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Antibiogram Pattern in *Escherichia coli* Strains isolated of Community Acquired Urinary Tract Infection in Iranian Girl Children's

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ABSTRACT

Most urinary tract includes (UTIs) in children are monomicrobic, often caused by *Escherichia coli*. Evidence on risk factors for UTI in children is limited. UTIs were associated with constipation, encopresis, bladder instability, and infrequent voiding in some studies but not in a cohort of febrile children younger than two years. In this study we evaluated antibiogram pattern *E. coli* isolated from urinary tract infection in Iranian girl children's.Materials and MethodsThe search was laboratory and performed in DEY laboratory in 2010 year in Isfahan, a total 702 urinary children samples, cultured and study with microbiological methods.Antibiotic susceptibility was performed with antibiotic susceptibility standard disc diffusion agar.ResultsAccording to result of antibiogram test, respectively 40(90.90%), 32(66.66%),16 (38.095%), 34(70.069%),10 (22.72%),18 (37.5%),19 (42.22%), 8(16.32%) and 26 (61.90%) of *Escherichia coli* strains Isolated was resistant to Nitrofurantoion, Ceftizoxime,Cephalothin,Ciprofloxacin,Tetracycline,Co-Trimoxazole,Nalidixic Acid, Amoxycillin and Gentamicin.DiscussionOral antibiotics are as effective as parenteral therapy in randomized trials.The optimal duration of antibiotic therapy has not been established,but one-day therapies have been shown to be inferior to longer treatment courses. Undiagnosed or untreated UTIs can lead to kidney damage,especially in kids younger than six year. Establish systems for monitoring antimicrobial resistance in hospitals and the community and link these findings to resistance and disease surveillance data is fundamental to developing treatment guidelines accurately and to assessing the effectiveness of interventions appropriately.

Key words: *Escherichia coli*,Bacteriuria, Urinary Tract Includes, Children, Antibiotic Resistance.

INTRODUCTION

A urinary tract includes (UTI) is an infection in the urinary tract. Infections are caused by microbes fungi, viruses, and bacteria. Bacteria are the most common cause of UTIs. Normally, bacteria that enter the urinary tract are rapidly removed by the body before they cause symptoms. However, sometimes bacteria overcome the body's natural defenses and cause infection. An infection in the urethra is called urethritis (Conway *et al*., 2007, Foster., 2008, Justice *et al*., 2006,Nicolle.,2008,U.S., 2008). A bladder infection is called cystitis. Bacteria may travel up the ureters to multiply and infect the kidneys. A kidney infection is called pyelonephritis (Conway *et al*., 2007, Foster., 2008, Justice *et al*., 2006, Nicolle., 2008,U.S.2008).Most UTIs are caused by bacteria that live in the bowel. The bacterium *Escherichia coli* causes the vast majority of UTIs. The urinary tract has several systems to prevent infection. The points where the ureters attach to the bladder act like one-way valves to prevent urine from backing up, or refluxing, toward the kidneys, and urination washes microbes out of the body.

E. coli is responsible for most uncomplicated cystitis cases in women, especially in younger women. *E. coli* is generally a harmless microorganism originating in the intestines. If it spreads to the vaginal opening, it may invade and colonize the bladder, causing an infection. The

