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# STUDIES ON DIAGNOSTIC AND THERAPEUTIC APPROACH FOR URINARY TRACT INFECTION

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## ABSTRACT

Globally urinary tract infection (UTI) is the second most common infectious presentation in the community. Due to an improper laboratory diagnosis along with the tremendous practice of evidence less therapy, UTI most often results in to life threatening complications. Hence, with the view to generate an easy approach of diagnosis.The present study on physical, chemical and microbiological examination of urine along with drug sensitivity have been carried out with known UTI female patients of reproductive age group. The present study enlighted, the predominant presence of albumin, with increased pus cells at least up to 30/ mf, epithelial cells up to 20/ mf, along with WBC up to 18 cu mm can be taken in to consideration as a diagnostic marker during the urine analysis. Also the positive test for the presence of *E.coli* with an existence of 72.72 % followed by *Proteus species, S. aureus* and *Pseudomonas species* with 54.54, 45.45 and 9% respectively can be used as a microbiological diagnostic marker for UTI. The present study also suggests that for therapy the Amoxicillin (30mcg) may be the choice of drug.

## INTRODUCTION

Urinary tract infection (UTI) is an infection of any of the organ in the Urinary tract which consists of the bladder, the urethra, and the kidneys. Worldwide, about 150 million people are diagnosed with UTI each year, costing the global economy in excess of 6 billion US dollars (Janifer *et al*., 2009). UTI, if not treated properly, leads to the serious complications like sepsis, renal scarring, and pelvic inflammatory diseases etc. The most common pathogens responsible for UTI includes *E.coli, Pseodomonas, K. pneumoniae, Proteus* species etc. Presently, single or combinational antibiotics are use as an empirical therapy However, it results in the development of Multiple Drug Resistant (MDR) strains of pathogens (Jumbo *et al.,* 2008).The diagnosis of UTI cannot be made on symptomatology alone and urine examination is utmost important (Srivaths *et al.,* 1996). Hence, taking this into consideration, the present study was conducted to evaluate the physical, chemical and microscopic parameters of urine in UTI along with the screening of associated uropathogens with their antimicrobial resistance and sensitivity pattern.

## MATERIALS AND METHODS

Total eleven urine samples were collected from the female patients of reproductive age group (22-30) suffering from UTI that had been registered in the civil hospital, Washim and transported aseptically in the laboratory. The physical parameters of urine viz. colour, odour, pH, appearance, volume etc, the chemical parameters viz. sugar, bile salts, bile pigments, occult blood, protein etc. and the microscopic analysis viz. pus cells, casts, yeasts, WBC, RBC etc. were determined adopting standard conventional methods (Godkar and Godkar, 2006).

The uropathogens were isolated by using the selective media viz. Cetrimide agar, Eosin-methylene blue agar; Mannitol salt agar and Cysteine- Lactose- Electrolyte- Deficient agar (Himedia, Mumbai).The identification of isolated pathogens were carried out adopting standard methods (Miles and Amyes, 1996).

The antibiotic sensitivity/ resistance pattern was determined by Disc diffusion technique (Bauer *et al*., 1996). The antibiotics which were frequently prescribed by physician, viz. Gentamicin (10mcg), Amikacin (30mcg), Ceftriaxone (30mcg), Ofloxacin (5mcg), Cephotaxime (30 mcg) and Amoxicillin (30 mcg) were used for analysis.

## RESULTS AND DISCUSSION

In the present study, urine samples obtained from total eleven UTI patients were subjected to routine urine analysis, along with pathogen identification and antibiotic S/ R pattern. The routine urine analysis shows correlation due to the elevated level of albumin in almost all the samples tested, indicating protein urea as the diagnostic marker for urinary tract infections. However, the findings should be correlated conducting studies with larger numbers of samples. The chemical parameters excluding the urine albumin doesn't showed significant alteration .In case of the physical analysis of urine color, odour and appearance shows significant alterations. In urine

**Table 1: Routine urine analysis of clinical samples**

| S.No. | pH | Colour | Odour | Albumin | Sugar +/- | B.S +/- | B.P +/- | Occult blood +/- | Pus cells /mf | Epithelial cells/mf | Casts types | WB/ Cumm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N | Pale | Fowl | + + | nil | - | - | - | 18-20 | 5-6 | WBC cast | 5-8 |
| 2 | A | Dark yellow | Fowl | + + + | + | - | - | - | 26-30 | 7-8 | WBC cast | 12-15 |
| 3 | N | Pale | Pungent | + + + | nil | - | - | - | 40702 | 6-8 | WBC cast | 4-6 |
| 4 | A | Slightly reddish | Fowl | + + + | nil | + | + | + | - | - | RBC cast | 12-15 |
| 5 | A | Dark yellow | Fowl | + + + + | nil | - | - | - | 24-26 | 24-26 | WBC cast | 15-18 |
| 6 | N | Pale | Pungent | + | + | + | + | - | 40702 | 8-9 | RBC cast | 4-6 |
| 7 | A | Pale yellow | Fowl | + + + + | nil | - | - | - | 20-24 | 18 | Epithelial cast | 8-10 |
| 8 | A | Pale | Fowl | + + + | nil | - | - | - | 40893 | 12-15 | WBC cast | 6-8 |
| 9 | A | Pale yellow | Fowl | + + + + | nil | - | - | - | 20-24 | 18-20 | Epithelial cast | 10-12 |
| 10 | N | Dark yellow | Pungent | + + | nil | - | - | - | 40702 | 4-8 | Epithelial cast | 4-5 |
| 11 | N | Pale | Pungent | + + | nil | - | - | - | 40765 | 6-8 | Epithelial cast | 5-8 |

