



COMMUNITY AND HOSPITAL ACQUIRED URINARY TRACT INFECTIONS- TWO FACES OF A COIN

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ABSTRACT

INTRODUCTION: Urinary tract infection is one of the most common infections to plague man worldwide. Though majority of these UTIs are acquired in the community and are benign in course but in some situations they greatly affect the general health and well-being e.g. Urosepsis in elderly, recurrent UTIs in pregnant females, hospital and catheter associated UTIs, UTIs affecting female sexual health. Hospital acquired urinary tract infections are considered to be an entirely different group, in terms of etiology, demography, susceptibility profiles and outcome.

MATERIALS AND METHODS: Hospital based prospective study involving Patients admitted in a tertiary care hospital, Sher-i-kashmir institute of medical sciences soura, Srinagar.

RESULT: The study involved a total of 250 cases, admitted in various specialties of a tertiary care hospital. Out of these, 154 were community and 96 were hospital acquired infections. Majority of the cases were in 30-60 year age group (42.2% in CA-UTI, 38.5% in HA-UTI). Females predominated in both the groups (55.8% in CA-UTI, 54.2% in HA-UTI). Clinical features suggested dysuria (76.6% vs. 56.3%) and fever (74.7% vs. 58.3%) were significantly associated with community acquired urinary tract infections. Among bacteria, gram negative bacteria predominated in both the groups (65.1% in CA-UTI, 77.8% in HA-UTI). The microorganisms isolated depicted a difference in the two groups, with E.coli predominating in CA-UTI and Candida- albicans in HA-UTI.

CONCLUSION: This study highlights the impact of urinary tract infections on the overall hospital stay, morbidity and mortality of patients. Indwelling urinary catheters, diabetes mellitus remain the major risk factors along with immunosuppression. Hospitals are a major source of fungal urinary tract infections. The overall prevalence of E. coli is decreasing and that of candida is increasing.

KEYWORDS : Nosocomial, Fungiuria, Reinfections, Resistance.

INTRODUCTION:

Urinary tract infection is one of the most common infection to plague man worldwide.⁽¹⁾ Over 150 million people worldwide experience an episode yearly, costing the world economy over 6 billion US Dollars in the treatment and work loss⁽²⁾.

- **COMMUNITY-ACQUIRED UTI (CA-UTI):** Defined as an episode detected at hospital admission or within the first 48 hours.
- **HOSPITAL ACQUIRED UTI (HA-UTI):** Episodes which are detected beyond 48 hour of hospital admission are considered to be HA-UTI.

Though majority of these UTIs are acquired in the community and are benign in course but in some situations they greatly affect the general health and well-being e.g. Urosepsis in elderly, recurrent UTIs in pregnant females, hospital and catheter associated UTIs, UTIs affecting female sexual health. Hospital acquired urinary tract infections are considered to be an entirely different group, in terms of etiology, demography, susceptibility profiles and outcome.

MATERIALS AND METHODS:

STUDY SETTINGS: It was a hospital based prospective study involving Patients admitted in a tertiary care hospital, sher-i-kashmir institute of medical sciences soura, Srinagar, from July 2016 to July 2018.

SUBJECTS : All the patients admitted in SKIMS with Symptoms and/or Signs suggestive of UTI were selected as Subjects for the Study.

DATA COLLECTION :

- Urine samples were collected by standard mid-stream "clean-catch" method.
- The samples were examined for pus cells and Red blood cells.
- All the samples were processed on the Hichrome agar by standard loop method & incubated at 37°C overnight, to look for bacterial growth.
- Culture results were interpreted as being significant & insignificant.
- Antibiotic susceptibility tests were carried out for bacterial isolates by Kirby-Bauer disc diffusion method. Mueller-Hinton agar plates were incubated for 24 hours after inoculation with organisms and placement of discs. After 24 hour the inhibition zones were measured and interpreted as per latest CLSI guidelines⁽³⁾.

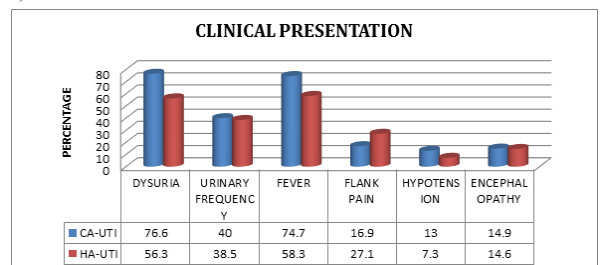
RESULTS:

The study involved a total of 250 cases, admitted in various specialties of a tertiary care hospital. Out of these, 154 were community and 96 were hospital acquired infections. Comparing the two groups revealed major differences, in terms of demography, clinical features, etiology etc.