spread of *E. coli* to the vaginal opening most commonly occurs when women or girls wipe themselves from back to front after urinating, or after sexual activity. *Staphylococcus saprophyticus* accounts for 5 - 15% of UTIs, mostly in younger women. *Klebsiella*, *Enterococci* bacteria, and *Proteus mirabilis* account for most of remaining bacterial organisms that cause UTIs. They are generally found in UTIs in older women. Rare bacterial causes of UTIs include *ureaplasma urealyticum* and *Mycoplasma hominis*, which are generally harmless organisms (Conway *et al*., 2007, Foster., 2008, Justice *et al*., 2006, Nicolle., 2008, U.S. 2008).Immune defenses also prevent infection. But despite these safeguards, infections still occur. Certain bacteria have a strong ability to attach themselves to the lining of the urinary tract.Children who often delay urination are more likely to develop UTIs. Regular urination helps keep the urinary tract sterile by flushing away bacteria. Holding in urine allows bacteria to grow. Producing too little urine because of inadequate fluid intake can also increase the risk of developing a UTI. Chronic constipation-a condition in which a child has fewer than two bowel movements a week-can add to the risk of developing a UTI. When the bowel is full of hard stool, it presses against the bladder and bladder neck, blocking the flow of urine and allowing bacteria to grow. UTI is one of the most common infections of childhood. It distresses the child, concerns the parents, and may cause permanent kidney damage. Some children develop UTIs because they are prone to such infections, just as other children are prone to getting coughs, colds, or ear infections(Conway *et al*., 2007, Foster., 2008, Justice *et al*., 2006, Nicolle., 2008, U.S. 2008).Uncomplicated UTIs can be diagnosed and treated based on symptoms alone (Nicolle, 2008).Oral antibiotics such as trimethoprim, cephalosporins, nitrofurantoin, or a fluoroquinolone substantially shorten the time to recovery. All are equally effective for both short and long term cure rates(Trestioreanu *et al*.,2010,Mori *et al*.,2009). About 50% of people will recover without treatment within a few days or weeks(Nicolle,2008). The Infectious Diseases Society of America recommends a combination of trimethoprim and sulfamethoxazole as a first-line agent in uncomplicated UTIs rather than fluoroquinolones (Warren *et al*.,1999). Fluoroquinolones are not recommended first line due to their cost and concern that over use will increase resistance and thus decrease the utility of this class for those with severe infections (Warren *et al*.,1999). Resistance has developed in the community to all of these medications due to their widespread use(Nicolle,2008). A three-day treatment with trimethoprim, TMP/SMX, or a fluoroquinolone is usually sufficient, whereas nitrofurantoin requires 7 days(Nicolle,2008). Trimethoprim is often recommended to be taken at night to ensure maximal urinary concentrations to increase its effectiveness. While trimethoprim/sulfamethoxazole was previously internationally used (and continues to be used in the U.S. and Canada), the addition of the sulfonamide gives little additional benefit compared to the trimethoprim component alone. However, it is responsible for a high incidence of mild allergic reactions and rare but potentially serious complications(Smaill.,2007,Michael *et al*.,2005, Warren *et al*.,1999, Zalmanovici *et al*.,2010). For simple UTIs, children often respond well to a three-day course of antibiotics.

Multiple bacilli (rod-shaped bacteria, here shown as black and bean-shaped) shown between white cells at urinary microscopy (Fig 1).This is called bacteriuria and pyuria, respectively. These changes are indicative of a urinary tract infection.In straight-forward cases, a diagnosis may be made and treatment given based on symptoms alone without further laboratory confirmation (Nicolle, 2008). In complicated or questionable cases, confirmation via urinalysis, looking for the presence of nitrites, leukocytes, or leukocyte esterase, or via urine microscopy, looking for the presence of red blood cells, white blood cells, and bacteria, may be useful(Nicolle,2008). Urine culture showing a quantitative count of greater than or equal to 10^3 colony-forming units (CFU) per mL of a typical urinary tract organism along with antibiotic sensitives is useful to guide antibiotic choice(Nicolle,2008). However, women with negative cultures may still improve with antibiotic treatment(Nicolle,2008). Most cases of lower urinary tract infections in females are benign and do not need exhaustive laboratory work-ups. However, UTI in young infants may receive some imaging study, typically a retrograde urethrogram, to ascertain the presence/absence of congenital urinary tract

anomalies. All males with a confirmed UTI should be investigated further. Specific methods of investigation include X-ray, nuclear medicine, MRI, DMSA, and CAT scans.Children with recurrent UTIs maybe treated with preventative antibiotics that decrease the rate of microbiological recurrence but not symptomatic recurrence.These conclusion must be viewed in light of the poor quality of evidence available(Lin .,2008,Schroeder *et al*.,2005,Shaikh *et al*.,2007,McGillivray *et al*.,2005,Mori *et al*.,2007).

Aims of present study was establish prevalence rates of community acquired urinary tract infection and antibiogram pattern in *Escherichia coli* strains isolated from urinary tract infection in Iranian girl children's.

