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SENSITIVITY AND PATTERN OF MICROORGANISMS CAUSING URINARY TRACT INFECTION

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Abstract:

Objective: *To determine the patterns and susceptibility of pathogens causing urinary tract infection in a tertiary hospital.*

Study Design: *A Prospective study.*

Place and duration: *In the Urology department of Fatima Memorial Hospital, Lahore in collaboration with Pathology department for one year duration from November 2017 to November 2018.*

Methods: *By an international standard method; all samples were analyzed under the qualified microbiologist supervision. Susceptibility to antibiotics of the microorganisms isolated was tested for antibiotics used commonly by Kirby Baur technique.*

Results: *458 total samples were sent from the accepted patients during the study period. Mean bacteriuria in (73.14%) 335 samples, 100 samples (21.8%) were sterile and in 23 samples (5.02%) insignificant bacteriuria was noted. In 297 (64,41%) samples E. coli was the most common pathogens isolated, Enterobacter and Klebseilla Spp in each sample in (11,31%)51 samples, 36 (7.8%) samples Proteus was isolated, Pseudomonas was noted in 15 (3.27%) samples and (1.74%) 8 samples were of Citrobacter.*

Conclusion: *73% of the samples have significant growth. In suspected UTI cases; there was high yield of good clinical relationship in positive cultures. In urine cultures; gram negative rods were the isolated organisms. One analysis shows that urinary tract infections causing pathogens develop resistance to antibiotics used commonly.*

Key words: *Antibiotics, Urinary tract infection, microorganisms, susceptibility bacteriuria.*

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INTRODUCTION:

Urinary tract infection is a common hospital infection, but in the community also an important source of morbidity [1]. After respiratory tract infections, It is the most common disease in humans. E. coli was the only causal agent without complication in above than 80% of UTIs [2]. The main etiology of urinary tract infection is urinary tract obstruction including pelvicureral union occlusion, stone disease, benign prostatic hyperplasia, vesicoureteral reflux, urethral stricture and neuropathic bladder. Recurrent or untreated infections result in renal failure. The insertion of stents or catheters also improves UTI in a majority of patients [3]. Urine analysis shows the bacteria detection and leukocytes in urine is the indirect proof of UTI, but may also be confirmed by microscopy and microbial culture. In uropathogens, Virulence factors including hemolysin, adhesives, drug resistance and capsular polysaccharide are a determining factor in the treatment and development of infections. Most accepted urological patients have complete or partial obstruction. They already were exposed to developing an infection during their hospitalization at various levels [4]. Therefore, it is mandatory to initiate antibiotics with empirical treatment in every case until the final result is obtained [5]. In order to ensure adequate treatment, current information of organisms causing UTIs and their susceptibility to antibiotics is mandatory. There have been several reports of changes in the model of pathogens and their susceptibility to commonly used antibiotics due to the extra chromosomal genetic material commonly used over the last two decades, as well as the resistance for gene to the antibiotics intensity [6]. The fact that the situation is bad, mainly in gram negative. For this reason, about bacteria it is ensured that information about the rapid modification of antibiotic susceptibility patterns of microorganisms is updated in urinary infections, especially in hospitalized patients [7-8].

MATERIALS AND METHODS:

This Prospective study was held in the Urology department of Fatima Memorial Hospital, Lahore in collaboration with Pathology department for one year duration from November 2017 to November 2018. Among all patients who applied for different urological diseases, only those who were suspected of having a MEMBER were included in the study. Fever, urinary symptoms, hematuria or purulent urine were suspected. In the Research and Diagnostic Laboratory the urine samples were sent under the qualified microbiologist supervision. The sample was collected using a standard & clean catch in patients without catheters, while in patients with catheters in a screw cap in a wide mouth the sample was taken in sterile container. All volunteers were asked to clean the genital area with water and soap, before the sample was collected, while genital lavage was advised in female patients with water and soap and also wash the vulva. For the white blood cells presence samples were extracted and analyzed. On Mckonkey medium and blood agar; samples were processed and examined with a standard cycle method and at 370°C were incubated for at least 24 hours. To detect bacterial growth plates were examined. The results of the cultures were analyzed as insignificant and significant according to the standard, ie a growth of ≥105 CFU / ml was marked as strong evidence of bacteriuria. The susceptibility to antibiotic was tested and for isolates of bacteria interpretation was done by using Kirby Baur technique. Uropathogens were detected based on Gram reaction, standard biochemical tests and morphology of colony. The 1st-line antibiotics analyzed were cephalexin, ampicillin, fosfomycin, cotrimoxazole, gentamicin, amakicin, norfloxacin and nalidixic acid. Secondary antibiotics analyzed were ceftazidime, ciprofloxacin, piperacillin and ceftriaxone. SPSS 17 version was used for data analysis.

RESULTS:

Urine samples were sent from 458 patients with suspected UTIs. The patients mean age ranged from 35 to 90 years. There were 295 (64.5%) males and 45 (35.5%) females in 458 patients. Of the 458 subjects, 335 (73.14%) has positive cultures, based on the most common bacteriuria most common in cases of 41 to 60 years (136, 29.65), as detailed in Table 1.

TABLE I: AGE AND SEX DISTRIBUTION OF THE CULTURE POSITIVE URINE SAMPLES

Age (in years)	Male	Female	Total
1-15	61	27	88 (19.21%)
16-40	80	45	125 (27.3%)
41-60	81	55	136 (29.69%)
Above 60	73	36	109 (23.79%)

No sample and growth were observed in (22%)100 cases. 91 (21.59%) catheter samples and 359 (78.39) non-catheter patients were included.