DEMOGRAPHY CHARACTERISTICS: Majority of the cases were in 30-60 year age group (42.2% in CA-UTI, 38.5% in HA-UTI). Females predominated in both the groups (55.8% in CA-UTI, 54.2% in HA-UTI).

CLINICAL PRESENTATION: All CA-UTI cases were symptomatic on presentation whereas some proportion (20.8%) of HA-UTI cases was asymptomatic as well (p value≤0.0001). In community acquired UTI, cases with duration of symptoms longer than three weeks were 60 (40.3%) in comparison to 16 (21.1%) of hospital acquired group (p value- 0.002).

Clinical features suggested dysuria and fever were significantly associated with community acquired urinary tract infections (Figure 1).



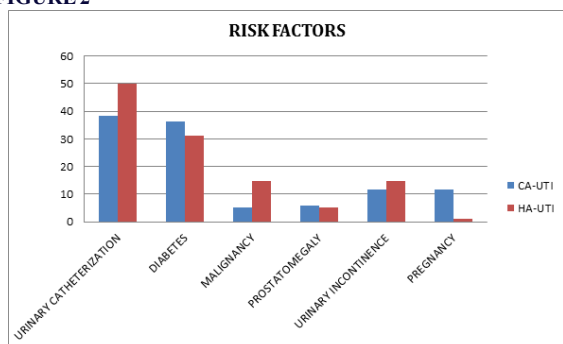
RISK FACTOR PROFILE: Indwelling urinary catheters were the predominant risk factors involved with UTI, though more commonly associated with HA-UTI (Table 1) (Figure 2).

Table 1

RISK FACTOR	CA-UTI	HA-UTI	TOTAL	FISHER'S EXACT TEST

URINARY CATHETERIZATION				
YES	59 38.3%	48 50%	107 42.8%	0.087
NO	95 61.7%	48 50%	143 57.2%	
TOTAL	154 100%	96 100%	250 100%	
DIABETES				
ABSENT	98 63.6%	66 68.8%	164 65.6%	0.494
PRESENT	56 36.4%	30 31.3%	86 34.4%	
TOTAL	154 100%	96 100%	250 100%	
MALIGNANCY				
ABSENT	146 94.8%	82 85.4%	228 91.2%	0.020
PRESENT	8 5.2%	14 14.6%	22 8.8%	
TOTAL	154 100%	96 100%	250 100%	
PROSTATOMEGALY				
ABSENT	145 94.2%	91 94.8%	236 94.4%	1.000
PRESENT	9 5.8%	5 5.2%	14 5.6%	
TOTAL	154 100%	96 100%	250 100%	
URINARY INCONTINENCE				
ABSENT	136 88.3%	82 85.4%	218 87.2%	0.561
PRESENT	18 11.7%	14 14.6%	32 12.8%	
TOTAL	154 100%	96 100%	250 100%	
PREGNANCY				
ABSENT	136 88.3%	95 99.0%	231 92.4%	0.002
PRESENT	18 11.7%	1 1%	19 7.6%	
TOTAL	154 100%	96 100%	250 100%	
OTHER RISK FACTORS				
URINARY CALCULUS	10 6.5%	0 0%	10 4%	0.002
UROLOGICAL PROCEDURE	11 7.1%	2 2.1%	13 5.2%	
STEROIDS	25 16.2%	25 26.1%	50 20%	

FIGURE 2



INVESTIGATIONS: A normal urine routine was more frequently associated with HA-UTI (7.8% IN CA-UTI, 15.6% IN HA-UTI), whereas a full field of pus cells with CA-UTI (54.5% vs. 27.1%). The difference was statistically significant (p value ≤ 0.0001). Urine culture was positive in 51.9% in CA-UTI and 59.4% in HA-UTI. Among bacteria, gram negative predominated in both the groups (65.1% in CA-UTI, 77.8% in HA-UTI). The microorganisms isolated depicted a difference in the two groups, with E.coli predominating in CA-UTI and Candida- albicans in HA-UTI (Figure 3) (Figure 4).

