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Prevalence of bacteriuria in Jeyaseharan Hospital of South India and their antibiogram

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ABSTRACT

Objective: To investigate the prevalence of bacteriologically positive urinary tract infection (UTI) among people enrolled in the hospital during January 2010 to June 2010. **Methods:** In the study period, a total of 1 546 patients were screened for UTI and the antibiogram was studied. **Results:** A total of 744 patients were positive. It revealed that females were more vulnerable to bacteriuria than males. Organisms predominantly isolated were *Esherichia coli* followed by *Klebsiella* in both males and females. Among the antibiotics tested against the isolated organisms for sensitivity test, chloramphenicol was more effective followed by amikacin and gatifloxacin for Enterobacteriaceae. For *Pseudomonas aeruginosa*, chloramphenicol was not effective, amikacin was effective. Amoxycillin, amoxycillin/clavulanic acid and first generation cephalosporin were least effective against Enterobacteriaceae and *Pseudomonas aeruginosa*. **Conclusions:** This study would not only help in proper treatment of patients but also discourage the indiscriminate use of antibiotics and prevent development of drug resistance.

1. Introduction

Urinary Tract Infection (UTI) is a serious health problem affecting millions of people each year. Infection of the urinary tract is the second most common infection in the body[1]. UTI causes about 8.3 million people visiting doctors each year. Women are especially prone to UTI for reasons that are not yet well understood[2]. UTI in men is not as common as in women but can be very serious when it occurs[2]. Normally, urine is sterile. It is usually free of bacteria, viruses, and fungi but does contain fluids, salts and waste products. An infection occurs when tiny organisms, usually bacteria from the digestive tract, cling to the opening of the urethra and begin to multiply. The urethra is the tube carrying urine from the bladder to outside the body. Most infections arise from one type of bacteria, *Escherichia coli* (*E. coli*), which normally live in the colon[3]. In many cases, bacteria first travel to the urethra. When bacteria multiply, an infection can occur. An infection limited to the urethra is called urethritis. Bacteria moving to the bladder and multiplying result in a bladder infection, called cystitis. If the infection is not treated promptly, bacteria may then travel further up to the ureters to multiply and infect the kidneys. A kidney infection is called pyelonephritis. Microorganisms called *Chlamydia* and *Mycoplasma* may also cause UTIs in both men and women, but these infections tend to remain limited to the urethra and reproductive system. Unlike *E.coli*, *Chlamydia* and *Mycoplasma* may be sexually transmitted and infection requires treatment of both partners[4].

Not everyone with a UTI has symptoms, but most people show at least some symptoms. These may include a frequent urge to urinate and a painful, burning feeling in the area of the bladder or urethra during urination. It is not unusual to feel tired, shaky, washed out and painful even when not urinating. Often women feel uncomfortable pressure above the pubic bone, and some men experience a fullness in the rectum. The common complain is that despite the urge to urinate, only a small amount of urine is passed. The urine itself may look milky or cloudy, even reddish if blood is present. Normally, a UTI does not cause fever if it is in the bladder or urethra. A fever may mean that the infection has reached the kidneys. Other symptoms of a kidney infection include pain in the back or side below the ribs, nausea, or vomiting. In children, symptoms of a urinary infection may be overlooked or attributed to another disorder. A UTI

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should be considered when a child or infant seems irritable, eats abnormally, has unexplained fever that does not go away, has incontinence or loose bowels, or is not thriving. Unlike adults, children are more likely to have fever without other symptoms[5].

