Female Urinary Tract Infection and Antimicrobial Susceptibility of Some Pathogens

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Abstract

A total of 471 urinary tract infection female patients who attened to the central Laboratory in Hilla during 1995 of different age groups with or without symptoms were studied. 409(86.8%) out of them gave a signifcant growth for urine culture and 62(13.1%) were a-bacteriuric. Total gram negative isolates were 255(54.11%) and the principle pathogen among them was E.coli 144(30.7%). Followed by Proteus sp. 56(11.8%), Klebsilla sp. 35(7.4%), Enterobacter 12(2.5%), Pseudomonas aerogenosa , Stap aureus constituted 58(12.4%) out of them, others were group B-Streptococci 25(5.3%), Strept. faecalis 22(4.6%), Staph albus 20(4.2%), Mixed infection represents 21(4.4%) of the total number of isolates. The significant finding was the isolation of Serratia marecescens from 2(0.4%) patients and Staphylococcus saprophyticus from 8(1.6%). Antibacterial Susceptibility pattern was done to all isolates and also correlation between age, type of infection, Pregnancy, have been attempted. The most effective antibocterial agents were nalidixic acid, Erythromycin and colistin for gram negative, gram positive bacteria and Pseudomonas aerogenosa respectivily.

Introduction

Urinary tract infection (U.T.I), although seldom Leading to renal failure, do produce considerable morbidity, in general practice they account for up to 60/1000 consultations, and are three times more common in women than men[1]. It involving at least 15 percent of all females at some time during their lives[2], Some studies showed that 20 precent of adult women, regardless of age, experience dysuria each year[3,4]. However, only 50 percent, mostly younger women, seek medical attention[5]. The urinary tract, wich should be viewed as a single anatomic unit connected by a continuous column of urine that extends from the urethra to the kidney[6], may be infected by different micro-organisms, but the most common agents are the gram negative aerobic bacilli found in the gut, and of the these E. coli is the most common and accounts for roughly 85% of infection followed by other members of enterobacteriaceae[7]. These organ-

isms assume increasing importance in recurrent infection associated with urologic mainpulation, calculi or obstrucation, they play a major role in nosocomial, catheter-associated infection[8]. gram-positive cooci play a lesser role in urinary tract infections, they account for about 5-10% of infections and often affect patients with renal stones or previous instrumentation[9], others suggested ahigher percentage of U.T.I and may account for about 15% caused by Stphylococci in sexually active women[10]. Many general practitioner doctors treat U.T.I. patients and they do not have the facilities for antibiotic sensitivity, the abuse of antibiotics led to a multiresistant strains[11], in facing this problem, an international meeting organized by WHO in Geneva in 1977 on the (Surveillance for the prevention and control of Health Hazards due to antibioticresistant Enterobacteria)[12], The experts expressed their concern about the worldwide increase in antibiotic resistance associted with the grwing and frequently indiscriminate use of antibiotics. In recent years, resistant bacteria have given rise to several serious outbreaks of infection with many deaths[12], this hase led to a need for surveilance programmes to monitor antibiotic for this, we tried in our study to be a part of this big aim.

Patients and Methodes

A clean catch midsteeam urine specimens were collected from (471) patients, and in this study we insist on this type of specimen, the specimens reached the L√boratory within one hour of collection, whenever possible during our work, urine specimens for within one hour of collection, whenever possible during our work, urine specimens for culture were collected in the morning, we asked the patients the night before to refrain from urinating until the specimen was collected, patients carefully instructed by nursing personnel to do every effort to a clean catch urine into asterile container. All urine specimens brought, examined at once or placed in refigerator until processing.

The examination procedure includes the following steps:

a. A gram stain, using a sterile pasteur pipette, taking one drop of well-mixed, uncentrifuged urine on a slide, vllowing the drop to dry without spreading, heat fixed and gram stained, then examined under oil immersion for the pressence or absence of bacteria, polymorphonuclear Leucocytes and squamous epthelial cell. This screening test offer a good evidence that the urine was not infected in the absence of Leucocytes and bacteria, specimen, that was negative after careful examination was not cultured.

b. A definitive culture for urine specimens positive in the screening test was done on Blood agar and Macconkey agar (with crystal violet) using a sterile loop, incubated at 37C

overnight, examined on the following day for growth, and identification procedures were initiated using well separated similarly appearing colonies, identification of enterobacteriaceae isolates was done following a special schemes and diagnostic tables for gram-negative bacteria the same thing was carried for gram positive bacteria using a simple key for identification[13], Staphylococcus saprophyticus was diagnosed depending on being aerobic cocci, novobiocin-resistant, urease-positive, coagulase-nagative.