N-Neutral,A-Acidic, + present, - absent

**Table 2: Growth response of uro pathogens from different urine samples on selective media**

| Sample No. | EMB agar | Cetrimide agar | MSA | CLED agar |
|---|---|---|---|---|
| 1 | + | - | + | + |
| 2 | + | - | + | - |
| 3 | + | - | - | - |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | + | - |
| 7 | + | - | - | + |
| 8 | + | + | + | + |
| 9 | + | - | - | + |
| 10 | + | - | + | + |
| 11 | + | - | - | + |
| Possible pathogen | *E.Coli* | *Psudomonase species* | *S.aureus* | *Proteus* species |
| Per cent existence | 72.72 | 9 | 45.45 | 54.54 |

(+) : growth; (-): no growth

**Table 3: Antibiotic sensitivity / resistance pattern of uropathogens**

| S.No. | Antibiotic | Disc content | *E.coli* | *S.aureus* | *Pseudomonas spp.* | *Proteus* spp. |
|---|---|---|---|---|---|---|
| 1 | Gentamycin | 10 mcg. | R (10) | R (11) | R (8) | R (11) |
| 2 | Amikacin | 30 mcg. | I (14 ) | R (12) | R (9) | I (15) |
| 3 | Ceftriaxone | 30 mcg. | R( 11) | R (20) | R (10) | R (14 ) |
| 4 | Ofloxacin | 5 mcg. | R (12) | R (8) | R (9) | R (10) |
| 5 | Cephotaxime | 30 mcg. | R (13) | I (16) | R (10) | R (12) |
| 6 | Amoxicillin | 30 mcg. | S (20) | S (18) | I (15) | S (19) |

Figures in parennthesis are zone of inhibition in( mm). R- Resistance, S- Sensitive, I- Intermediate

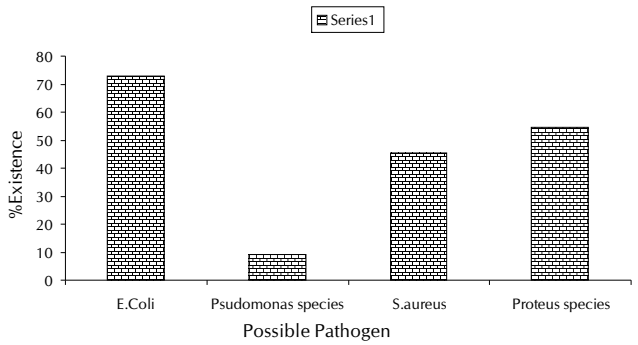


**Figure 1: percent existence of possible uropathogen**

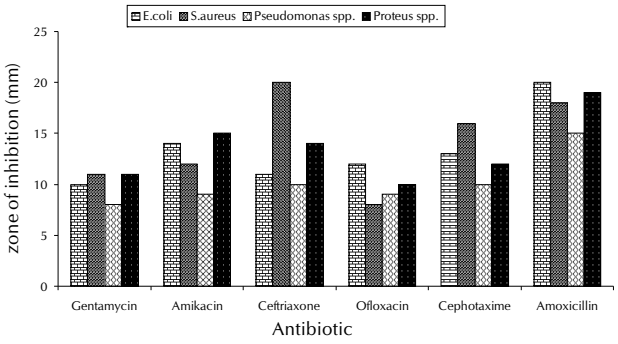


**Figure 2: Antibiotic sensitivity / resistance pattern of uropathogens**

microscopy the presence of epithelial cells, casts yeast cells, WBC etc were predominant which indicates the tissue disintegration in the urinary tract (Table 1).

The predominant pathogens identified were *E. coli* (72.72%), followed by *Proteus* spp. (54.54%), *S. aureus* (45.45%) and *Pseudomonas* spp. (9%) (Table 2; Fig. 1). These results were in accordance with the conclusions given by most of the workers (Dhakal *et al.,* 2002 and Sahm *et al.,* 2001).The results on antibiotic sensitivity test revealed the presence of MDR in all the uropathogens (Table 3; Fig. 2).These results were in

correlation with the results obtained by Pandiyal *et al.,* 2009. The presence of MDR in uropathogens may be due to plasmid carrying the resistance genes or it may be linked to integrons (Miller and Tang, 2004).

Hence, the present study clearly indicates that the routine urine analysis especially with the protein urea, altered physical parameter and the presence of WBC, Casts, yeast cells and epithelial cells along with positive test for *E.coli* can be used as an accurate diagnostic marker for UTI. Secondly, due to the continuous changes in the behavior of the uropathogens against currently indicated antibiotics, surveillance for antibiotic sensitivity of the uropathogens is very important for developing an empirical antibiotic therapy which may be beneficial for reducing the disease period in the patients as well as their medico-expenditure.

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