



## RESEARCH ARTICLE

### A STUDY ON URINARY STAPHYLOCOCCI AS UROPATHOGENS AT A TERTIARY CARE HOSPITAL

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#### ABSTRACT

**Background:** Staphylococci as a cause of UTI is not uncommon. But studies related to their association with UTI and their resistance patterns are limited. Therefore this study was undertaken to know the rate of isolation of urinary staphylococci with special reference to methicillin resistant strains.

**Material & Methods:** Urine samples collected from clinically suspected UTI cases were processed and those samples which yielded staphylococci were included in the study. Their antibiogram was determined by Kirby-Bauer disc diffusion method.

**Results:** Of the 3170 urine samples processed 1426 were culture positive for various organisms. A total of 273 urinary staphylococci were obtained. 64 of them were *Staphylococcus aureus* and 209 were Coagulase Negative Staphylococci (CONS), constituting 4.5% and 14.7% of the total isolates. 17.2% of those urinary staphylococci were methicillin resistant.

**Conclusion:** This study shows the rate of isolation of urinary staphylococci and their tendency towards resistance.

#### INTRODUCTION

Urinary tract infection (UTI) is a common, distressing and occasionally life-threatening condition, (Kasi Visweswaran, 2012), affect men and women of all ages and vary dramatically in their presentation and sequelae. They are a common cause of morbidity and can lead to significant mortality (Anthony, 2012). It is estimated that 150 million patients are diagnosed with UTI yearly (Hiep T. Nguyen, 2011). The vast majority of urinary tract infections are caused by a single organism from a very limited spectrum of bacteria. In uncomplicated cystitis, the organism is almost always *Escherichia coli* or *Staphylococcus saprophyticus*, where as in complicated cases the spectrum is more diverse, encompassing several enterobacteriaceae and gram positive microorganisms such as enterococci. Polymicrobial infections occur virtually exclusively in complicated cases, especially in patients with chronic indwelling catheters (Soren, 2005). *Escherichia coli* by far the most common cause of UTI's accounting for 85% of community acquired and 50% of hospital acquired infections (Kasi Visweswaran, 2012). Other gram negative enterobacteriaceae, including proteus, klebsiella and gram positive cocci are responsible for remainder of cases. Among gram positive cocci CONS account for majority followed by *Staphylococcus aureus* and enterococci species. (Slack, 2007.) Accurate diagnosis and treatment of a UTI is essential to limit its associated morbidity and mortality and avoid prolonged or unnecessary use of antibiotics (Hiep, 2011). However development of more powerful antimicrobial agents allows improved and less morbid treatment of UTI but at the same

time the infecting organisms are becoming more and more resistant to routine antimicrobial agents and more problematic to treat, with fewer agents from which to select. In 1993 Calvin Kunin referred to this problem as a "worldwide calamity" resulting from bacterial genetic change causing resistance and population mobility. Most of the studies on UTI are usually on the gram negative enterobacteriaceae and studies related to gram positive bacteria and their susceptibility pattern are less frequently found in published literature. Hence this study was undertaken to know the rate of isolation of *Staphylococcus aureus* and CONS among all urinary isolates and their resistance patterns with special reference to methicillin resistant strains.

#### MATERIALS AND METHODS

This study was done over a period of 1 year from Jan 2014 to Dec 2014 in the Department of Microbiology at Alluri Sitaramaraju Academy of Health Sciences. This study included urine samples from clinically suspected UTI patients. Both inpatients and outpatients of all age groups and both sexes. Only those samples that showed growth of *Staphylococcus aureus* and Coagulase negative staphylococci were included in the study and those samples that showed growth of other organisms were excluded from the study. All the samples were collected in a universal container. Specimens were screened by preliminary Gram's stain and then inoculated on blood agar and MacConkey's agar. *Staphylococcus aureus* and CONS were then identified by Gram stain, catalase, coagulase test, mannitol fermentation and characteristic golden yellow pigment of *Staphylococcus aureus* (Baird, 2008 and Patricia M. Tille, 2014).

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**Antimicrobial susceptibility testing (AST)**

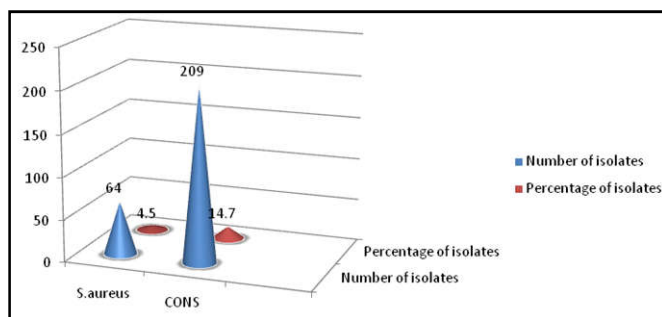
Was performed by Kirby-Bauer disc diffusion method as per CLSI guidelines on Muller-Hinton plates. Reduced susceptibility to cefoxitin (30µg) disc with zone sizes ≤ 21mm for staphylococcus aureus and ≤ 24mm for CONS was used as a screening method for MRSA (CLSI, 2012).

