

## Original Article

# Urinary Tract Infections (UTI) among Females Caused by *Staphylococcus Saprophyticus*

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## ABSTRACT

**Objective:** *Staphylococcus saprophyticus* is a uropathogen frequently isolated from young female outpatients presenting with uncomplicated urinary tract infections.<sup>1</sup> Antibiotic resistance in uropathogen is increasing worldwide in out patients as well as hospitalized patients<sup>2</sup>

**Study design:** cross-sectional study.

**Place and Duration of Study:** The urine specimens were obtained from Nephrology, Urology and Gynecology / Obstetric and outpatient departments of JPMC, Karachi for three years. They were processed in the Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi from May 2003 to May 2005.

**Material and Methods:** The proper and necessary records of the patient were maintained, then the samples were processed by the standard methods. Blood agar plates and MacConkey's agar plates were used for culture. The biochemical tests were done by using different sugar media, TSI, Simon citrate agar, urease, indole and MRVP tests

**Result:** Out of 175 urinary pathogens isolated from female patients complaining from symptoms of UTI, 28 (16%) yielded *Saprophyticus* predominantly in pure culture and in high counts. In the age group of 18-28 years, this organism was found in 10 (36%), while in the age group of 29-39 years it was found in 8 female patients i.e. it was 28%.

**Conclusion:** Hence it is observed that as the age advances *Staph saprophyticus* becomes a rare finding so it is not a common organism in elderly males as well as females of all ages. But the sensitivity pattern must be seen to commonly use antimicrobial agents for proper and timely therapy.

**Key Words:** UTI, *S. saprophyticus*,

## INTRODUCTION

Urinary tract infection is one of the most common condition seen in female patients in general practice<sup>3</sup>. These infections affect 50% of women at least once in their lives, and more than 20% of infections are resistant to trimethoprim and cephalosporins and 50% to amoxicillin<sup>4</sup>.

*Staphylococcus saprophyticus* was the second most common cause of UTI in young sexually active females without known pre-existing kidney disease or preceding manipulation of the urinary tract. If bacteria are present on the vaginal introitus and urethra, sexual intercourse can facilitate inoculation of bacteria into the bladder by factors such as spermicides<sup>5</sup> The organisms were rarely found as a contaminant in urine cultures. Simple adequate laboratory identification may be based on resistance to novobiocin (disc diffusion test), absence of hemolysis and coagulase and intense pigment production<sup>6</sup>.

The management of uncomplicated symptomatic UTI in the female population has been the subject of several randomized controlled trials. Most studies exclude the very elderly and focus on the younger adult population. UK guidelines advocate that Trimethoprim should be used as the first-line antibiotic in uncomplicated symptomatic UTI in females<sup>7,8,9</sup>.

## MATERIALS AND METHODS

The urine specimens were obtained from Nephrology, Urology and Gynecology / Obstetric and outpatient departments of JPMC, Karachi during the period of May 2003 to May 2005. Two hundred and fifty female patients between the ages of 18 – 70 years were included in this study. All had having symptoms suggestive of UTI and not taking any chemotherapeutic agents. Conventional identification methods based on biochemical characteristics can efficiently identify *S. saprophyticus*<sup>10</sup>. The patients of all ages were divided into the following groups:

Group 1 = 18-28 years

Group 2 = 29-39 years

Group 3 = 40-50 years

Group 4 = 51-61 years

Group 5 =  $\geq 62$  years

### Bacteriological Methods

On receiving the urine specimens from the patients, they were immediately refrigerated at 4 to 6°C to avoid contamination and then processed for culture within 2-3 hours of collection.

### Urine culture

Urine was inoculated onto blood agar and CLED agar by means of Calibrated loops (0.01 ml). The plates were then incubated at 37°C for 24 hours. Count of  $\geq 10^5$

bacteria/ml in pure culture was considered as significant in symptomatic patients.

### Other bacteriological Methods

The coagulase test was performed as a slide test method. The test for DNAs activity was done on DNAs agar (Oxoid). The glucose fermentation test was performed and found positive for it. Beside this Novobiocin sensitivity test was also performed accordingly, as the strain was resistant. So the organism was found to be *Staphylococcus saprophyticus*. All the biochemical tests are shown in table 4.

## RESULTS AND OBSERVATIONS

For the period of three years, total 250 female patients were contacted who were complaining of symptoms of urinary tract infection (UTI). Out of 250 female patients, 175 (70%) patients yielded significant bacteriuria i.e.  $\geq 10^5$  bacteria/ml (Table 3). The frequency of *Staphylococcus saprophyticus* among bacteriuric females in different age groups showed great variation as shown in table 1. It was highest in the groups 18-28 years and 29-39 of age (36% and 28% respectively). Ultimately the frequencies decrease as the age of the patient increases.

