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Examination of Staphylococcal Bacterial Infection Incidence and Antibiotic Sensitivity in Patient's Urine Culture to Taleghani Hospital in Abadan 1394

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Abstract: Urinary infection is one of the most common causes of nosocomial infections and it is considered have high mortality among these infections. This research is conducted in descriptive method. Patient's urine samples in different sectors under sterile conditions were sent to laboratory and then samples were cultured on dedicated setting such as blood agar and mannitol salt agar then they are colored and by conducting dedicated biochemical tests we distinguished staphylococcus from other Gram-positive bacteria and investigated sensitivity and antibiotic resistance using disk diffusion method. Out of 129 samples which belonged to patients with symptoms and in terms of gram-positive bacterial growth sent to laboratory 84 samples (65.1) were related to women and 49 samples (34.9) were related to men. Among whom, 19 cases were positive in terms of staphylococcal growth (14.7) and 110 cases were negative (85.3). Meanwhile, children with 22 samples (17.1), women with 11 samples (8.5) and men with 8 samples (6.2), emergency with 29 samples (22.5) and 59 samples (45.7) were related to patients referred to laboratory. Among them, 19 cases were positive in terms of Staphylococcus growth (14.7) and 110 cases were negative. This research indicated that the most resistance has been observed regarding antibiotic cefexime and co-trimoxazol and most sensitivity has been observed against gentamicin antibiotics and imipenem and amikacin and tazobactam.

Key words: Staphylococcus, urinary infections, drug resistance, urine culture, distinguished

INTRODUCTION

Urinary infection has significant social and economic impacts. International association has defined the Signs and symptoms of urinary infections as in voluntary loss of urine and a health and social problem. According to many physiological changes, age may lead to urine infection. Pregnancy, childbirth and physical straining during reserch, pregnancy injuries which lead to increased urine incontinency and menopause can also considered as main causes of urinary infection (Abrams *et al*., 2010).

Urine infection is a social problem with a high degree of discomfort and it is largely affected by women's quality of life. For example, women cannot visit a doctor for treatment during journey, hence it leads to a chronic disease and prolonged treatment cycle for them. There is a significant relationship between age, childbirth, chronic cough, constipation and urine infection thus these conditions are described as risk factors (Amin *et al*., 2009).

National Institute of Diabetes, Digestive and Kidney Disease has conducted an epidemiologic and clinical research regarding different aspects of urinary infections treatment (Anuradha and Ramesh, 2015; Barzan *et al*., 2016). In fact, it can be said that urine infection is one of the most common causes of nosocomial infections and after respiratory system infection it is considered as the second cause of mortality among infections (Bodhare *et al*., 2010). This infection in women is more than men, (Crude *et al*., 2001) so that half of the female population suffer from this infection at least one time during their life (Gad *et al*., 2009). Bacteria can infect urinary tract ascending through urethra but in rare cases, infection may also occur through blood. In urinary infection, bladder and urethra may be involved (cystitis and urethritis) and/or upper urinary tract such as the ureter, renal parenchyma and collecting system (pyelonephritis) may be involved. Ascending infection of urinary system is a complicated process which is related to Genetic and Anatomy factors of host and also it is related to invasion, virulence factors and motion characteristics of bacteria (Zorc *et al*., 2005; Vandecasteele *et al*., 2003). Therefore, identification of type of bacteria which leads to urinary infection is important in prevention of infection and its complications. Based on antimicrobial resistance pattern of infection pathogens, treatment is conducted but antimicrobial

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resistance of urinary pathogens is increasing worldwide (Tajvidi *et al*., 2014). The bacteria which are usually observed in urine infections include staphylococcus, staphylococcus is a gram-positive bacteria with a little guanine and cytosine and in fact it is the most common organism in medicine and main cause of 80% of purulent infections. Staphylococcus is the main cause for most of the chronic infections result from Medical equipments. Increased use of medical devices had a significant impact on staphylococcus role in developing nosocomial infections. Due to existence of different kinds of staphylococcal species on skin and repeated insemination of equipment's, they are considered as main causes of these infections (Soltandalal *et al*., 2006; Steers *et al*., 2009).

High prevalence of antibiotic resistance, especially in aureus Staphylococcus and sometimes other staphylococcus make the investigation of antibiotic resistance necessary because of horizontal transfer of antibiotic resistance and pathogenicity genes. In different studies which are conducted in different cities it has been specified that antibiotic Resistance pattern of the bacteria causing urinary tract infection was different in different places and different times and requires investigation in each geographic region and time (Haghgoo *et al*., 1392; Khameneh and Afshar, 2009). For example, in Gholami *et al*. (1393) in Fasa it was indicated that 99.7 of gram-negative bacteria were operating and most resistance was related to ampicillin (Mansouri and Shareifi, 2002) but in Hosseini in Qazvin the most important cause of urinary tract infection was *E. coli* and most resistance was related to amoxicillin (Mohajeri *et al*., 2011). Haghgoo *et al*. (1392) examine 2566 urinary culture in Tabriz and found that among total of 18.7% of positive cultures, two-thirds were female and remaining were men. The most common cause of urinary tract infection was *Escherichia coli* and most sensitivity was related to amikacin (Montanaro *et al*., 1999).

