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The occurrence of urinary tract infection caused bacteria in human and animals in Baghdad city and it's susceptibility to antibiotics

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Abstract

The aim of this study was to investigate the occurrence of urinary tract infection caused bacteria in human and animals (cows and sheep) in Baghdad city and its susceptibility to different antibiotics. Three hundred midstream urine specimens were collected from patients with different age and sex suffering from urinary tract infection (UTI) from Central Children hospital, Al–Karama hospital and Abu-Ghraib hospital in Baghdad city, One hundred and fifty specimens (urine, vaginal swabs and rectal swabs) were collected from animals (sheep and cows) of the College of Veterinary Medicine, Baghdad University and from the slaughterhouse in Baghdad city during 2010-2011. Results showed that *E. coli* represent the highest isolate 167 (55.6%) followed by *Klebsiella* spp. 58(19.3%), *Staphylococcus aureus* 17 (5.3 %) and *S. saprophyticus* 19 (6.3%) in Human, while in animals *E. coli* represent the highest isolates 49 (32.6%) followed by *Klebsiella* 22 (14.6%), *S. aureus* 12 (8 %) and *Staphylococcus saprophyticus* 8 (5.3%), then their susceptibility towards selected antibiotics were detected. Results appeared the resistance of *E. coli* (93.5%) and *S. aureus* (88.5%) to ampicillin whereas *Staphylococcus saprophyticus* was resistance to cefotaxime (94.7%).

Key words: Urinary tract infection, Antibiotic susceptibility, Human, Animal, Baghdad.

Introduction

Urinary tract infection (UTI) is the second most common type of infection in the body. There are an estimated 150 million urinary tract infections per year worldwide (Stamm, 2001; Muhsin and Mousa, 2013). Urinary tract infection (UTI) is defined as an inflammatory response of the urothelium to bacterial invasion (Walsh *et al*., 2002).

Escherichia coli, is the most common uropathogen and accounts for (80-90%) of cases of uncomplicated pyelonephritis and cystitis among otherwise healthy women (Ann, 2005). Other *Enterobacteriaceae* including *Proteus* spp., *Klebsiella* spp., *Enterobacter* spp. and *Citrobacter* spp., *Streptococcus* and *Staphylococcus* spp., *Candida albicans* and other fungi have been reported (Behnam and Masoomeh, 2007).

A UTI is common in dogs, cows and horses, especially females but they are uncommon in cats less than 10 years of age, (Joseph, 2007).

This study was aimed to investigate the occurrence of some bacteria in UTI cases in human and animals in Baghdad city and evaluation its susceptibility to different antibiotics.

Materials and Methods

Samples: This study included the collection of 300 specimens in a sterile container from patients with different age and sex suffering from (UTI) from Central Children hospital, Al-Karama hospital and Abu-Ghraib hospital in Baghdad city whereas in animals 150 samples were collected directly from the bladder, after sloughing and they were put in a sterile container or by sterile cotton swabs from vagina and rectum from sheep and cows in the farm of Veterinary Medicine College, University of Baghdad during 2010-2011.

laboratory investigations: Firstly, urine and swab specimens were cultured immediately to avoid contamination, the specimens were cultured in blood agar and MacConkey agar and incubated at

37^{o} C for 24 hours, (Baron, *et al.* 1994).

Cultural characteristics: Colonial morphology of grown bacteria on culture media, fermentation of lactose on MacConky agar, hemolysis on blood agar, swarming phenomena, odors, pigments and other characteristics were observed, (Baron *et al*., 1994).

Biochemical Tests: Various biochemical tests which include oxidase, catalase, ureas activity, indol test, methyl red test were used for diagnosis.

Antibiotics susceptibility test: The modified Kirby-Bauer method was used for this test according to (Lalitha *et al.,* 2005).