**Table No.1: Distribution of urinary tract infection cases according to age in female patients**

Name of organism	18-28 years	29-39 years	40-50 years	51-61 years	$\geq 62$ years
Staph. Saprophyticus	10 (36%)	8 (28%)	05 (18%)	03 (11%)	02 (7%)

**Table No. 2: Antimicrobial sensitivity (%) of *staphylococcus saprophyticus***

Drugs	Sensitive	Resistant
Ampicillin (10 $\mu$ g)	80.00	20.00
Ceftriaxone (30 $\mu$ g)	65.50	34.50
Nitrofuradantoin (30 $\mu$ g)	100.00	0.00
Cephalothin (30 $\mu$ g)	100.00	0.00
Ceftazidime (30 $\mu$ g)	66.60	33.33
Trimethoprom (5 $\mu$ g)	33.33	66.67
Cefotaximne (30 $\mu$ g)	69.50	30.50
Tetracycline (30 $\mu$ g)	60.00	40.00
Augmentin (20/10 $\mu$ g)	90.00	10.00

**Table No.3: Distribution of bacterial growth from urine of female patients with urinary tract infection**

Groups	No. Tested	Positive Culture	
		Total	Percent
Female	250	175	70.00
Male	250	75	30.00

*Staphylococcus saprophyticus* grow readily on blood agar and produce somewhat irregular yellow white colonies. *Staphylococcus epidermidis* developed distant, white colonies on the same medium. All were coagulase and DNAs negative. No growth occurred on

MacConkey's agar. All strains were resistant to novobiocin, i.e. the zones of inhibition from a 5 $\mu$ g novobiocin disc was  $< 16$  mm in diameter. For novobiocin sensitive *Staph. epidermidis*, on the other hand, the zone of inhibition were  $\geq 25$  mm in diameter. The susceptibility of *Staph saprophyticus* to antibiotics is summarized in table 2. They were highly sensitive to Ampicillin (80%), Nitrofuradantoin (100%), Cephalothin (100%) and Augmentin (90%). Some strains were resistant to Ampicillin (20%), Ceftriaxone (34.5%), Trimethoprim (66.67%), Ceftazidime (33.3%), Cefotaxime (30.5%), Tetracycline (40%) and Augmentin (10%).

Table 3 shows the distribution of bacterial growth from urine of female patients with UTI from total 500 urine specimens only 250 samples from female were tested. Out of these 250 urine samples only 175 were positive culture i.e. 70%. While table 4 shows the biochemical tests for *Staphylococcus saprophyticus*.

**Table No.4: Biochemical tests for *staphylococcus saprophyticus***

Coagulase	Catalase	DNase	Mannitol	Sucrose	Novobiocin (5 $\mu$ g disc)
-ve	+ve	-ve	+ve	-ve	Resistant

**Table No.5: Distribution of associated symptoms of UTI in female patients**

Symptoms	Female	Percentage
Frequency	142	81
Burning micturition	131	75
Flank pain	121	69
Dysuria	66	38
Pyuria	36	20
Haematuria	35	20

**Table No.6: Urinary Pathogens Isolated from female patients complaining of symptoms of urinary tract infection (N=175)**

Urinary Pathogen	Positive	Percentage
<i>Escherichia coli</i>	55	31.42
<i>Staphylococcus saprophyticus</i>	28	16.00
<i>Klebsiella</i>	25	14.28
<i>Proteus</i>	18	10.20
<i>Staphylococcus epidermidis</i>	20	11.42
<i>Staphylococcus aureus</i>	16	9.14
<i>Pseudomonas</i>	10	5.71
<i>Enterococci</i>	01	0.69
<i>Enterobacter</i>	02	1.14

Table 5 shows the distribution of associated symptoms of UTI in female patients. Females who suffered from pyuria and haematuria were 20% each.

Finally table 6 shows the urinary pathogens isolated from female patients complaining of symptoms of urinary tract infection. This table also shows *Staphylococcus saprophyticus* and is the second most common urine isolate.

## DISCUSSION

The study was conducted in the Department of Microbiology, BMSI, JPMC, Karachi. In this study 70% of female and 30% male patients having symptoms of UTI were found to have significant bacteriuria as shown in Table 3. The higher incidence of UTI in female patients as compared to male patients is similar to those found in the study carried out by Thomas<sup>11</sup>.

In present study the second most common urine isolate found in females was *Staph. saprophyticus* (16%) as shown in Table 6 which is according to Nathaniel<sup>12</sup> who reported that *Staphylococcus saprophyticus* (17%) is the second most leading cause of UTI among females during child bearing age. This study also correlates with the present study. Similar reports have been published by various workers. Bailey<sup>13</sup> isolated 16.7% *Staphylococcus saprophyticus* from urine of women of child bearing age, and Smith et al.<sup>14</sup> found that 14.28% of UTI in females of child bearing age were caused by *Staphylococcus saprophyticus*. Wallmark et al<sup>5</sup> reported that the prevalence of *Staphylococcus saprophyticus* UTI in females was 22% and the incidence being higher in the younger age group i.e. between the ages of 16 and 25 years which was 41.7%. In my study in the age group 18-28 years, the percentage of the infected females, we came across was 36% and in the age group 29-39 years the percentage of the infected females were 28% as shown in Table 1. Hence all the above studies correlate with that of mine.

## CONCLUSION

*Staphylococcus saprophyticus* is the second most common bacteria as an etiological agent of urinary tract infection in females of child bearing age but it is a rare urinary pathogen in the male population. It has been observed that *Staphylococcus saprophyticus* was seen to be sensitive to most of the antimicrobial agents commonly used in UTI. It is therefore concluded that when *Staphylococcus* is isolated from the urine, it should not be ignored as a contaminant but sensitivity pattern must be seen to commonly use antimicrobial agents for proper and timely therapy.

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