Evaluation of pathogenesis and sensitivity pattern of the microorganisms involved in the urinary tract infection against common antibiotics in inpatients and outpatients of Imam Khomeini hospital of Ardabil in 2016

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ABSTRACT

Background: *Urinary tract infection (UTI) is the most common human bacterial infection that affects different age groups and can occur anywhere in the urinary tract. In this article, we tried to assess the pathogenic and antibiotic susceptibility pattern of these pathogens in inpatients and outpatients of Imam Khomeini hospital of Ardabil.*

Materials and Methods: *In this retrospective and descriptive cross-sectional study we evaluated list of all patients using hospital information system (HIS) software and the result of urinary culture and gender and type of admission were recorded. Obtained data from the study were studied using descriptive statistics.*

Results: *In outpatients and inpatients E. coli was agent in 74 cases (59.6%) and 72 cases (53.7%) respectively. The highest levels of antibiotic sensitivity of E. coli in outpatient and inpatients were to drugs of nitrofurantoin (72.9-70.8) and amikacin (56.7-48.6). The highest rates of antibiotic resistance of E. coli in outpatients were to drugs of cotrimoxazole (35.1 percent), ampicillin (24.3 percent) and ciprofloxacin (24.1 percent) and in hospitalized patients were to drugs of ciprofloxacin (40.2 %), ampicillin (37.5 percent) and gentamicin (27.7 percent).*

Conclusion: *E. coli is the main cause of urinary tract infection in inpatients and outpatients of Imam Khomeini hospital of Ardebil and the most effective antibiotics are nitrofurantoin and amikacin in empirical treatment for these patients.*

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INTRODUCTION

Urinary tract infection (UTI) is the most common human bacterial infection that affects different age groups and can occur anywhere in the urinary tract (kidneys, ureters, bladder, and urethra) [1, 2]. Studies have shown that about 60 percent of women experience UTI at least one time in their lifetime [3]. While in advanced cases of the disease that caused by the lack of treatment or improper treatment of disease; complications appear such as urinary tract disorders, hypertension, uremia, preterm birth and even abortion [2]. E. coli is the main and most important microorganism involved in the development of UTI and it is one of Enterobacteriaceae that are living in the gastrointestinal tract [3]. E. coli is responsible for 90 percent of these infections, but in the next category in the pattern of involved microorganisms, differences are seen in different parts of the world even hospitals located in an area [2,4]. The important thing in the treatment of UTI is incidence of antibiotic resistance in these microorganisms that is increasing in recent years and has influenced medication therapy [5,6]. Considering the importance of starting UTI treatment empirically, the issue of antibiotic resistance gets more importance [3,4]. Empirical Start of treatment is essential until preparation of the culture results (48-72 h) for the prevention of disease progression and subsequent consequences also, many centers do not use culture results in uncomplicated urinary tract infections (urinary tract infection that is not associated with any underlying disease or predisposing conditions) and they continue the treatment empirically to the end [7,8]. In recent years, several studies aimed at identifying the pathogenic pattern and antibiotic susceptibility of microorganisms in different parts of the world (1-7). In our country, conducting such researches in any area and identifying its change trends is essential because by indiscriminate and arbitrary use of antibiotics, there is a high risk of developing resistance to antibiotics (6) and on the other hand empirical control in UTI treatment is vital (8). Although, proper studies in this field in various regions of Iran have been conducted and antibiotic susceptibility pattern of different areas had some differences (4) but by searching the literature it was revealed that there is no such a study in Ardabil. In this article, we tried to assess the pathogenic and antibiotic susceptibility pattern of these pathogens in inpatients and outpatients of Imam Khomeini hospital of Ardabil.

MATERIALS AND METHODS

In this retrospective and descriptive cross-sectional study, we evaluated list of all patients that were suspected to have urinary tract infection and were referred to the hospital lab for urine culture, using (HIS) software of hospital laboratory and patients were classified based on gender and type of admission (inpatient / outpatient). If culture results were positive, type of microorganism and the extent of its sensitivity to common antibiotics were recorded to identify the percentage of sensitivity and antibiotic resistance after necessary evaluations. Obtained data from the study were studied using descriptive statistics (frequency, percentage, mean, standard deviation). Since in this study there was no dealing with names and no names of individuals mentioned in the report, therefore, the moral issue is not proposed for the project.

