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Research Article

**A SIX-MONTHLY DESCRIPTIVE OBSERVATIONAL  
RESEARCH ON IN-VITRO EFFICACY OF CIPROFLOXACIN,  
COTRIMOXAZOLE AND NITROFURANTOIN AGAINST  
NUMEROUS URINARY ISOLATES****Dr. Taiba Zulfiqar, Dr. Amsal Saeed, Dr. Rafia Javed**  
EMO, THQ Hospital, Wazirabad**Abstract:**

**Background:** Young adults face the issue of urinary tract infections as a common disease. Because of the increased use of the fluoroquinolones, empirical therapy in the case of an uncomplicated infection of the urinary in the target age group has also become controversial. Our research was also aimed at the nitrofurantoin efficacy, cotrimoxazole and ciprofloxacin (trimethoprim-sulphamethaxazol); these are orally used drugs available in common.

**Material & Methods:** Our descriptive research was held in Services Hospital, Lahore (Microbiology Department) in the time span of January – June, 2016. We included a total of 270 isolates of urinary tract infection selected from outdoor and indoor respectively 132 and 138; culturing of the specimens was also carried out in the time span of the research. We identified the isolates through conventional techniques with the help of API – 10 S. We also assessed all the isolated for ciprofloxacin, nitrofurantoin and cotrimoxazole (trimethoprim-sulphamethaxazol) along with related common antibiotics which are also used for the urinary pathogens.

**Results:** In the total sample of the research dominant isolated was *E. Coli* which was cultured in the 158 cases (58.51%), after that the *Klebsiella pneumonia* in 48 cases (17.77%) & *enterococcus spp* respectively in 16 cases (5.92%). The sensitive percentage in the outdoor cases (132) was observed as nitrofurantoin (92.4%), ciprofloxacin (47.1%) and cotrimoxazole (62.1%); whereas in the indoor isolates (138) the respective sensitivity was observed as 84.0%, 34.7% and 28.9% respectively.

**Conclusion:** The effectiveness of the Nitrofurantoin is outdoor and indoor isolates is useful in the empirical urinary tract infection which is not complicated.

**Keywords:** Nitrofurantoin, Cotrimoxazole, Ciprofloxacin, Trimethoprim-sulphamethaxazol, Urinary Tract Infections and Urine.

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**INTRODUCTION:**

After respiratory infections the second common most infection is the infection of the urinary tract [1]. It is estimated that 8 – 10 million cases are dealt by the clinicians all UTI suspected [2, 3]. Common most cause of the UTI is considered *Escherichia coli* in indoor and outdoor patients. Previously, trimethoprim-sulfamethoxazole and ampicillin were prescribed for the treatment of the infection specially in the non-complicated cases of UTI [4]. However, its existence leads to resistance development as stated by various research studies [5 – 8]. On the later stage, the first option was considered as quinolones for UTI empirical treatment. Unfortunately, as a result of the misuse and overuse of the quinolones, a major problem has been considered as the resistance that restricts the UTI's oral treatment [9]. Nitrofurantoin is considered an effective treatment in both the cases including gram positive and negative pathogens because it is rare in nature, no cross activity is involved and reduced side effects associated to other agents of the antimicrobial nature. Results are even effective in opposition to the pathogens that is multi-drug resistant urinary.

Our research was also aimed at the nitrofurantoin efficacy, cotrimoxazole and ciprofloxacin (trimethoprim-sulphamethaxazol); these are orally used drugs available in common.

**MATERIAL AND METHODS:**

We carried out a research that was based on the laboratory setting and descriptive in nature in the Services Hospital, Lahore (Microbiology Department) in the time span of January – June, 2016. Specimen of the urine were centrifuged, the specimen having puss cells above 4 – 5/HPF were made a part of the research. Gender and age were not used as the discriminatory factors. All the specimens having mixed organism's growth were not included in the research. Research was completed on 270 isolated in the period of six months. With this

