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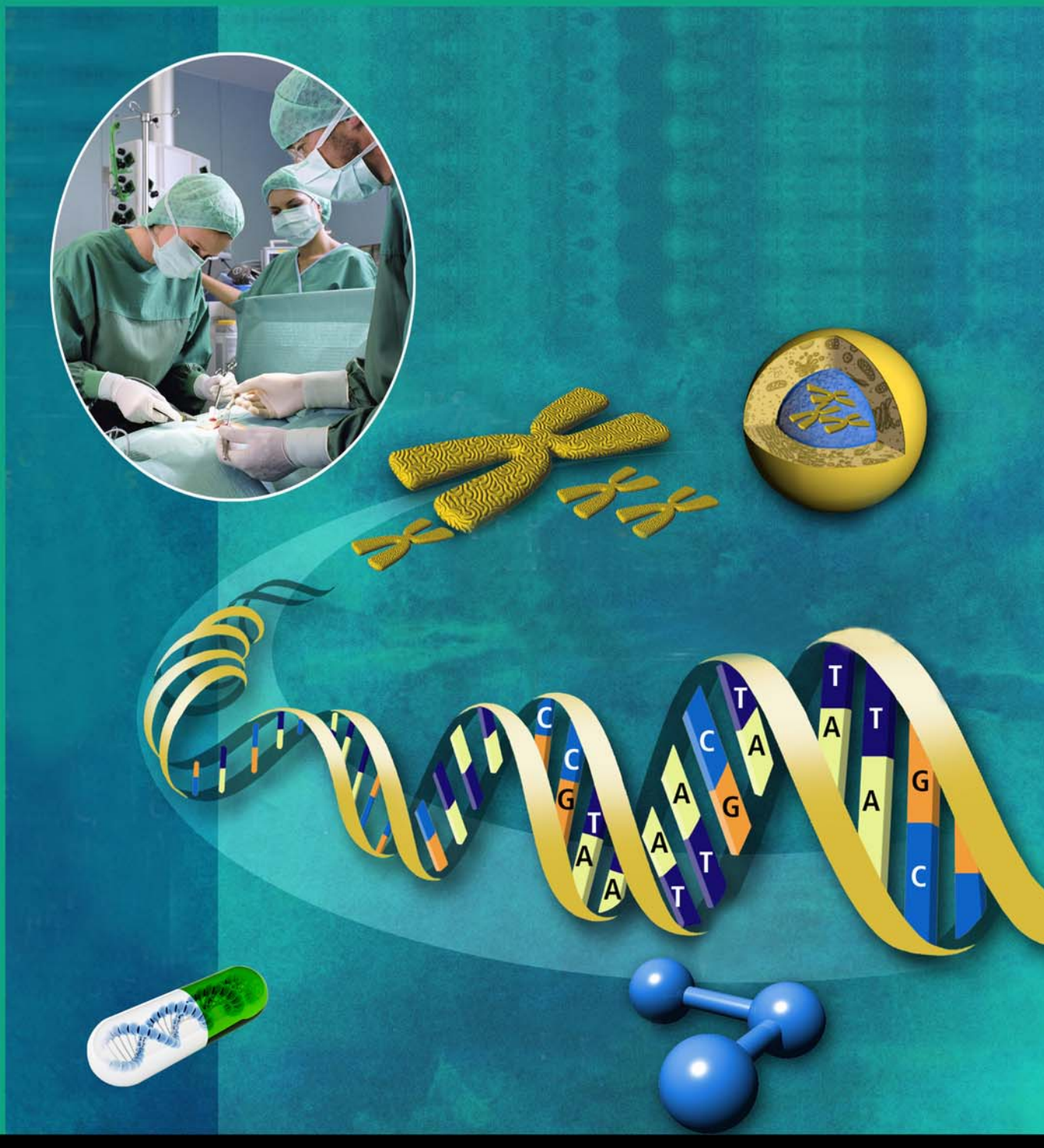