Clinical Isolates

A total of 1027consecutive non-repeat culture isolates of Urine cultures were obtained from urine clinical over a period of 24 months (April 2009 to December 2010). The isolates were identified on the basis of conventional microbiological procedures (Koneman *et al*.,2006).

Antimicrobial susceptibility

Antimicrobial susceptibility was determined by Kirby-Bauer disk diffusion method as per CLSI recommendations. (CLS.,2004). Antimicrobial disks used were Nitrofurantoion, Ceftizoxime, Cephalothin, Ciprofloxacin, Tetracycline, Co-Trimoxazole, Nalidixic Acid, Amoxycillin and Gentamicin.

Identification bacteria were performed with microbiological methods e.g Gram stains and biochemical tests with the BioMerieux database system and use of differential culture medium. In first step specimen grows on sheep blood and EMB agars then incubated at 37°C under aerobic conditions (Jalalpoor *et al*., 2007,2009,2011; Washington *et al*., 2006).

Culture Technique and Definitions

Urine cultures were routinely obtained on children younger than 10 years of age. Urine specimens were then sent to the microbiology laboratory in sterile containers by pneumatic tube. Urine was refrigerated, if not plated, within 10 minutes of receipt. Standard quantitative culture was performed by laboratory technologists. A loop calibrated to deliver approximately 0.001 mL was used to inoculate blood agar (Merck) and MacConkey (Merck) agar plates. All plates were incubated at 35°C and examined daily for growth for 2 days. A positive result was defined as growth of a single urinary tract pathogen at e"10^4 CFU/mL (Kathy etal.,1998).

RESULTS

According to results from 702 study urine cultures sample, frequency of bacteriuria in girl children's was 32%.

According to result of antibiogram test, respectively 40 (90.90%), 32 (66.66%),16 (38.095%), 34 (70.069%),10 (22.72%),18 (37.5%),19 (42.22%), 8 (16.32%) and 26 (61.90%) of *Escherichia coli* strains isolated from urine cultures sample was resistant to Nitrofurantoion, Ceftizoxime, Cephalothin, Ciprofloxacin, Tetracycline, Co-Trimoxazole, Nalidixic Acid, Amoxycillin and Gentamicin (Diag 1).

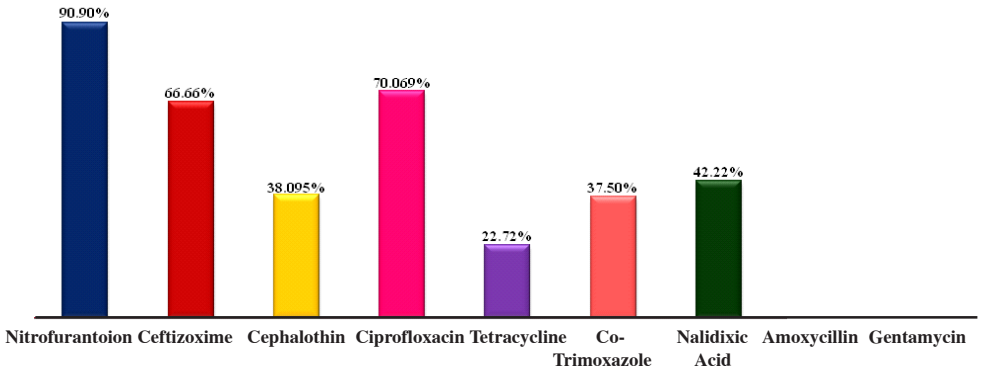

Fig. 1. Antibiotic resistance in *E. coli* st. Isolated ofgirl children urine cultures