Results and Discussion

Results showed the following bacterial isolates from the human specimens: *E. coli* 167 (55.66%), *Klebsiella* spp. 58 (19.3), *Staphylococcus saprophyticus* 19 (6.3), *Staphylococcus aureus* 17(5.6%), *Proteus* spp. 10 (3.3%), *Pseudomonas* spp. 9 (3%), *Staphylococcus epidemidis* 5 (1.6%), *Streptococcus* spp. 3 (1%) fungi as *Candida* spp. 3 (1%) (Table 1).

Escherichia coli took the first rank of isolation in current study, this was in accordance with finding of Anandkumar *et al*. (2003), while this rate disagree with (Farajzadeh, 2010) who found in study in Iran that *S. saprophyticus* represent 34.5% followed by *E. coli* 31%, *Klebsiella* spp. 17.2%, *Proteus* spp. 6.9%, *S. aureus* and *Pseudomonas* spp. 3.4%.

In addition negative growth represent 3(1%), and some were defined as pyuria. Pyuria refers to the presence of white blood cells (WBC) in the urine and generally indicates a significant inflammatory response to bacteriuria, such as occurs with infection, but may also be present in the setting of asymptomatic bacteriuria without overt infection (Schaeffer, 2003). In animals Specimens results of microbial positive growth (taken from urine, rectal and vaginal swabs) were distributed as the following: *E. coli* 49 (32.66 %), *Klebsiella* spp. 22 (14.66%), *Staphylococcus aureus* 12 (8%) *and Proteus* spp. 14 (9.3%), *Staphylococcus saprophyticus* 8 (5.33%) and yielded negative Growth 45 (30%), While some were defined as pyuria (Table 2).

The adhesion of bacteria is the first step in pathogenesis of UTI following the second step which include attachment and colonize of bacteria to the gut, perineum, urethra, bladder, renal pelvicalyceal system and renal interstitium (Mulvey, 2002).

These results agree with Al-Yassaree (2005) who isolated 24 isolates of *E. coli* (42.10%), 14 isolates of *klebsiella. Pneumoniae* (43.75 %), 6 isolates of *S. aureus* (40%) from cows, While 17 isolates of *E. coli* (29.82%), (12) isolates of *klebsiella pneumoniae* (37.5%) were isolated from sheep obtained from (150) clinical specimens from different animals.

The results of the present study showed that the high rate of bacterial isolation was obtained from female cows. Different biochemical tests were used to the suspected colonies for complete identification of bacterial isolation (Table 3).

In the last three decades, there have been many reports in the scientific literature on the inappropriate use of antimicrobial agents and the spread of bacterial resistance among microorganisms causing urinary tract infections (Kurutepe *et al*., 2005).

Results showed the resistance of *E. coli* to ampicilin (93.5%) (Table 4), similar results were found by Al- Begat, (2007). High antibiotic randomly use may encourage high resistance rates to this antimicrobial agents group, through the production of β-Lactamase enzymes by Enterobacteriacea (Al-Benea, 2006) *E. coli* was became resistance to many antibiotics which are effective against other causative agents, hence antibiotic resistance is growing problem (Wenz *et al*., 2005). *E. coli* was resistant to gentamicin at a percentage of (10.1%) this agreed with the findings of Al-Hemidawi (2005). Results showed that *Staphylococcus aureus* isolates were resistant to streptomycin and ampicillin (84.4 and 88.5%) respectively and this may due to the β-lactamase enzyme produced by *S. auresus*, similar described in the literature Farwachi and Hassan (2008).

Staphylococcus saprophyticus isolates were resistant to nalidixic acid (78.9%) (Table 4), and this is in agree with Mandal *et al*. (2001) who found that *S. saprophyticus* was resistant to nalidixic acid and ciprofloxacin in India, while disagree with Aziz *et al*., (2006) who find in their study in Pakistan that *S. saprophyticus* was resistant to ampcillin, trimethoprime. This may be due probably to indiscriminate use of antibiotics in our society.