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Research Paper

PREVALENCE OF MRSA AS UROPATHOGEN IN A TEACHING TERTIARY CARE HOSPITAL OF NORTH INDIA

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UTI is one of the most common infectious diseases in clinical settings. Though *Escherichia coli* is the most frequently isolated pathogen, the frequency of *Staphylococcus aureus* has increased over time along with the corresponding increase in the occurrence of MRSA. The knowledge of prevalent strains of MRSA and their antibiotic susceptibility pattern is important to determine the best empiric treatment option. This study was designed to determine the prevalence and antimicrobial sensitivity profile of MRSA among uropathogens. A total of 38 *S. aureus* isolates from 1075 urine samples were studied for the detection of methicillin resistance using 30 µg cefoxitin disc as per CLSI guidelines. Antimicrobial sensitivity of MRSA isolates was determined against commonly recommended antibiotics. Out of 38 *S. aureus* isolates, 14 (36.84) were found to be methicillin resistant. Linezolide (100%) and nitrofurantoin (78.57%) were found to be most effective drugs against MRSA isolates. Amoxyclav (48%), pristinamycin (7.14%) and co-trimoxazole (7.14%) were the least effective drugs. All strains (100%) studied were resistant to doxycycline and norfloxacin. In our geographical area cotrimoxazole, doxycycline and norfloxacin should no longer be considered as the first line drugs. Nitrofurantoin and amoxiclav can be used as an alternative drug only after the sensitivity testing. Linezolide can be kept as reserve drug for the treatment of complicated UTI. We suggest strict practice of infection control measures and antimicrobial stewardship program, to contain these strains.

Keywords: MRSA, Uropathogens, Linezolide, Antimicrobial resistance, *S. aureus*

INTRODUCTION

Urinary Tract Infection (UTI) is one of the most common infectious disease, both in the community as well as in hospital settings, affecting almost 10% of people once during their life time. Incidence of UTI is second only to upper respiratory infections. A wide variety of microorganisms are able to infect urinary tract but still bacterial agents are the leading uropathogens. The UTI may be asymptomatic or symptomatic human illness. This disease is rapidly responsive to the routine antibiotic therapy but, the recent emergence of different resistant strains, viz., methicillin resistant *Staphylococcus aureus*

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(MRSA), Extended Spectrum β-lactamase (ESBL) producing pathogens and Vancomycin Resistance *Enerococcus* (VRE) have threatened the continued effectiveness of the antimicrobials. If such infections are left untreated they may result in serious complications like secondary bacteremia and sepsis leading to rise in morbidity and mortality. Management of such complicated UTIs may lead to prolonged hospital stay, expansion of health care cost and loss of working days. Such conditions are likely to improve significantly with the immediate use of empirical antimicrobial agents against such notorious strains (Tice, 1999; Clarridge *et al*., 1998; Dalela *et al*., 2012; Shigemura *et al*., 2005; Alzohairy and Khadri , 2011; and Bahadin *et al*., 2011).

Prevalence of these resistance strains vary geographically, it is necessary to avail information on prevailing levels of antimicrobial resistance among common urinary pathogen. Formulation of institutional antibiotic policy will guide the clinicians in choosing appropriate empirical and definitive therapeutic agent for a particular geographical area (Tice, 1999; Clarridge *et al*., 1998; Aggarwal *et al*., 2009; Shigemura *et al*., 2005; Alzohairy and Khadri , 2011; and Bahadin *et al*., 2011). Plenty of data is available assessing the resistance pattern among gram negative bacilli causing UTI but, there is scarcity of data eluci-dating resistance spectrum among *S. aureus* as uropathogen from this part of globe (Dalela *et al*., 2012). To address this issue, we assessed the prevalence of MRSA strains as uropathogens and their antimicrobial susceptibility pattern.