In a research which was conducted by German comorbidities were investigated which were more common in patients with urinary tract infection compared to patients without this symptom. Ease of suffering from urinary tract infection and its serious complications such as: Kidney failure, blood infections and premature childbirth, specifies the importance of diagnosis and treatment this disease (Mostafa, 1393). Correct, timely and adequate treatment with appropriate antibiotics is an important step in patient's improvement (Nicolle, 2002). On the other hand, emergence of resistance in pathogenic bacteria, compared to antibiotics is one of the health problems around the world. This problem is significant, especially in the countries where antibiotics application is inappropriate (Pradhan *et al*., 2012; Sharifian *et al*., 2006). Antibiotic-resistant of urinary infection generating pathogens is increasing (Montanaro *et al*., 1999). Thus, urine culture, determining the type of microorganisms and urinary infection antibiotic resistance pattern is important in treatment (Shilpi *et al*., 2008).

Since used methods in each research and each region and strains of bacteria and studied population are different thus in each region, identification of common species and examination of microbial sensitivity patterns to antibiotics is important because of saving medical expenses and hospital stay time. This research is aimed to investigating incidence of bacterial contamination and antibiotic resistance in urine samples of patients referred to Taleghani Hospital in Abadan which is conducted in three months to guide doctors in treatment of urinary tract infection in the region.

MATERIALS AND METHODS

In this research which was conducted on urine samples and only in terms of gram-positive bacteria in different patients, patients were asked to observe morning urine and sampling procedures including cleaning sampling position with alcohol and sample collection with name, family name, age and patient's sector. First, samples were isolated to achieve single-cultured colonies on blood agar and Mac Cancan and mannitol salt agar medium to differentiate staphylococcal categories from other cultured gram-positive bacteria. Then cultured samples were incubated for 24 h in 37°C and then results were read. In order to separate gram-positive bacteria staphylococcus family, isolates were cultured on medium (mannitol salt agar) so that, colonies separated and single colonies obtained. Then according to obtained single colonies with a colony morphology similar to staphylococcus, staining was conducted to ensure bacteria purity, gram positive, cluster appearance and cocci bacteria. Then, morphological features were ensured (Blood agar) to observe hemolysis.

In order to differentiate Staphylococcus from other gram-positive bacteria, specific biochemical tests such as catalase and coagulase have been used. Staphylococcus is a catalase positive bacteria and in terms of coagulase staphylococcus species it is coagulase positive. These bacteria are able to ferment sugar mannitol.

Antimicrobial sensitivity testing method (Kirby-Bauer): To do so, staphylococcus grown on culture medium was

cultured on Mueller-Hinton agar medium. The concentration of bacteria which is used for culture was McFarland standard 0.5 (equal to 108-1.58 Dr per mL). To do so , first , an amount of bacteria (approximately 2-3 colonies) is prepared in the tubes containing 1 ml of Mueller-Hinton medium broth and them incubated the tubes in 37°C until the concentration of bacteria be the same with half of the McFarland concentration. Then, using sterile cotton swab, bacteria was cultured on Mueller-Hinton agar medium. Then, using a sterile forceps remove 0.6 inch antibi gram and insert on culture medium, so that distance of each disk to plate edge is 15 mm and the distance to disk center is 24 mm. After one night incubation at 37°C, diameter of the inhibitory halo around the disk was measured using ruler in mm and based on the available standard regarding diameter of halo around the disk or growth inhibited region, bacteria sensitivity pattern for antibi gram disk can be used. Strain of staphylococcus aureus can be used to control this test. The antibi grams used in this research include:

Tetracycline (30 μg), chloramphenicol (30 μg) rifampin (5 μg), azithromycine (15 μg), tobramycin (10 μg) ceftaroline (30 μg), Cefoxitin (CX, 30 μg), Vancomycin (V, 30 mg), Gentamicin (GM, 10 mg), Erythromycin (E, 15 mg), Clindamycin (CC,2 mg), Ciprofloxacin (CP, 5 mg), Cotrimaxazole (SXT, 25 mg).