c. Susceptibility tests on bacterial isolates were done by the method of disc diffusion (K-B method)[14] using a commercially available discs (oxoid) of Penicillin G10μg, Erthromycin 15μg, Tetracyclin 30μg Kanamycin 30 μg, Gentamicine 10μg, Cotrimoxazole 25μg Ampicillin 10μg, Nitrofuration 300μg , Nalidixic acid 30μg, Carbenicillin 100μg, Tobramycin 10μg, Colistin 100μg and Polymyxin B 100μg .

Results

Out of the total 471 patients refered to the central public helth Laboratory in Hella, 355(75.37%) showed one or more signs of U.T.I, while the remander 116(24.6%) were asymptomatic, table summarises this, and also shows that a significant growth(23) was obtained in 326(92.7%) from the symptomatic group and in 83(71.5%) from the asymtomatic. Table 2 showes the age distribution of cases and most cases were within the rang of 20-29 year of age. Total incidence of infection was 388(82.1%) as single and mixed infection appeared in 21(4.3%) patientsss, pregnant womens account 63 of the total number of patients in a ratio of (13.3%), and only 52(10.9%) patients were positive for a significant growth.

Table 3 showes that out of the 409 isolates, gram negative bacteria were more frequently encountered (255 isolates, 54.1%) than gam positive ones (133 isolates, 28.3%) and Mixed infection appeared in 21(4.4%) of cases, within enterobactria group, E.coli was the most common and accunts 144(30.5%) followed by Proteus sp. 56(11.8%), Klebsiella aerogenosa 35(7.4%), Enterobacter sp. 12(2.5%), Pseudomonas aerogenosa 6(1.2%) and Serratia marcescens 2(0.4%), while Staph. aureus account 58(12.4%) of gram positive bacteria followed by group B-Streptococci 25(5.3%) Streptococcus faecalis 22(4.6%), Staph. albus 20(4.2%) and Staph. saprophyticus 8(1.6%). The antimicrobial sensitivity of the isolates was presented in table 4, Nalidixic aerogenosa, Colistin was still effectiv against it with a percentage of (83.3%) followed by Polymixin-B (66.6%), other isolates showed a variable degrees of sensitivity to the tested antibiotics as sshown from the table.

Discussion

symptomatic infections of the uninary tract may occur in fem ales of any age with a variety of symptoms. Maskell and polak[15] in astudy of 389 syptomatic patients found that 62 percent of them had negative urine culture and no difference in the severity or rang of symptoms was found between the infected and the uninfected groups, in our study(tabl 1) symptomatic patients give a singnificant growth in a ratio of 92.7%, However, it is widely recognized that bacteriuria may also occur in individuals without any of the clinical evidences of active infection[16],Studies[17,18]of large asymptomatic population indicate that in femals approximately 1 percent of girls aged 5 to 10 are bacteriuric and the rate rises by approximately 1 percent for each decade of life thereafter, in this study Asymptomatic patients constitued 24.6% with 72.5% bacteriuric different result were obtained by other workers [19,20] who demonstrated higher percentages (75.8% and 82.2% respectively) while others[21] have found a lower percentage(46.1%). Table2 showed that most cases were within the age of 20-29 years, patients at this age are mostly married, and infection of uninary tract are strongly influenced by sexual behaviour[22,23], also a high rate of infection was noticed in pergnant women 52 out of 63 (82.5%) this may be a result of many resones such as pregnancy associated structural changes in the urinary tract especially urethral dilatation, socioeconomic status, personal hygiene and sexual ctivity[10,24,25]. Table 3 showed that 409 (86.8%) U.T.I isolates were obtained, Most of them belong to the family Eentrobactriaceae 255 (54.1%), our findings were consistent with others which indicate that most urinary tract infection are caused by gram negative aerobbic bacteria found in the gut or urethra[26,27]. differences of the dominant species among this family as the main causative agent for U.T.I was mentioned[28,29], within the enteric pathogens isolated in this study, Serratia marcescens was isolated from 2(0.4%) patients and this bacterium was not a common pathogen for U.T.I although it do somotimes, both of the patients were subjected to instrumentation one of them with indwelling urinary catheter and she was reached the stage of permanent colonization of her urinary tract by highly resistant strain, but she was able to co-exist with this without serious inconvenince or damage, earlier reports[8] stated the role of urinary catheter in causing urinary tract infection and the association between them was estimated in acute care hospitals to exceed 500,000 per year in the united states. Gram positive bacteria affect 133(32.5%) and this may be higher than previously believed, reports account its incidence for about 15% of U.T.I in sexually active woman[11,12], others indicated less[9], the recognizing thing in this group, was the isolation of Staph. saprophyticus, it was iso-