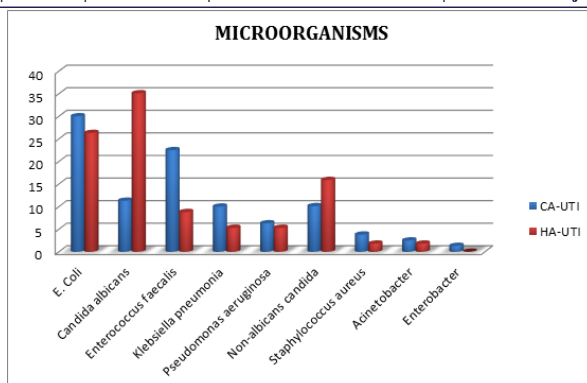
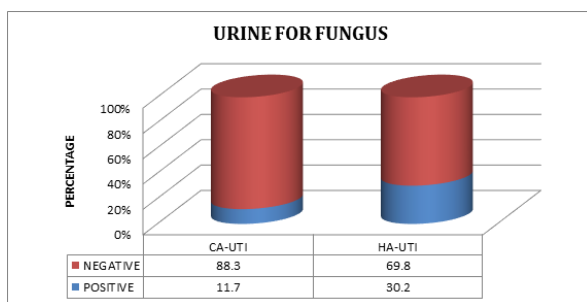


FIGURE 3



Fisher's Exact Test: ≤0.0001 FIGURE 4

Among candida infections, albicans was more commonly grown in HA-UTI cultures (50% in CA-UTI vs. 69% in HA-UTI) and non-albicans in CA-UTI (50% vs. 31%).

OUTCOME: Around 35% cases had recurrent infections on follow-up, in both the groups. The difference in reinfections (39.1% vs. 42.9%) and relapses (60.9% vs. 57.1%) between the two groups was not statistically significant (p value : 1.000).

DISCUSSION:

The study was conducted at a tertiary care centre. In a total of 250 studied cases, males were 112 and females 138, with a male: female ratio of 0.8:1. The finding that females (55%) had higher prevalence of UTI is in agreement with earlier studies [4,5,6,7,]. Close proximity of the female urethral meatus to anus, short urethra, and sexual intercourse have been reported as factors which influence the higher prevalence in women. Females predominantly presented in the age-group 30-60 years whereas majority of males were above 60 years. This finding is similar to study conducted by Sood *et al* [8]. This is probably because with advancing age, the incidence of UTI increases among males due to prostate enlargement and neurogenic bladder.

Dysuria (68.8%) and fever (68.4%) were the predominant presenting features, followed by increased urinary frequency (39.6%) and flank pain (20.8%). Large number of patients presented with encephalopathy (14.8%) and shock (10.8%). Sepahi *et al* [9] found that fever; pain, irritability, dysuria, and haematuria were the main clinical presentation of UTI.

Our study found that patients with renal transplant, catheter associated, hospital acquired urinary tract infections tend to be less symptomatic than others. The difference was statistically significant in hospital acquired cases (Fisher's Exact Test: ≤0.0001). The predictability of UTI by these symptoms, individually, is to be questioned. Thus clinical presentation plays a very minor role, if any, in diagnosing UTI, reconfirming the fact that urine analysis is essential to diagnose UTI.

Out of 250 cases, 154(61.6%) were community acquired and 96(38.4%) were hospital acquired infections. Female predominance was seen in both the groups (55.8% vs. 54.2%) with majority falling in the age group 30-60 years (42.2% vs. 38.5%). This is due to the comorbid conditions associated with elderly population predisposing them to infections.

Majority of patients (40.3%) with CA-UTI had symptoms with duration more than three weeks whereas with HA-UTI, majority

(60.5%) had shorter duration i.e. less than one week (p value: 0.002).

Predominant clinical presentations were dysuria and fever. Dysuria was present in 76.6% of CA-UTI patients in comparison to 56.3% of HA-UTI group. Similar was the case with fever (74.7% vs. 58.3%). The association was statistically significant with P-value less than 0.05, conclusive of the fact that symptoms of UTI are strongly associated with CA-UTI group than hospital acquired which can frequently be asymptomatic.