MATERIALS AND METHODS

The present study was conducted in the Department of Microbiology which is a part of 1,300 bedded teaching tertiary care hospital in North India. A total of 1075 urine samples received in the microbiology laboratory from both outdoor and indoor patients were processed following standard protocol. All the gram positive cocci isolated in significant numbers were identified by standard microbiological procedures (Duguid *et al*., 1989).

Methicillin resistance was determined among all *S. aureus* using 30 µg cefoxitin disc as per Clinical and Laboratory Standards Institute (CLSI) guidelines. Zone diameter of more than or equal to 22 was considered as cefoxitin sensitive (MSSA) and less than or equal to 21 was considered as cefoxitin resistant (MRSA) (Clinical and Laboratory Standards Institute, 2009; and Bauer*et al*., 1996).

Antimicrobial susceptibility of MRSA isolates was done by disc diffusion method and results were interpreted according to CLSI guidelines using *S. aureus* ATCC 25923 as control strain. Antimicrobials used were nitrofurantoin (300 µg), cotrimoxazole (1.25/23.75 µg), doxycycline (30µg), norfloxacin (10 µg), linezolide (30 µg), amoxyclav (20/10 µg) and pristinamycin (15 µg) (Clinical and Laboratory Standards Institute, 2009; and Bauer *et al*., 1996). All MRSA detection tests and antimicrobial susceptibility tests were done on Mueller Hinton Agar (MHA). MHA and susceptibility discs were procured commercially from Hi-Media (Mumbai, India).

RESULTS

Out of 1075 samples, 210 urine samples yielded significant growth. Among these 210 isolates, 165 were gram negative bacilli and were excluded from the study. Out of the remaining 45 (21.42%) gram positive bacteria and yeast cells isolated, 38 (18.09%) were *S. aureus*. Methicillin resistance was found in 14 (36.84%) *S. aureus* isolates Figure 1. Linezolide (100%) and nitrofurantoin (78.57%) were found to be most effective drugs

against MRSA isolates. Amoxyclav (48%), pristinamycin (7.14%) and cotrimoxazole (7.14%) were least effective drugs. All the strains (100%) studied were resistant to doxycycline and norfloxacin Figure 2.

DISCUSSION

UTI remains a worldwide therapeutic problem. Early diagnosis and prompt antimicrobial treatment are required to minimize complications and in shortening the disease course. In recent years, bacterial resistance to various antibiotics has raised dramatically leaving physicians with few therapeutic options. Infectious Diseases Society of America (IDSA) recently recommended that each hospital should determine the local establish mechanisms to resistance rates among the uropathogens and that the standard antimicrobial regimens for empirical treatment of UTIs should be assessed periodically in the light