Table (1): Numbers and rates of bacterial Isolates from Human

Microbial Isolates	Number	Rate %
E. coli	167	55.66
Klebsiella spp.	58	19.3
S. aureus	17	5.6
Proteus spp	10	3.3
S. saprophyticus	19	6.33
S. epidemidis	5	1.6
Pseudomonas spp.	9	3
Streptococcus spp.	3	1
Candida spp.	3	1
No growth	45	30.6
Total	300	100

Table (2): Numbers and rates of bacterial Isolates from Animals (sheep and cows)

Microbial Isolation	Number	Rate%
E. coli	49	32.66
Klebsiella spp.	22	14.66
S. aureus	12	8
Proteus spp.	14	9.3
S. *saprophyticus*	8	5.33
No growth of pathogenic bacteria.	45	30.6
Total	150	100

Table (3): Biochemical tests reaction of some bacterial isolates

Isolates	Catalase	Oxidase	Moti-le	Urea-se	Indol production	Mannitol	Heamolysin	Gelatinase
E. coli	+	--	+	--	+	+	--	--
Klebsiella spp.	+	_	_	+	_	+	+	--
S. aureas	+	--	--	--	+	+	+	+
S. saprophyti	+	--	--	+	--	+	--	--
Proteus spp.	+	--	+	+	--	d	--	+

(+) = positive reaction, (--) = negative reaction and (d) = variable reactions

Table (4): Antibiotic susceptibility test of the bacterial isolates from Human and Animals against antibiotics.

Antibiotics	*E. coli*		*S. aureus*		*S. saprophyticus*	
	Sensitive	Resistance	sensitive	Resistance	sensitive	resistance %
Cefotaxime	12.5%	87.5%	97.7%	2.7%	94.7%	5.6%
Gentamicin	89.9%	10.1%	82.2%	17.8%	78.9%	21.1 %
Ciprofloxacin	92.2%	7.8 %	89.2%	10.8%	84.2%	13.8 %
Streptomycin	54.5%	44.5 %	10.6%	89.4%	10.6%	89.4%
Ampicillin	6.5%	93.5%	21.5%	88.5 %	68.5%	31.5 %
Tri-methoprim	78.5	21.5%	62.4%	37.6%	68.5%	31.5%
Erythromycin	34.5%	64.5%	40.4%	59.6%	47.4%	52.6%
Nalidixic acid	87.7 %	12.3%	30.1%	69.9.%	21.1%	78.9%

The mechanisms producing resistance to antibacterial drugs include production of enzymes by bacteria which destroy or inactive the drug and reduction of bacterial cell permeability, bacteria may also develop alternative metabolic pathways to these inhibited by the drug (Quinn *et al*., 2006).

Conclusions

Escherichia coli were the most common bacteria isolated from urinary tract infection in Human (55.66%) and animals (32.66%). The highly percentage of susceptibility to ampicillin and cefotaxime was the potent antibiotic against UTI caused bacterial.

References

Al-Banea, H.Z. 2006. Factors affecting on haemolysin production from pathogenic bacteria isolated from diabetes patients urine and its resistance to some antibiotics. M. Sc. Thesis, College of Science, Al-Mustansiyra University, Iraq.

Al-Begat, T.S. 2007. Study of most common aerobic bacteria causing lower urinary tract infection (UTI) in Ramadi General Hospital. M. Sc. Thesis, College of Medicine, Al-Anbar University, Iraq.

Al-Hemidawi, T.F. 2005. Hemolytic activity of *Escherchia coli* isolated from urinary tract infections and its resistance to antibiotics. Ph. D. Dissertation. College of Science, Al-Mustansiriya University, Iraq.

Al-Yassaree, A.S.S. 2005. Investigation about *Staphlococcus saprophyticcus* in urinary tract infection in human and some animals. M. Sc. Thesis, College of Veterinary Medicine, Baghdad University, Iraq.

Ann, S. 2005. Novel mechanism of P–fimbriated *E. coli* virulence in pyelo-nephritis. J. Am. Soc. Nephrol., 16: 3458-3460.