Major risk factors were indwelling urinary catheterization (38.3% vs. 50%), Diabetes-mellitus (36.4% vs. 31.3%), malignancies (5.2% vs. 14.6%), urinary incontinence (11.7% vs. 14.6%), pregnancy (11.7 vs. 1%), use of steroids (10% vs. 10%). Catheterization was frequently associated with HA-UTI, though the association was not statistically significant. Around 14.6% of HA-UTI cases had documented infection at other sites viz. skin, chest, besides urinary tract, though we do not have data to prove or disapprove their association.

Urine microscopy is frequently found normal in HA-UTI group (7.8% vs. 15.6%) with statistically significant association. Predominant microorganisms isolated from CA-UTI cultures were *E. Coli* (30%), *Enterococcus faecalis* (22.5%), *Candida albicans* (11.3%), *Klebsiella pneumoniae* (10%) and *Pseudomonas aeruginosa* (6.3%) whereas in HA-UTI group the major isolate was *Candida albicans* (35.1%) followed by *E.coli* (28.5%). This may be due to frequent use of broad spectrum antibiotics, indwelling catheters, co-morbidities and other associated clinical conditions.

Our study revealed that among Gram-negative bacteria, the most common isolate *E. coli* showed high level of resistance (> 50%) to commonly used empirical antibiotics like β -lactams (ceftriaxone, ampicillin, ampicillin-sulbactam), fluoroquinolones (ciprofloxacin and levofloxacin) and co-trimoxazole. This value is similar to various previous studies done in India^{8,10,11}. Extended-Spectrum β -Lactamases (ESBLs) were four (10.3%). These high resistant rates among uropathogenic isolates raises question about selection pressures that generate, maintain and spread resistant strains in the community. It is also possible that due to poor access to health care services, irrational prescription of antimicrobials which are available over-the-counter has contributed to this alarming situation. Unqualified practitioners, untrained pharmacists and nurses all over the country use antimicrobials indiscriminately. The widespread use of antimicrobials in veterinary practice may be another possible factor for the emergence of resistant strains. Our findings thus suggest that empirical treatment with these drugs should no longer be appropriate.

Drug susceptibility profile of *E. coli* showed high sensitivities to Amikacin (91%), Imipenem (90.3%), and Nitrofurantoin (83.8%). *Klebsiella pneumoniae* was the most resistant microorganism with resistance levels peaking for levofloxacin, Ceftriaxone, cotrimoxazole. The same microorganism we labeled as the commonest uropathogen in hospitalized renal transplant group in one of our study⁽¹²⁾.

There was not any major difference in the outcome between the two groups except relapses being more common in community acquired infections, though the difference was not statistically significant.

ETHICAL CONSIDERATIONS: Study has been cleared by SKIMS Institutional Ethical Committee (IEC).

STATISTICAL ANALYSIS: The categorical variables were analyzed by Pearson's Chi Square and Fisher's Exact test using SPSS software version 22. P value less than 0.05 was considered to be statistically significant.

STATISTICALLY SIGNIFICANT OUTCOMES OF OUR STUDY

- Significant proportions of hospital acquired urinary tract infections were asymptomatic.
- Majority of community acquired UTIs presented late, with average duration of symptoms more than three weeks.
- Clinical features like dysuria and fever were significantly high in community acquired infections.
- Patients with malignancies were more prone to develop hospital acquired UTIs due to their frequent visits to health care facilities and immunosuppressive state.
- Fungal UTI was significantly high in hospital settings.

CONCLUSION:

1. Geriatric population is the most vulnerable age-group for developing complicated urinary tract infections.
2. Males overtake females in contracting infection as age increases.
3. Leucocytosis, increased serum creatinine and low albumin are frequently associated with complicated UTIs.
4. Indwelling urinary catheters, diabetes mellitus remain the major risk factors along with immunosuppression. Clinical presentation can be unpredictable and urinalysis is essential for screening patients for urinary tract infections.
5. Hospital acquired UTIs are frequently asymptomatic and community acquired UTIs seeks medical advice late.
6. Hospitals are a major source of fungal urinary tract infection, frequently associated with indwelling urinary catheterizations.
7. *E. coli* is still the most widely prevalent organism causing UTI in the community but in hospital settings, *Candida albicans* emerged as the commonest.
8. The overall prevalence of *E. coli* is decreasing and that of *Candida* is increasing, which is worrisome.

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