RESULTS AND DISCUSSION

As it was said before urine infection is one of the most common causes of hospital infections and after respiratory system infection it is considered as the second cause of mortality (Abrams *et al*., 2010). This disease in women is more than men so that half of the world populations suffer from this infection at least one time in their life (Amin *et al*., 2009). This research is conducted during three months on patients with suspected infections and different sectors of Taleghani hospital in 1394. Out of 129 samples sent from patients with symptoms who were in the group of gram-positive bacteria in terms of bacterial growth, 84 samples (65.1) related to women and 45 samples (34.9) related to men that women constituted a greater number.

Meanwhile, children with 22 samples (17.1), women with 11 samples (8.5), men with 8 samples (6.2) and emergency with 29 samples (22.5) and 59 samples (45.7) were related to patients referred to a laboratory, respectively, of which 19 cases were positive in terms of staphylococci growth (14.7) and 110 cases were negative (85.3). 17 samples were related to (13.2) children under one year and 24 samples were related to 1-5 year old children, 5 sample (3.9) were related to 5-10 year old children and 4 samples (3.1) were related to 10-20 year old children, 23 samples (17.8) people aged 20-30 year old and 56 samples (43.4) were related to people older than 30 (Table 1-5) and (Fig. 1-6).

Table 1: Sensitivity and antibiotic resistance profile

ANTI BIOTIC	R	I	S
Cefazolin	1	0	4
Amikacin	2	1	7
Cefexime	12	0	2
Ampicillin	1	0	1
Doxycycline	0	0	1
Co-amoxiclave	0	0	1
Co-trimazole	9	0	0
Tetracycline	3	0	3
Amoxicillin	2	2	1
Cloxacilin	4	0	0
Gentamycin	1	2	5
Imipenem	1	2	5
Cefizoxim	5	0	3
Sefepim	0	0	1
Cephalotin	4	0	1
Piperacillin	6	0	2
Oxacillin	5	0	0
Ceftriaxone	5	0	2
Norfloxacin	0	0	2
Penicillin	3	0	1
Azithromycin	5	2	1
Cephalexin	0	2	0
Clindamycin	2	0	2
Ceftriaxone	5	0	2
Meropenem	1	0	0
Vancomycin	1	1	2
NalidixicAsid	3	0	4

Table 2: Examination of gender-based Staphylococcal infections

Gender	Number	Percent
Woman	84	1/65
Man	45	9/34

Table 3: Positive and negative results in staphylococcal infection

Gender	Number	Percent
Woman	9	7/14
Man	110	3/85

Table 4: Classification based on age range

Age	Number	Percent
Birth to 1	17	2/13
0-05	24	6/18
5-10	5	3/9
10-20	4	1/3
20-30	23	8/17
Older than 30	56	4/43

Table 5: Classification based on type of sector

Sector	Number	Percent
Children	22	1/17
Women	11	5/8
Men	8	2/6
Emergency	29	5/22
Laboratory	59	7/45