Anandkumar, H.; Dayanand, A.; Vindokumar, C.S. and Kapur, I. 2003. *In vitro* activity of norfloxacin against uropathogens and drug efficacy in simulated bladder model under diabetic conditions. Indian J. Med. Microbiol., 21(1): 37-42.

Aziz, M.K.; Habib-Ullah, K. and Ihsan-Ullah, M. 2006. Antimicrobial sensitivity pattern of urine isolates from asymptomtic bacteriuria during pregnancy. Biomedica, 22(Jan-Jun 2006)

Baron, E.J.; Peterson, R. and Finegold, S.M. 1994. Hospital epidemiology, conventional and rapid microbiology methods for identification of bacteria and fungi. In: Bailey and Scott's Diagnostic Microbiology, Mosby, 9th ed., Chapter, 6: 40, 41, 97-108, 451-456 pp.

Behnam Z., and Masoomeh, M. 2007. Prevalence of asymptomatic bacteriuria and associated host factors in women with type 2 diabetes in Shahre-kord, Iran 2005. Kuwait Med. J., 39(4): 340-343.

Farajzadeh, S.A.; Jomehzadeh, N. and Amin, M. 2010. Prevalence of asymptomatic bacteriu ria in elderly referred to outpatient clinics in Talegani hospital, Abadan, Iran. Jundishapur J. Microbiol., 4(3): 147-151.

Farwachi, M.I. and Hassan, M.M. 2008. Clinical and microbiological study of otitis externa in sheep. Iraqi Vet. Sci., 22(1): 43-48.

Joseph, W.B. 2007. Urinary tract infection: selfreported incidence and associated costs. Annu. Epidemiol., 10: 509-15.

Kurutepe, S.; Surucuoglu, S.; Sezgin, C.; Gazi, H.; Gulay, M. and Ozbakkaloglu, B. 2005. Increasing antimicrobial resistance in *Escherichia coli* isolates from community-acquired urinary tract infections during 1998-2003 in Turkey. Japan J. Infect. Dis., 58: 159-161.

Lalitha, M.K. 2005. Manual on antimicrobial susceptibility testing (Under the Auspices of Indian Association of Medical Microbiologists). Tamil Nadu, India, 6: 7.

Mandal, P., Kapil, A.; Goswami, K.; Das, B. and Dwivedi, S.N. 2001. Uropathogenic Escherichia coli causing urinary tract infections. Indian J. Med. Res., 114: 207-211.

Muhsin, E.A. and Mousa, N.K. 2013. The correlations of some hematological factors in pediatrics chronic renal diseases. J. Genet. Environ. Resour. Conserv., 2013,1(3): 135-139.

Mulvey, M.A. 2002. Adhesion and entry of uropathogenic *Escherichia coli.* Cell Microbiol., 4(5): 257–271.

Quinn, P.T.; Markey, B.K.; Carter, M.E.; Donnelly, W.J. and Leonard, F.C. 2006. Veterinary micro diseases. printed and bound in great Britain by Enter national. Ltd Padstow – Corn wall.

Schaeffer, A.J. 2003. Infections of the urinary tract. In: Walss, P.C; Retik, A.B.; Vaughn, E.; Wein, A. J. ed., Campbell's Urology 8th ed., Philadelphia. W. B. Saunders Company, Volume1, Chap.14, 465-543 pp.

Stamm, W.E. 2001. Catheter-associated urinary tract infections: Epidemiology, pathogene-sis, and prevention. Am. J. Med., 91: 65-71.

Walsh, R.; Vaughan, S. and Wein, L. 2002. Campbells Uorology. 8th ed., Philadelphia. W.B. Saunders Company; Volume1, Chap.10, 204-206 pp.

Wenz, J.R.; Lombard, J.E.; Elia, R.; Prentice, D.; Garry, F.B. and Dinsmore, R.P. 2005. Efficacy of parenteral ceftiofur for treatment of systemically mild clinical mastitis in dairy cattle. J. Dairy Sci., 88: 3496-3499.