Figure 1: Distribution of Various Organisms Isolated from Urine

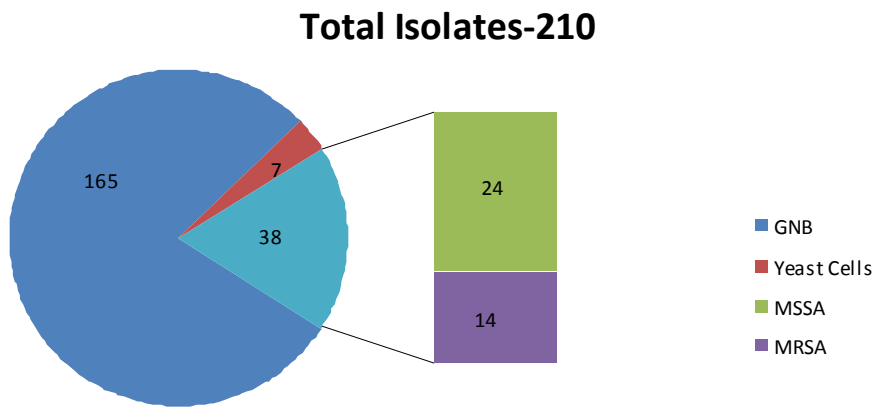
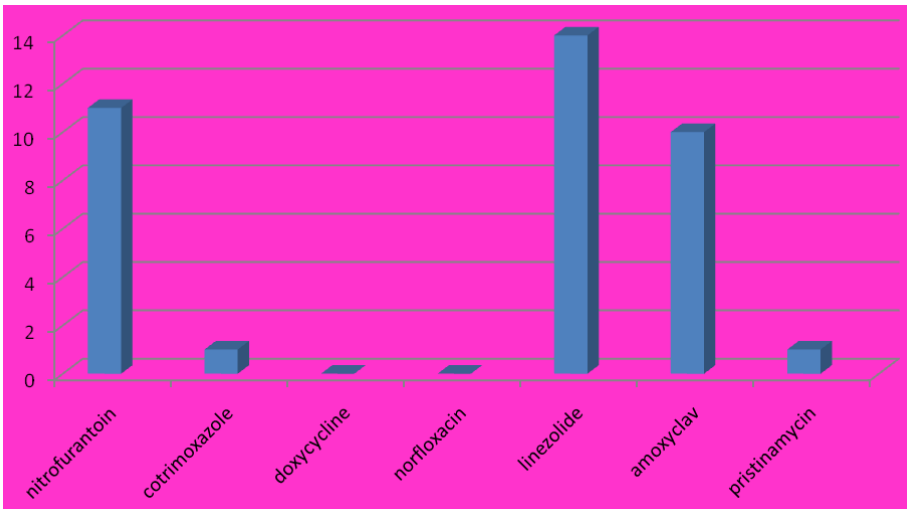


Figure 2: Antimicrobial Susceptibility of MRSA Isolates



of changing susceptibility pattern. Attempts have been made by various authors to assess the antimicrobial susceptibility pattern of uropathogens in specific geographical locations but, most of the studies have focused largely on resistance pattern of gram negative bacilli (Tice, 1999; Clarridge *et al*., 1998; Dalela *et al*., 2012; Shigemura *et al*., 2005; Alzohairy and Khadri , 2011; and Bahadin *et al*., 2011). To the best of our knowledge there is no published data describing antimicrobial susceptibility of MRSA as uropathogen from this part of the globe.

In the present study, out of total 210 urinary isolates, 38 (18.09%) were *S. aureus*. Though gram negative bacteria are constantly predominating as uropathogens some authors have observed increase in isolation rate of *S. aureus* from 1.3% to 5.5% in 10 years duration (Shigemura *et al*., 2005). It was observed that 14 (36.84%) *S. aureus* isolates were resistant to methicillin. Some investigators have reported higher prevalence(41.4%) of MRSA in the urinary isolates (Dalela *et al*., 2012). Other workers have reported a quite lower prevalence (14%) of MRSA (Rajuduraipandi *et al.,* 2006). This geographical differ-ence may be due to different patterns of antibiotic use and differences in the selection of the organi-sms for the study.

In our study a high rate of drug resistance was observed against the MRSA isolated as uropathogens. None of the MRSA isolate was found sensitive to norfloxacin and doxycycline. IDSA recommends use of a three day course of cotrimoxazole, as a first line drug, except in institutes with a high rate of drug resistance (>10-20%) among uropathogens (Rubin *et al*., 1992). In our study a large proportion of MRSA isolates (92.86%) were found to be resistant to cotrimoxazole. So, none of these drugs could be included in our institutional antibiotic policy for empirical therapy. Similar findings have also been reported by other workers (Dalela *et al*., 2012). Nitrofurantoin and amoxiclav were two drugs with good sensitivity (>70%) that can be used only after only after the sensitivity testing. All MRSA isolates were sensitive to linezolide in our study, which should be kept as reserved drug for the treatment of complicated UTI as reported by other authors (Dalela *et al*., 2012).

MRSA isolates are prevalent in our institute as uropathgens. It is essential to report these isolates along with the routine susceptibility testing, as this will help clinicians in selecting out proper antimicrobial agent. We suggest strict practice of infection control measures and antimicrobial stewardship program, to contain these strains.

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