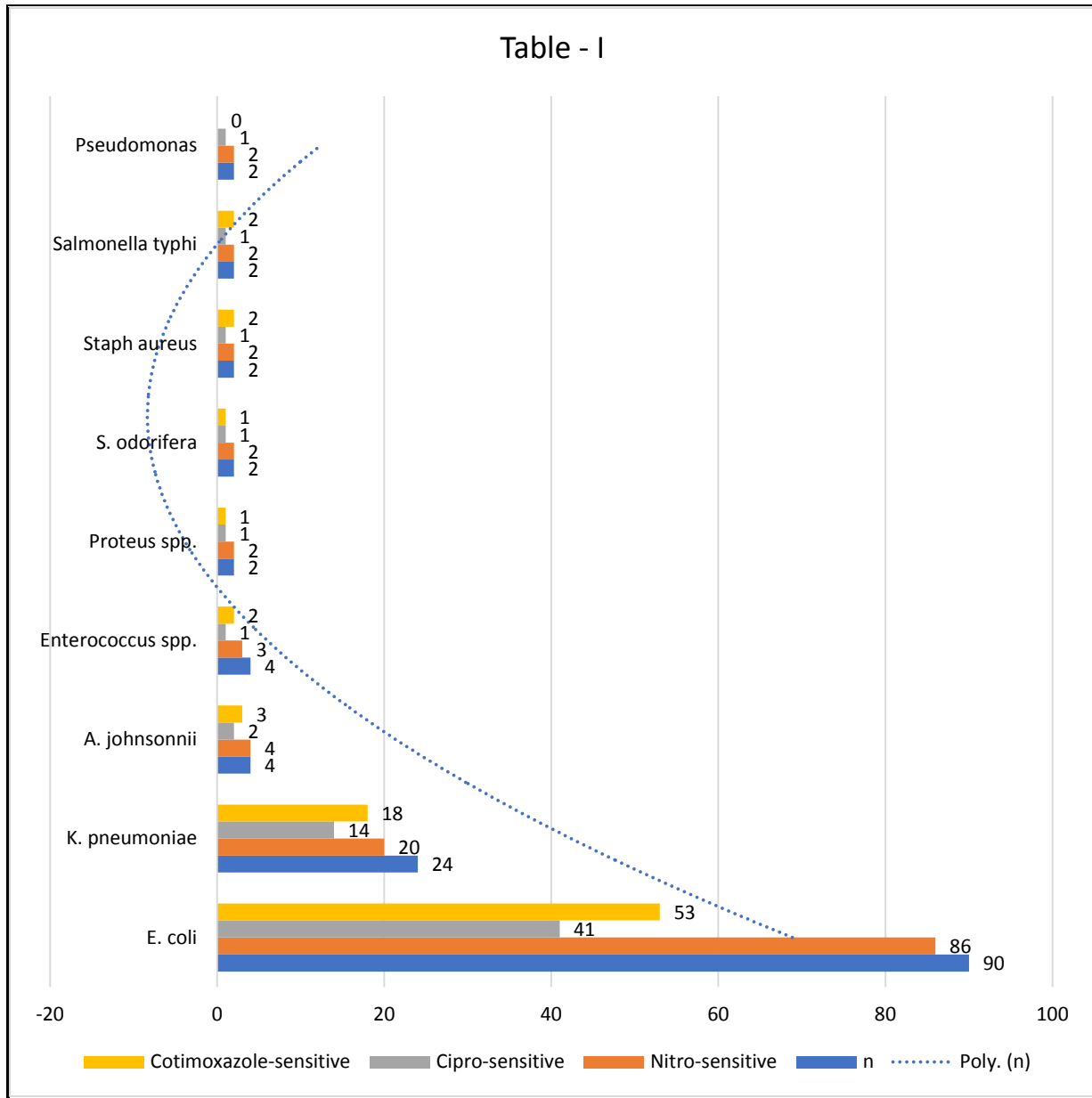
protocol, urine samples were inoculated on CLED medium and they were incubated at the temperature of 37°C for a period of 24 – 48 hours. All the colonies were also subjected to rapid tests and Gram stain. Differentiation and Confirmation of the species was carried out through traditional biochemical tests with the help of API 10 – S system. We also carried out antimicrobial susceptibility testing with the help of Muller Hinton Agar having 300µg (nitrofurantoin), 1.25/23.75 µg (trimethoprim/sulfamethoxazole), 30 µg (ciproxin), 10 µg (ampicillin), 30µg (doxycycline), 10µg (gentamicin), 30µg (cef-tazidime), 10/100µg (tazobactam/piperacillin), 105µg (sulbactam/ cefoperazone), 30µg (vancomycin) and 10µg (imipenem); all this was performed by Kirby-Bauer disk diffusion modified method [12]. The strains used were *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* respectively ATCC – 25923, ATCC – 25922 (β – lactamase negative) & ATCC – 25853.

**RESULTS:**

In the total sample of the selected isolates culturing was carried out in outdoor and indoor patients such as 132 and 138 specimens of the isolates. Numerous isolates were cultured through the department of gynecology and remaining were in ICU department. Male to female ratio was respectively 180 females (67%) and 90 males (33%) with a dominance of female over male. *K. pneumonia* and *E. coli* were mostly observed as isolated in both indoor and outdoor cases as shown in Table – I & II. Maximum sensitivity was observed in nitrofurantoin in the indoor and outdoor isolates. Surprisingly, cotrimoxazole was much sensitive in comparison to the ciprofloxacin in the outdoor isolates as shown in Table – I & II. In the total research sample 21 isolates (7%) were producing an Extended Spectrum Beta Lactamase (ESBL). Among these twenty-one sensitive cases were two in all drugs and sensitivity to the nitrofurantoin was observed in three isolates.