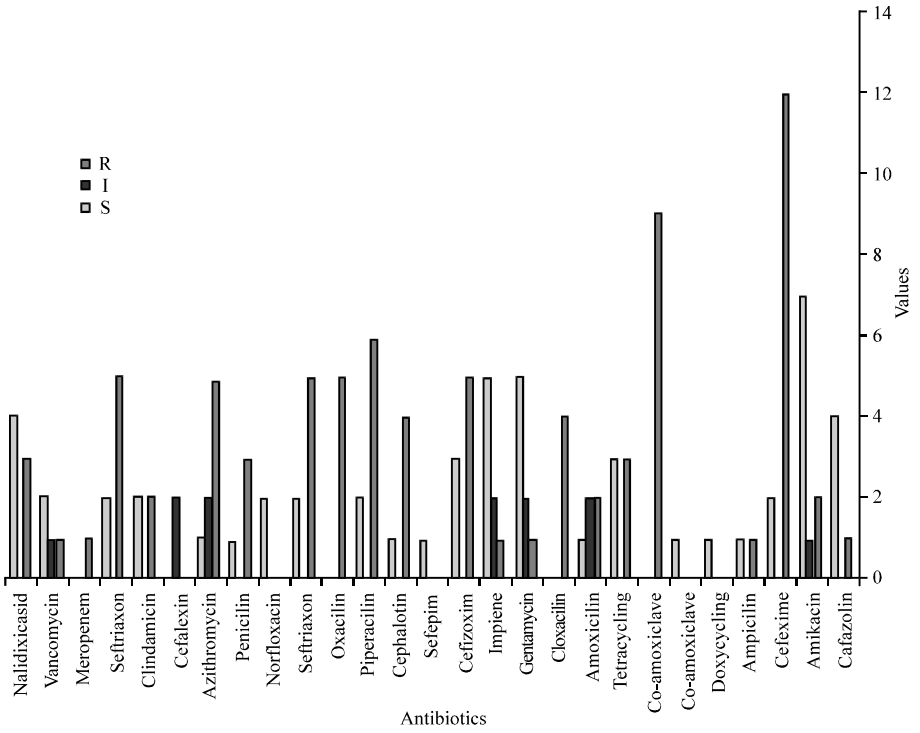

Fig. 1: Examination of antibiotic resistance

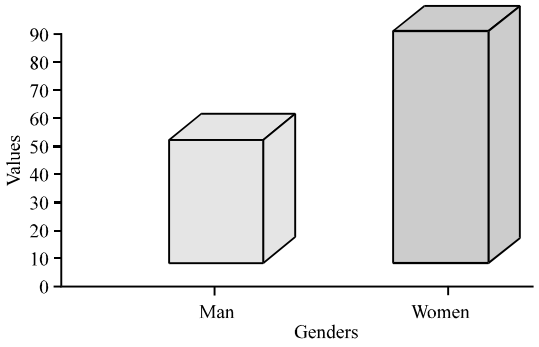

Fig. 2: Examination of gender-based Staphylococcal infections graphically

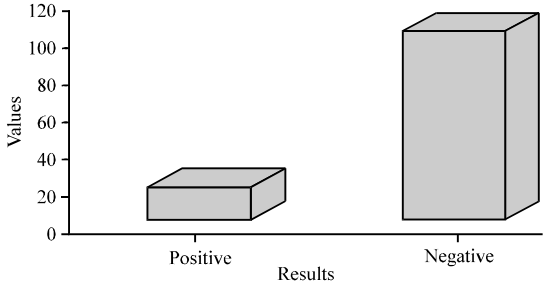

Fig. 3: Positive and negative results in staphylococcal infection graphically

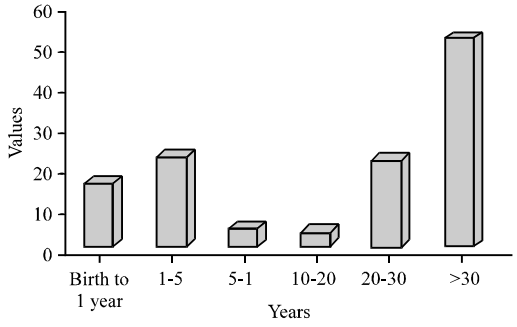

Fig. 4: Classification based on age range graphically

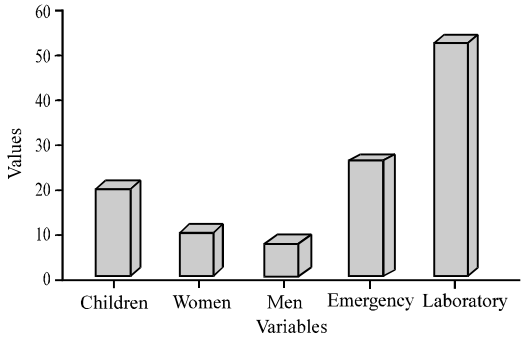

Fig. 5: Classification based on type of sector graphically

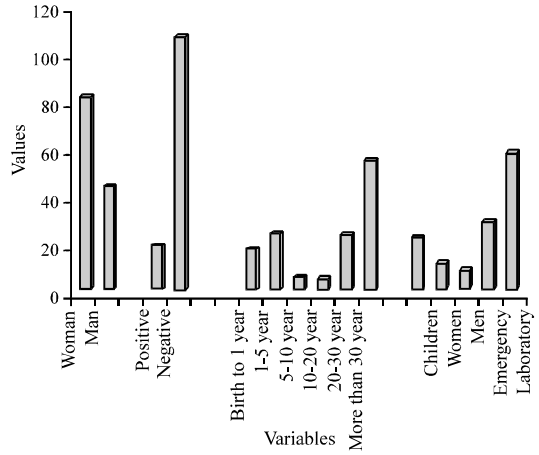

Fig. 6: Category based on type of age-sector –gender and negative and positive in staphylococcal infection

CONCLUSION

Examination of uropathogenic factors in each region helps the doctor to update his knowledge in the field of indentifying causative factors of urinary tract infections and their antimicrobial sensitivity profile and select an appropriate experimental treatment (Tajvidi *et al*., 2014). In this research which was conducted on 1394, the greatest number of samples was related to people older than 30 and women included the highest statistical population in terms of bacterial infections with 84 samples. This research indicated that this hospital up to 14.7% is in an appropriate level in terms of staphylococcal contamination. Most resistance was related to antibiotic cefexime and cotrimaxazole and most sensitivity was related to gentamicin antibiotics, imipenem and amikacin. Generally, this research indicated that antibiotic pattern of urinary tract infections cause factors changes over time due to increasing resistance and increased use. Thus, it is suggested that for empirical treatment of urinary tract infections, especially in children Amikacin, piperacillin-tazobactam antibiotics are considered (Tajvidi *et al*., 2014).

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