lated in a low value(1.6%), although it is recognized to be a common cause of U.T.I in young women(30) and being second only to E. coli in sone population(31). Mixed infection appeared in 21(5.1%) patients, reports[28,29] mentioned that this type of infection was very rarely encountered but among patients with recurrent infection or prognants a higher incidence was noticed. The remaining 62(13.1%) patients with a negative culture results in spite of presence of signs or symptoms of U.T.I may be due to different reasons such as of being on anitbitoic, convetional pathogens in low numbers or infections by unusual pathogen (Mycobacterium tuberculosis, Ureoplasma urealyticum, Chlamydia, Mycoplasma and some anaerobes) [21,32,33]. Table 4 showed that Nalidixic acid (86.9%) was more effective that other antibiotics used, However, variation in coliform strains susceptibility is great and Laboratory test for antibiotic senssitivity are essential, since multipli drug resistance is common[27], other workers[34] have doubtfuls whether such antibiotic sensitivity test are necessary, since the causative organisms of U.T.I are usually sensitive to a wide range of antimicrobial drugs, other effective antibiotics were Erythromycin (78.7), penicillin G(70.95), Cotrimoxazole (70.5%), but low susceptibility values were obseved for nitrofuratoin (58%), a higher sensitivity incidences for these antibiotics were reported[34,35], this disappointing findings may be due to the big usage of these antibiotics (espicially gentamycin) in both general and hospital practice. Ps. aerogenosa isolates were susceptible to colistin(83.3%) and polymixin B(66.6%) as the principle antibiotic, earlier reports[36] stated that in

vitro effect of colistin is not the sam as in vivo, others[37] repoted thatpolymixin B was the most active agent and that the susceptibility of Ps. aerogenosa has not changed over 20 year, finally, we know that drugs differ so greatly in toxicity that possible side effects must be weighed againstthe severity of the illness. So reproducible patterns of sensitivity to many antimicrobial grugs can be used as a guide to chemotherapy and the choice of durg. The use of the predictable antibiogram must be qualified by possible differences in the occurrence of resisiant strains in certain geographical areas and such

Table 1. Symptoms and significant growth correlation in 471 patients with urinary tract infection.

Symptoms	No. of patients	%	Significant growth	%
Frequency	39	8.2	36	92.3
Urgency	46	9.7	40	86.9
Tenesmus	39	8.2	35	89.7
Flank pain	50	10.6	47	94
Fever	58	12.3	53	91.3
Hematuria	34	7.2	30	88.2
Pyuria	53	11.2	50	94.3
More than one	36	7.6	35	97.2
Total Symptomatic pt.	355	75.3	326	92.7
ASymptomatic	116	24.6	83	71.5

Table 2. Age, pregnancy, Type of infection distribution of patients

age group	No.	%	Single infection	%	Mixed infection	%	Infected pregnants No.	%
1-9	71	15	55	11.6	1	0.2	-	-
10-19	68	14.4	57	12.1	2	0.4	1	0.2
20-29	163	34.6	137	29	10	2.1	39	8.2
30-39	90	19.1	71	15	8	1.6	12	2.5
40+	79	16.7	68	14.4	-	-	-	-
Total	471*	99.8	388	82.1	21	4.3	52	10.9

* 63 out of them were pregnants

Table 3. Pathogens associated with urinary tract infection

Pathogens	Positive No. of isolates	Total %
E. coli	144	30.57
Proteus sp.	56	11.88
Klebsiella aerogenosa	35	7.43
Enterobacter sp.	12	2.54
Pseudomonas aerogenosa	6	1.27
Serratia marcescens	2	0.42
Total Gr-ve	255	54.11
Staph. aureus	58	12.42
Staph. albus	20	4.24
group B-Sterptococci	25	5.30
Strep. faecalis	22	4.67
Staph. saprophyticus	8	1.69
Total G+ve	133	28.32
Mixed infection	21	4.45
Total infections	409	86.83
No growth	62	13.16
All samples	471	99.99

