tested samples is known to cause infections of the urinary tract (Jones et al., 1990), and can be isolated from hospital patients (Schimpff et al., 1972; de Champs et al., 2000). The isolated Acinetobacter baumannii and Staphylococcus aureus are common in hospitals where the injured could be spread widely among individuals working in the hospital or between patients thus can cause urinary tract infections (Ando et al., 2004). Serratia marcescens was also isolated and thus it can inhabit hospitals. Also Enterococcus faecalis was recorded and it can infect the urinary system (Guzmán et al., 1989).

The present study indicated that Escherichia coli was the predominant uropathogen causing UTI and also E. coli and Enterobacter cloacare were highly resistant to most of the antibiotics. Klebsiella spp was found to be the most common isolated pathogens of UTI followed by E. coli (Hammoudi, 2013). Mandal et al. (2001) reported that E. coli is the commonest cause of UTI and has a high antibiotic resistance among the strains, which emphasize the need for judicious use of antibiotics. Certain virulence factors like haemolysin production and presence of fimbriae in the E. coli may be associated with urovirulence.

The study revealed that, there is a high percent in resistance of pathogenic strains to Cephalothin, Ertapenem, Gentamicin and Ampicillin antibiotics. Hooton (2003) found recorded a significant increase in resistance of pathogenic strains to Ampicillin and Cephalothin. Also, most of UTI pathogen in our study showed antibiotic resistance to Gentamicin. However, Manikandan et al. (2011) mentioned that Gentamicin still show high efficacy against UTI pathogens. These differences in sensitivity pattern of the isolates could be attributed to time difference between the two studies or environmental factors such as practices of self medication, the drug abuse and indiscriminate misuse of antibiotics among the general population, which has favored the emergence of resistance strains. The efficiency of Pipercillin-Tazobactam, Ciprofloxacin, Levofloxacin and Tigecycline antibiotics against all UTI pathogenic strains because of their multiple mechanisms of action seem to have enabled it to retain potent activity against pathogens.

Drug resistance is one of nature’s never ending process by which the organisms develop tolerance to new environmental condition. It may be due to a pre-existing factor in the organisms or result from the acquired factor(s).

In recent years, the increasing prevalence of infectious diseases resistant to chemotherapy has caused an urgent need to discover and develop new antibiotics. It is urgent to find rare sources, as well as microorganisms as promising sources of new antimicrobial compounds.

REFERENCES:


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حساسية بكتيريا عدوى المساكم البولية لبعض المضافات الجوية

Mohamed Abul Naga**, جامعى محمد رياض

قسم البيئات البيئية، معهد العلوم البديلة، جامعة حلب، سوريا

يفتقد هذا العمل إلى دراسة مقاومة بكتيريا عدوى المساكم البولية لبعض المضافات الجوية. تم تجربة 100 شبكة بول من مرضى تراوم أعمارهم من 5 إلى 70 سنة، السلالات البكتيرية المعروفة تم تعريفها بالعنيدة العلمية للعاملية، ونوعي البكتيريا المعروفة. حيث تم تقدير نسبة البكتيريا السائدة بنسبة *E. coli* 48% (53) عباد عدوى المساكم البولية، تليتها البكتيريا *Klebsiella pneumoniae* (19%)، *Klebsiella pneumoniae* (19%)، *Pseudomonas aeruginosa* (19%)، *Staphylococcus aureus* (6%)، *Enterococcus faecalis* و *Enterobacter cloacae* (4%)، *Lactobacillus plantarum* و *Staphylococcus aureus* (2%)، *Citrobacter koseri* و *Staphylococcus aureus* (2%)، *Simonsiella marcescens* و *Staphylococcus sciuri* (1%)، *Acinetobacter beun* و *Staphylococcus aureus* (5%)، *E. coli* (5%)، *Enterobacter cloacae* (5%)، *Simonsiella marcescens* و *Staphylococcus aureus* (5%)، *Citrobacter koseri* (5%)، *Enterobacter cloacae* (5%)، *Simonsiella marcescens* (5%)، *Staphylococcus aureus* (5%)، *Citrobacter koseri* (5%).