UTIs are treated with antibacterial drugs. The choice of drug and course of treatment depend on the patient's history and the urine tests that identify the offending bacteria. The sensitivity test is especially useful in selecting the most effective drug. The drugs most often used to treat routine, uncomplicated UTIs are trimethoprim (Trimpex), trimethoprim/sulfamethoxazole (Bactrim, Septra, Cotrim), amoxicillin (Amoxil, Trimox, Wymox), nitrofuantoin (Macrodantin, Furadantin) and ampicillin (Omnipen, Polycillin, Principen, Totacillin). A class of drugs called quinolones includes four drugs approved in recent years for treating UTI[6]. These drugs include ofloxacin (Floxin), norfloxacin (Noroxin), ciprofloxacin (Cipro), and trovafloxin (Trovan). Often, a UTI can be cured with 1 or 2 days of treatment if the infection is not complicated by an obstruction or other disorder. Still, many doctors ask their patients to take antibiotics for a week or two to ensure that the infection has been cured. Single-dose treatment is not recommended for some patients, for example, those who have delayed treatment or have signs of a kidney infection, patients with diabetes or structural abnormalities, or men who have prostate infections. Longer treatment is also needed for patients with infections caused by *Mycoplasma* or *Chlamydia*, which are usually treated with tetracycline, trimethoprim/sulfamethoxazole (TMP/SMZ), or doxycycline. Kidney infections generally require several weeks of antibiotic treatment. Researchers at the University of Washington found that 2-week therapy with TMP/SMZ was effective as 6 weeks of treatment with the same drug for women with kidney infection that did not involve an obstruction or nervous system disorder. In such cases, kidney infections rarely lead to kidney damage or kidney failure unless untreated. Various drugs are available to relieve the pain of a UTI. The difficulty is increased by the variations in sensitivity patterns of different population. The degree of exposure of a population to specific antibiotic could play a role in this variation[7]. UTIs pose a serious health threat with respect to antibiotic resistance and high recurrence rates.

Microorganisms responsible for UTI such as *E.coli* and *Klebsiella* spp. have the ability to produce Extended-Spectrum β-lactamase (ESBLs) in large quantities. These enzymes are plasmid borne and confer multiple drug resistance, making urinary tract infection difficult to treat. *E. coli* is the most frequent urinary pathogen isolated from 50%-90% of all uncomplicated urinary tract infections. Antibiotics are usually given empirically before the laboratory results of urine culture are available. To ensure appropriate therapy, current knowledge of the organism that cause UTI and their antibiotic susceptibility should be educated. Much of the data is available for community acquired infections. This may be different from that of hospital acquired infections. Since patterns of antibiotic resistance in a wide variety of pathogenic organisms may vary even over short periods and depend on site of isolation and on different environments, periodic evaluation of antibacterial activity is needed to update this information[8].

This study was carried out on hospitalized patients with UTI and those attending the outpatient department with UTI. Clinical laboratory records of UTI cases were studied for the spectrum of bacterial isolates and their antibiotic susceptibility results were analyzed during January 2010 to June 2010.

2. Materials and methods

2.1. Sample collections

Specimen "Clean-catch", midstream urine were collected in sterile wide mouthed, screw-capped bottle after very thorough preliminary cleansing of external genitalia with soap and water. The number of organisms was estimated by calibrated loop method to evaluate the clinical significance of a "positive" urine culture.

2.2. Inoculation by calibrated loop method

A 4 mm platinum loop which delivers 0.01 mL is used. MacConkey ' s agar was inoculated by quickly transferring one loopful of the diluted or undiluted well-mixed, uncentrifuged urine specimen, and then touching the loop to 3 or 4 places on the MacConkey ' s agar. The blood agar was inoculated, by 4 area-streaking, from one area to the next, and not going over previously streaked areas. This should give adequate isolation of colonies in the fourth area of streaking.After overnight incubation of all plates at 37℃, the number of each colony was counted, and the number of viable bacteria present in 1.0 mL undilution urine was also calculated. The number of colonies was multiplied by 100 if undiluted urine was used in inoculation; by 1 000 if a 1:10 dilution of urine was used; by 10 000 if a 1:100 dilution was used. The significance of a positive urine culture is most reliably assessed in terms of the number of viable bacteria present in the urine.

2.3. Culture techniques

Aseptically collected samples were plated on suitable culture medium like blood agar and MacConkey´s agar. Blood agar serves as an enriched medium and a differential medium for haemolytic organisms. It is useful to differentiate various strains of *Streptococci*. MacConkey´s agar is a selective as well as differential media. It is used for the detection of coliforms and pathogenic species of *Enterobacteriaceae*. Bile salt mixture inhibits gram positive organisms. Lactose fermenting coliforms produce red colonies and non lactose fermentors produce colourless colonies on the medium.

2.4. Identification of organisms

Bacterial isolates were further identified by staining