RESULTS

Of the 2496 patients, 1627 patients (65.1%) were women and 869 cases (34.9%) were male. Of 256 positive samples of UTI, 134 cases were inpatients and 124 cases were treated as outpatients and the highest number of positive samples (73% -187 samples) was among women. In 124 outpatients, E. coli was agent in 74 cases (59.6 percent), Staphylococcus saprophyticus 17 cases (13.7 percent), Staphylococcus epidermidis 11 cases (8/8 percent), coagulase-negative staphylococci 8 cases (6.4 %), Klebsiella 8 cases (6.4 percent) and the rest of microorganisms 6 cases (5.1 percent).

In 134 inpatients E. coli was agent in 72 cases (53.7 percent), Klebsiella 12 cases (8.9 percent), Enterococcus 9 cases (6.7 percent), Enterobacter 8 cases (5.9 percent) Pseudomonas aeruginosa 6 cases (4.4%), Staphylococcus epidermidis 6 cases (4.4%) and other micro-organisms 21 cases (16 percent). Results of antibiogram test showed that the highest levels of antibiotic sensitivity of E. coli in outpatient were to drugs of nitrofurantoin (72.9 per cent), amikacin (56.7 percent) and ciprofloxacin (43.2 percent) and in the inpatients, was to drugs of nitrofurantoin (70.8 per cent), amikacin (48.6 percent) and gentamicin (33.3%). Also, the highest rates of antibiotic resistance of E. coli in outpatients were to drugs of cotrimoxazole (35.1 percent), ampicillin (24.3 percent) and ciprofloxacin (24.1 percent) and in hospitalized patients were to drugs of ciprofloxacin (40.2 %), ampicillin (37.5 percent) and gentamicin (27.7 percent).

Discussion

Empirical treatment of urinary tract infections based on worldwide trend, cannot be useful in specific geographic regions such as Iran because according to various studies, pathogenesis and resistance and microbial sensitivity pattern is different among people of different countries [2-4]. Thus, the study of pathogenesis in each geographic region seems to be essential. In addition, the increasing resistance of UTI organisms is the leading cause of failure in treatment of this disease and hence knowledge about level of antibiotic sensitivity of common organisms in nosocomial UTI in outpatient and inpatient will assistance to choose proper antibiotics for treatment (4). Based on findings of this study of E. coli bacteria is the most common of micro-organisms that cause UTI in both study groups (outpatients and inpatients) with a prevalence of 59 and 53 percent. In study of Kashef and colleagues that conducted in Tehran in 2010, this microorganism with a prevalence of about 68 percent was reported the most common cause of UTI. in study of Sharifian and colleagues in 2006 among children under 12 years old in Tehran [9], in the study of Rahman and colleagues in 2009 in Bangladesh (5) and in the Zhanel and colleagues study in 2005 in North America (10) also E. coli bacteria was the most common cause of UTI.

In various studies, the incidence of urinary tract infections among women was more than men (4). In this study, also 73% of patients were females and the rest were men. Results of this study showed that the most effective antibiotics for empirical treatment of UTI in Ardebil are nitrofurantoin and amikacin. Because more than 57 per cent of micro-organisms involved in nosocomial urinary tract infection (outpatient and inpatient) is related to E. coli and in both groups of patients, mentioned bacteria has shown the most sensitivity to antibiotics. In the study of Kashef and colleagues in Tehran also relatively good sensitivity has been reported to nitrofurantoin [4].

On the other hand, the results of this study showed that respectively the highest rates of antibiotic resistance in outpatients are to cotrimoxazole, ampicillin and ciprofloxacin and in inpatients to ciprofloxacin, ampicillin, and gentamicin. Therefore, these antibiotics are not proper for empirical treatment. While in study of Kashef and colleagues in Tehran relatively good sensitivity has been reported to ciprofloxacin (4). Like the results of this study, in study of Kashef and colleagues in Tehran (4), Rahman and colleagues in Bangladesh (5) and Gupta and colleagues in India (11) also bacterial resistance to ampicillin has been reported. Ampicillin in addition to anti-bacterial resistance in the treatment of symptomatic cystitis has relatively poor performance, and therefore does not seem to be appropriate antibiotic. High resistance to ampicillin can be because the drug is rapidly excreted and the length of time that effective concentration of drug remains in the urine is short (4). In general, factors such as overuse, abuse, false detection of pathogens and empirical therapy without urine culture have been mentioned to be important in the development of drug resistance to antibiotics (6).

CONCLUSION

In total based on the findings of this study it was specified that E. coli is the main cause of urinary tract infection in inpatients and outpatients of Imam Khomeini hospital of Ardebil and the most effective antibiotics are nitrofurantoin and amikacin in empirical treatment for these patients. Also, due to the increasing resistance of bacteria that cause urinary tract infections, early and timely detection of treatment-resistant strains in order to select appropriate treatment and prevent the spread of resistance is essential.

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