Table 4- antimicrobial susceptibility pattern to different species of U.T.I. isolated pathogens

Organisms	E.coli		Proteus		Klebsiella		Eentero bacter		Serratia		Staph. albus		Staph. aureus		Staph. Saprophyticus		Group B streptococci		Strept. faecalis		Pseud. aerog.		Mean
Antibiotic	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	%
Co-trimoxazole	111	77	43	76.7	26	74.2	9	75	1	50	40	68.9	13	65	5	62.5	22	88	15	68.1	-	-	70.5
Ampicillin	97	67.3	37	66.1	23	65.7	8	66.6	-	-	38	65.5	14	70	5	62.5	21	84	15	68.1	-	-	61.5
Nitrofurantoin	85	59	33	58.9	20	57.1	7	58.3	1	50	36	62	10	50	4	50	19	76	15	59	-	-	58
Nalidixic acid	122	84.7	47	83.9	29	82.8	10	83.3	2	100	-	-	-	-	-	-	-	-	-	-	-	-	86.9
Tetracycline	77	53.4	29	51.7	18	51.4	6	50	-	-	38	65.5	14	70	6	75	21	84	18	81.8	-	-	58.2
Gentamycin	81	56.2	31	55.3	19	54.2	6	50	1	50	43	74.1	15	75	6	75	22	88	19	86.3	2	33.3	63.4
Penicillin G	-	-	-	-	-	-	-	-	-	-	26	44.8	13	65	5	62.5	23	92	20	90.9	-	-	70.9
Kanamycin	77	53.4	36	64.2	22	62.8	6	50	1	50	49	84.4	17	85	7	87.5	22	88	19	86.3	2	33.3	67.7
Carbenicillin	75	52	32	64.2	21	60	5	41.6	1	50	34	58.6	11	55	4	50	17	68	16	72.7	3	50	56.5
Colistin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	83.3	83.3
Polymixin B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	66.6	66.6
Erythromycin	-	-	-	-	-	-	-	-	-	-	41	70.6	15	75	7	87.5	22	88	16	72.7	-	-	78.7
Torbramycin	80	55.5	30	53.5	19	54.2	6	50	1	50	34	58.6	13	65	6	75	20	80	17	77.2	2	33.3	59.3

information may be obtained from Local microbiological Laboratories.

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الخلاصة

درست حالة 471 انثى مصابة بخمج المجاري البولية ، راجعت المختبر المركزي في الحلة خلال عام 1995 بأعمار مختلفة بوجود الاعراض او عدمها . اعطى زرع الادرار نمواً معنوياً في 409(86.8%) من الحالات بينما كان 62(13.1%) خالي من النمو . كان مجموع العترات السالبة لصبغة غرام 255(54.11%) وكانت الاشريكية القولونية ، Escherichia coli الاكثر او بنسبة 144(30.7%) تليها المنقلبة Proteus sp. 56(11.8%) الكلبسية Klebsiella sp. 35(7.4%) ، الانتروبكتر Enterobacter sp. 12(2.5%)، الزائفة الزنجارية Pseudomonas aero- 6(1.2%) qenosa بينما كانت نسبة وجود البكتريا الموجبة لصبغة غرام 133(28.3%) ، مثلت المكورات العنقودية الذهبية Staph. aureus منها 58(12.4%) تليها العقديات group B-streptococci 25(5.3%) ، العقدية البرازية Strept. fae- 22(4.6%) calis العنقودية البيضاء 20(4.2%) Staph. albus بينما كانت نسبة الاصابات المشتركة 21(4.4%) من المجموع الكلي للعزلات ، والشيء الجدير بالاهتمام هو عزل السيراتية Serratia marcescens من 2(0.4%) والعنقوديات الرمامة Sta- phylococcus saprophyticus من 8(1.6) من عينة البحث . وتم اجراء فحص الحساسية الدوائية لجميع العزلات وكذلك درست العلاقة بين العمر ، نوع الاصابة ، الحمل ، وظهر ان أكثر المضادات الحيوية فعالية هي الناليديكسك والاريثروميسين والكوليستين في تأثيرها على البكتريا السالبة لصبغة غرام والبكتريا الموجبة لصبغة غرام وبكتريا الزنجارية على التوالي.