**RESULTS**

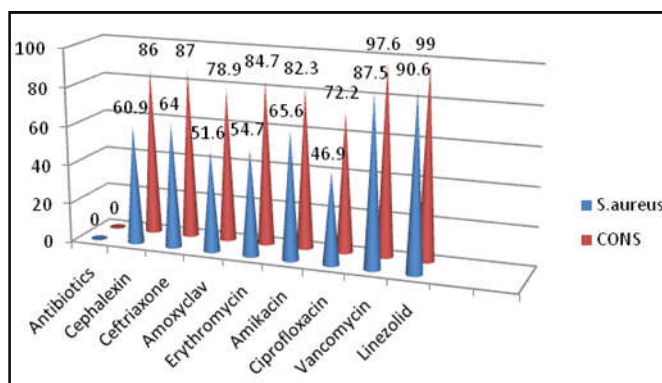
Of the 3170 urine samples received for culture and sensitivity, 1845 were outpatients and 1325 were inpatients. A total of 1426 samples showed growth of various bacteria. As reported in the literature Escherichia coli was the predominant organism isolated. A total of 273 urinary isolates of staphylococci were obtained in this study. Of them 64 were identified as Staphylococcus aureus and 209 were identified as CONS. Distribution and isolation rate of various organisms from the urinary samples is shown in Table 1. Culture positivity of urine samples in our study was 1426 (44.9%). Distribution of urinary staphylococci is shown in chart 1. Out of the total 273 staphylococcal isolates, 64(4.5%) were S.aureus and 209 (14.7%) were CONS. Of the 273 urinary staphylococci 47 (17.2%) were methicillin resistant staphylococci. 22(34.8%) were methicillin resistant staphylococcus aureus and 25(11.2%) were methicillin resistant CONS.

**Table 1. Distribution of urinary samples**

	Samples	Culture positives
Inpatients	1325	605
Outpatients	1845	821
Total	3170	1426



**Chart 1. Distribution of urinary staphylococci**



**Chart 2. Shows the antibiotic sensitivity pattern of urinary staphylococci**

**DISCUSSION**

UTIs are among the most common bacterial infections that lead patients to seek medical care. Advances in our understanding of the pathogenesis of UTI, the development of new diagnostic tests and the introduction of the new antimicrobial agents have allowed physicians to appropriately tailor specific treatment for each patient. The etiological agents have not changed their rank order significantly but their susceptibility patterns to antimicrobials has much geographical variability and also keep changing with time. As in other studies Escherichia coli was the predominant organism in this study also. Urinary staphylococci accounted for 19.1% of all the urinary isolates. Of them staphylococcus aureus was the causative agent in 4.5% of the cases which is similar to Ajanta G S *et al* (2011), and Opera Bolance.O.*et al.* (2013) While Nwoire A. *et al* (2013) noted a higher rate of urinary Staphylococcus aureus isolation compared to the present study.

In this study Coagulase negative staphylococci was the causative agent in 14.7% of the cases which is in comparison with that reported by Sarathbabu *et al* (Sarathbabu, 2013) and slight lower than that reported by Changdeo.S.Aher *et al.* (2014) 17.2% of urinary staphylococci in the present study were methicillin resistant. Of them 34.8% were methicillin resistant staphylococcus aureus which is similar to the one reported by Ghamba PE *et al.* (2012). This study also revealed that 11.2% of urinary CONS were methicillin resistant coagulase negative staphylococci (MRCONS), while Manijeh Mehdiyad *et al* (2008) reported 57.96% which is quiet higher than that reported in the present study. In this study urinary staphylococci showed higher sensitivity to vancomycin and linezolid and moderate sensitivity to ciprofloxacin, erythromycin and amoxyclav.

**Conclusion**

This study reveals the frequency of occurrence of urinary staphylococci and their tendency towards antibiotic resistance. It indicates that these organisms still play a major role as uropathogens. Drug resistance is a major problem of late and has much geographical variability. Therefore appropriate therapy should be based on local hospital antibiograms for which periodic evaluation of these data are required so as to limit the development of antibiotic resistance. This small study will help clinicians in our tertiary care center to reduce drug resistance among uropathogens and to select appropriate antibiotics for the treatment of patients.

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