CONCLUSION

The history and clinical course of a UTI vary with the patient's age and the specific diagnosis. No one specific sign or symptom can predict the presence of UTI in infants and children. Combinations of findings, including a prior history of UTI, circumcision in males, and, in older children, typical symptoms, should be taken into account when making a decision to evaluate for UTI (Shaikh *et al.*,2008).Resistant bacteria are emerging worldwide as a threat to favorable outcome in the treatment of common infections in community and hospital settings (Chaudhary *et al.*,2004). Older children usually complain of classic symptoms, such as pain or stinging when passing urine, or a frequent urge to run to the toilet. Sometimes child might pass small amounts of urine frequently, and have trouble starting urination. These symptoms can be accompanied by fever and abdominal pain, and there might be blood in the urine. The younger child, the less specific the symptoms. Child might have an unexplained fever, irritability and bouts of crying, go off his feeds or vomit (Lin .,2008,Schroeder *et al.*,2005,Shaikh *et al.*,2007,McGillivray *et al.*,2005,Mori *et al.*,2007).If child has a structural abnormality, specialist might recommend long-term antibiotic therapy.Do the following can help avoid urinary tract infections:Teach daughter to wipe from front to back after urinating or opening her bowels, so she doesn't spread bacteria forward from her anus (Smaill.,2007,Michael *et al.*,2005, Warren *et al.*,1999, Zalmanovici *et al.*,2010). Drinks always plenty of fluids, particularly water.Dress child in cotton underwear, as it lets air flow better – this helps keep the area cool, making it harder for germs to multiply(Gould *et al.*,2010,Jepson.,2008, Modgil.,2006, Perrotta *et al.*,2008, Williams *et al.*,2006).Encourage child to use the bathroom frequently, emptying his bladder every three or four hours and before bedtime(Gould *et al.*,2010,Jepson.,2008, Modgil.,2006, Perrotta *et al.*,2008, Williams *et al.*,2006).

Probiotics are beneficial microorganisms that may protect against infections in the genital and urinary tracts. The best-known probiotics are the lactobacilli strains, such as acidophilus, which is found in yogurt and other fermented milk products (kefir), as well as in dietary supplement capsules. The probiotics *bifidobacteria* and GG lactobacilli may also be helpful. Other probiotics include the lactobacilli *rhamnosus*, *casel*, *plantarium*, *bulgaricus*, and *salivarius*, and also *Enterococcus faecium* and *Streptococcus thermophilus*. Not all studies show a benefit for probiotics in preventing urinary tract infections.Observational studies have found that UTIs have been diagnosed in Sweden in at least 2.2% of boys and 2.1% of girls by age 2 years (Jakobsson *et al.*,1999) in 7.8% of girls and 1.7% of boys by age 7 years (Hellstrom *et al.*,1991) and in the UK in 11.3% of girls and 3.6% of boys by age 16 years(Coulthard *et al.*,1997).Bladder infections are most common in young women with 10% of women getting an infection yearly and 60% having an infection at some point in their life (Nicolle,2008). Pyelonephritis occurs between 18–29 times less frequently (Nicolle,2008).According to the 1997 National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey, urinary tract infection accounted for nearly 7 million office visits and 1 million emergency department visits, resulting in 100,000 hospitalizations(Epidemiology,2010). Nearly 1 in 3 women will have had at least 1 episode of urinary tract infections requiring antimicrobial therapy by the age of 24 years. The risk of urinary tract infection increases with increasing duration of catheterization. In non-institutionalized elderly populations, urinary tract infections are the second-most-common form of infection, accounting for nearly 25% of all infections(Epidemiology,2010). The condition rarely occurs in men who are younger than 50 years old and who did not undergo any genitourinary procedure. However, the incidence of urinary tract infections in men tends to rise after the age of 50.According to statistics from 1990, the prevalence of urinary tract infections in pre-school and school girls was 1% to 3%, nearly 30-fold higher than that in boys (The epidemiology,2010). Also, the statistics from the same year show that approximately 5% of girls will develop at least one urinary tract infection in their school years. In what concerns the symptoms of the condition, bacteriuria appears to increase in prevalence with age in women, still being 50 times greater than the one in males. It is estimated that bacteriuria will be experienced by 20 to 50% of older women and 5 to 20% of older men.Community studies suggest that boys younger than 1 year of age and girls younger

than 5 years of age are most at risk for UTI. The literature estimates that the prevalence of UTI in febrile children presenting for outpatient evaluation ranges from 1% to 20% (Crain *et al.*,1990,Hoberman *et al.*,1993, Kathy *et al.*,1998). The studies vary in their definition of UTI, method of urine collection, and eligibility criteria. Most have small sample sizes, and none have been true prevalence studies in which data are collected on all children (Kathy *et al.*,1998).

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