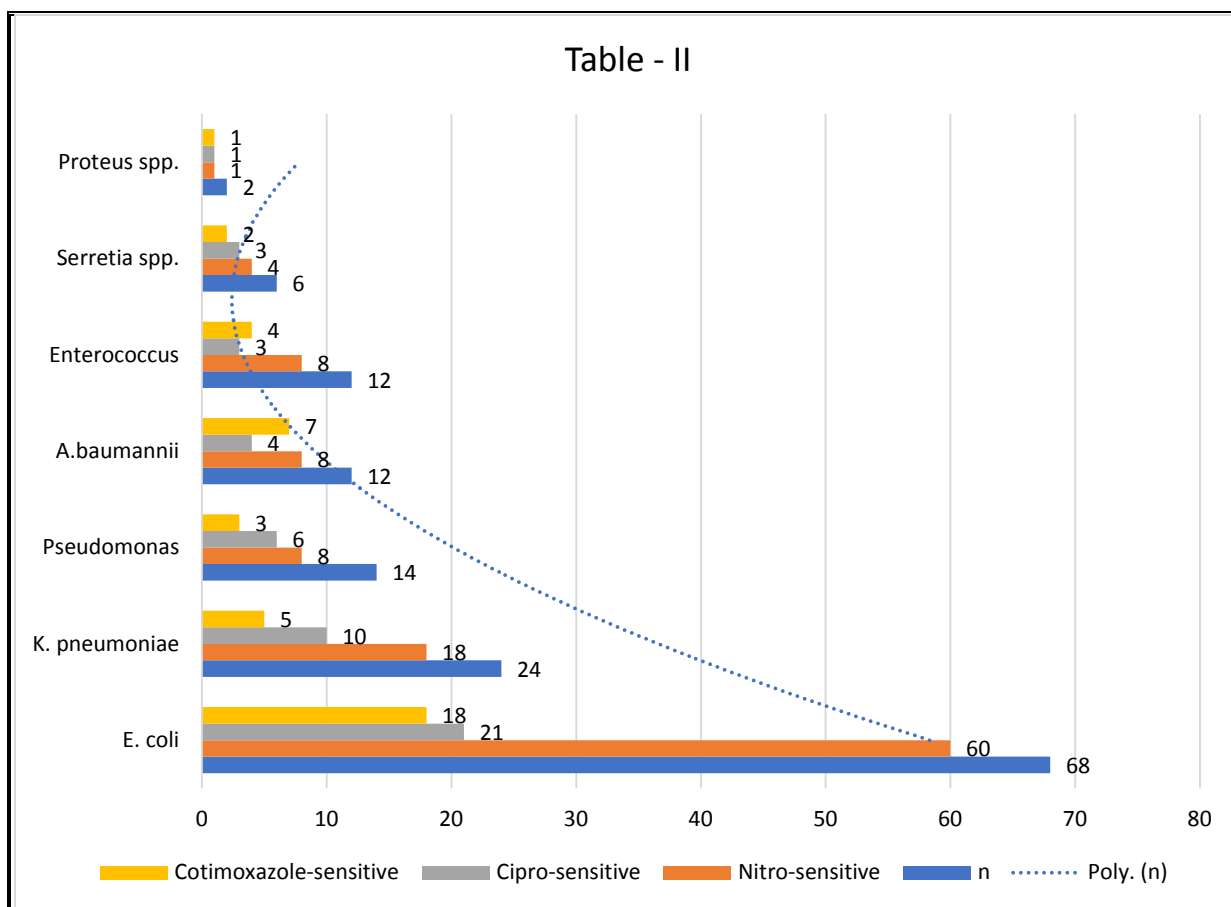
**Table 1: Sensitivity pattern of urine samples from outdoor isolates to nitrofurantoin, ciprofloxacin and cotrimoxazole (n=132)**

Urinary Isolate	n	Nitro-sensitive	Cipro-sensitive	Cotrimoxazole-sensitive
<i>E. coli</i>	90	86	41	53
<i>K. pneumoniae</i>	24	20	14	18
<i>A. johnsonii</i>	4	4	2	3
<i>Enterococcus spp.</i>	4	3	1	2
<i>Proteus spp.</i>	2	2	1	1
<i>S. odorifera</i>	2	2	1	1
<i>Staph aureus</i>	2	2	1	2
<i>Salmonella typhi</i>	2	2	1	2
<i>Pseudomonas</i>	2	2	1	0