TABLE II: UROPATHOGENS ISOLATED FROM URINE SAMPLE OF CATHETERIZED AND NON-CATHETERIZED PATIENTS

Micro-organisms	Catheter-ized	Non-catheter-ized	Total
E. Coli	33 (11.11%)	264 (88.88%)	297 (64.41%)
Klebseilla spp	24 (47.06%)	27 (52.94%)	51 (11.31%)
Enterobacter	22 (43.14%)	29 (56.86%)	51 (11.31%)
Proteus mir-abilis	9 (25.0%)	27 (75.0%)	36 (7.86%)
Citrobacter	4 (50%)	4 (50%)	8 (1.74%)
Pseudomo-nas aerugi-nosa	7 (46.67%)	8 (53.33%)	15 (3.27%)

As mentioned in Table II, Escherichia Coli, Klebseilla and Enterobacter are the most common pathogens in catheterized and non-catheterized patients. None of the reports showed mixed growth. The maximum sensitivity was Amikacin for all pathogens (90.83%) and the lowest Cephalexin (43.6%). E. coli and Klebsiella SPP were more sensitive to amakicin, ie 95% and 84%, respectively. Observed sensitivities / sensitivities Table no. 3.

TABLE III: PATHOGENS ISOLATED FROM URINE SAMPLES AND THEIR SUSCEPTIBILITY PATTERN ANTIBIOTIC SUSCEPTIBILITY (%)

Isolated Organisms	No(%) n=458	Amp	Cpx	Gm	Amk	Fos	NA	Nfn	Cmz	Cfx	Cfz	Cft	Ppc
E. Coli	297 (64.41)	65	65	85	95	85	68	66	75	70	80	80	-
Klebseilla	51 (11.31)	32	10	65	84	80	54	5	30	63	70	69	-
Enterobacter	51 (11.31)	36	12	76	86	83	57	6	34	61	72	70	99
Proteus	36 (7.86%)	55	48	72	88	76	50	14	57	75	66	65	-
Citrobacter	8 (1.74)	60	60	84	95	80	54	28	43	88	68	67	100
Pseudomonas	15 (3.27)	45	66	83	97	66	-	-	-	79	97	87	100
Mean susceptibility		48.8	43.6	77.5	90.83	78.3	56.6	23.8	47.8	72.6	75.5	73.0	99.9

First line antibiotics: Amp: Ampicillin; Cpx: cephalexin; Gm: Gentamicin; Amk: Amikacin; Nfx: Norfloxacin; NA: Nalidixic Acid; Cmz: co-Trimoxazole; Cfx: Ciprofloxacin; Cfz: Ceftazidime; Cft: Ceftriaxone; Ppc: Piperacillin

DISCUSSION:

Urinary tract infection is one of the major diseases that cause a burden on the national treasury. Due to the widespread and careless use of antibiotics at the community level, we have found an increasing pattern of resistance to common antibiotics by microorganisms [9]. Concerning the results, a large number of small children affected by UTI, middle-aged patients (41-60 years) had the highest incidence of UTI due to the presence of stone disease in the ureter or obstruction. Although the definitive diagnosis was based on the results of the cultures, significant bacteriuria observation was observed in 73% of the samples by Das et al. As indicated by a good clinical relationship between clinical and microbiological diagnosis shows [10]. Negligible growth or the presence of sterile urine may be due to antibiotic use or inadequate sample collection. Gram-negative bacteria have a variety of properties that may adhere to the urothelium compared to gram-positive pathogens, and, interestingly, in this study, all isolated pathogens were isolated from Yoon et al. All organisms detected were gram negative [11]. E. coli (64.5%), 70% cotrimoxazole and 65% amoxicillin were the most common isolates in urine samples sensitive to first-line antibiotics [12]. There are many studies on the resistance of microorganisms to conventional antibiotics such as ciprofloxacin. In our study, 67% of catheterized patients had non-E. coli organisms such as Klebseilla, Enterobacter and Pseudomonas, while 72% of non-catheterized patients had E. coli in urine [13]. This suggests that the presence of a catheter developed a more resistant microorganism model. Pseudomonas aeruginosa, the most common cause of hospitalized UTI, was less sensitive to quinolones and cephalosporin than aminoglycosides, but the number of samples that were positive for this organism was low. Most of the patients who were examined because of the presence of microorganisms in the urine came from their homes instead of any hospital which may be the cause of a few patients with Pseudomonas in their urine [14]. They were found to be resistant to common antibiotics such as amoxicillin and quinolones and cephalosporins. They are sensitive to fosfomycin and aminoglycosides. In our study, pseudomonas was susceptible to amikacin and fosfomycin observed by Rizvi et al. The average sensitivity for quinolones in our study was 51% (ciprofloxacin, norfloxacin, nalidixic acid). Ceftazidime and ceftriaxone showed high sensitivity (75%) and cephalexin showed low sensitivity (43%) [15]. This suggests that low sensitivity to common precursor antibiotics is due to the widespread use of these antibiotics in community settings, as seen by Allen and others. Although most of our patients have stone disease or BPH, this study does not attempt to distinguish between community-acquired and hospital-acquired infections.

CONCLUSION:

73% of the samples have significant growth. In suspected UTI cases; there was high yield of good clinical relationship in positive cultures. In urine cultures; gram negative rods were the isolated organisms. One analysis shows that urinary tract

infections causing pathogens develop resistance to antibiotics used commonly.

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