**Table 2: Sensitivity pattern of urine samples from indoor isolates to nitrofurantoin, ciprofloxacin and cotrimoxazole (n=138)**

Urinary Isolate	n	Nitro-sensitive	Cipro-sensitive	Cotrimoxazole-sensitive
<b>E. coli</b>	68	60	21	18
<b>K. pneumoniae</b>	24	18	10	5
<b>Pseudomonas</b>	14	8	6	3
<b>A.baumannii</b>	12	8	4	7
<b>Enterococcus</b>	12	8	3	4
<b>Serratia spp.</b>	6	4	3	2
<b>Proteus spp.</b>	2	1	1	1



### DISCUSSION:

Recently UTI treatment is difficult because of the increased resistance which is a result of the use of various antibiotics [10]. UTI treatment through fluoroquinolones may be less or unfruitful because of the excessive antibiotics intake by the patients. We also treat fever with ciprofloxacin without any confirmed salmonella which increases the resistance even to higher stage. A research study states that 100 suspected cases of UTI were treated with fluoroquinolones, among these cases manhandled treatment was observed in eighty-one cases [11]. Nitrofurantoin has returned to increase the incidence of resistance [12]. It is observed through worldwide research studies that nitrofurantoin efficacy shows low resistance and its application in the cases of UTI especially non-complicated cases is useful [13, 14]. However, in the countries like Germany their use is still controversial because of the associated side-effects of the interstitial pneumonia and polyneuropathy. With the time the resistance of the cotimoxazole is decreasing.

We observed that pre-dominant isolate was found to be the E. Coli isolate observed in fifty-eight percent

of the isolates with an overall susceptibility to nitrofurantoin (92.4%), ciprofloxacin (47.1%) and cotrimoxazole (62.1%); whereas in the indoor isolates (138) the respective sensitivity was observed as 84.0%, 34.7% and 28.9% respectively. As per the outcomes an overall most effective drug is nitrofurantoin against E. Coli both in outdoor and indoor respectively (95.5%) and (88.2%) patients. Nitrofurantoin susceptibility difference in the indoor and outdoor cases was significant with the p-value of  $p < 0.001$ . Same outcomes have been identified by the Tekin, which are comparable to the outcomes of our research [10]. An overall nitrofurantoin susceptibility was observed as outdoor (93.1%) and indoor (89.2%) isolates. It was also observed that effectivity of ciprofloxacin was less than cotimoxazole against the isolate of E. Coli in the outdoor cases and in the case of indoor patients more effective for the ciprofloxacin. Another research was carried out in USA, 2008 about the nitrofurantoin susceptibility, ciprofloxacin & cotrimoxazole against E. Coli was respectively 96%, 75% and 80% which proves the effectivity of the cotimoxazole in-vitro than the ciprofloxacin in contradiction of E. Coli [12].

Second most common in the isolates of outdoor and indoor specimens was *Klebsiella pneumonia* which was observed as (17.7%) in the total sample population. An overall *K. pneumonia* susceptibility to nitrofurantoin (79.1%), ciprofloxacin (50.0%) and cotimoxazole (47.9%) respectively. *K. pneumonia* susceptibility to nitrofurantoin for outdoor cases was 83.3% and indoor 75%. It is suggested through the outcomes that nitrofurantoin provides better activity against the isolates of *K. pneumonia* which is considered as the UTI's second repeated reason. We faced a big problem that was caused by the incidence of *Acinetobacter baumannii* in the patients who were hospitalized. In the total sample of research 12/270 cases (4.4%) were of *Acinetobacter baumannii* with a number of cases resistant to multi-drugs. The reason behind may be the isolates of MDR which were spread from the ICU to the other wards because of the less protected environment of the infection control. In the cases of *A. baumannii* isolates (12 in number), pattern of susceptibility of these isolates against nitrofurantoin 66.0%, ciprofloxacin 33.3% and cotimoxazole 58.3%. In the locally collected data *A. baumannii* isolated from catheterized and ventilator patients reflected less amount of sensitivity to low cost antibiotics and less commonly used including doxycycline and cotimoxazole. Among the isolates of *A. baumannii* which were cultured through the patients of ventilator, cotimoxazole or doxycycline was sole way out with polymyxin. According to Pour in an Indian research states that a number of *A. baumannii* isolates which are cultured through catheterized patients form catheter biofilms, resultantly poses a serious challenge of therapeutic nature with available option of indwelling catheter removal.

### CONCLUSION:

The effectiveness of the Nitrofurantoin is outdoor and indoor isolates is useful in the empirical urinary tract infection which is not complicated.

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