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ISOLATION AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF ENTEROCOCCI FROM URINE SAMPLES

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ABSTRACT

The study was conducted to see the emergence of enterococci as uropathogens and their susceptibility pattern. *Enterococcus* spp., although less common, has been recognized as an important uropathogen. They are the normal flora of the human gastrointestinal tract and are also important nosocomial pathogens. These are gram positive cocci arranged in angulated pairs. The center for disease control and prevention's national nosocomial surveillance survey listed *enterococci* as the second most common cause of nosocomial uti (Mendiratta *et al.*, 2008). Because of the indiscriminate use of antibiotics *enterococci* have acquired resistance against several classes of antimicrobial agents. The overall incidence of *enterococci* among urinary tract infections was 10.05% in this region. In 97% of the cultures a single uropathogen was identified. The linezolid has the 100% susceptibility followed by vacomycin (89.47%). The rising antibiotics resistance is worrisome as the commonly used antibiotics for the treatment of nosocomial uti are less effective. It has been considered a threat to the public health problem worldwide.

Keywords: UTI-Urinary Tract Infection, AST-Antibiotic Susceptibility Testing, CDC-Center for Disease Control

INTRODUCTION

Urinary tract infection is one of the most common infectious conditions in clinical practice and an important cause of nosocomial infection. It is one of the most common bacterial illnesses associated with leading cause of morbidity and health care expenditures in persons of all ages (Kunin, 1997). The risk factors for *Enterococcal* UTI include old age, diminished host immunity, the use of broad-spectrum antibiotics and indwelling catheters (Ali, 2014).

Gram-negative rods and *Staphylococcus saprophyticus* are the most frequent infecting organisms of the urinary tract (Kunin, 1997; Kucheria *et al.*, 2005). *Enterococcus* spp., although less common, has been recognized as an important uropathogen (Kunin 1997; Ronald A 2002). *Enterococci* are Gram positive cocci arranged in angulated pairs. They are the normal flora of the human gastrointestinal tract and are also important nosocomial pathogens (Sonal, 2003). The genus *Enterococcus* includes more than 29 species. According to recent studies 80% of clinical isolates are *Enterococcus faecalis* and is followed by *E. faecium* (10-15%). *E. durans*, *E. avium*, *E. raffinosus*, *E. gallinarum*, *E. casseliflavus*, and *E. hirae* are the rare species reported in India (Sonal, 2003; Parvati, 2003). The Center for Disease Control and Prevention's National Nosocomial Surveillance Survey listed *Enterococci* as the second most common cause of nosocomial UTI (Mendiratta, 2008). Because of the indiscriminate use of antibiotics *Enterococci* have acquired resistance against several classes of antimicrobial agents, including chloramphenicol, tetracyclines, glycopeptides, quinolones and nitrofurantoin (Pogue, 2007; Mohanty, 2005). There is also an emergence of acquired resistance to vancomycin, very limited numbers of antibiotic are available for treating *Enterococcal* infections and it is crucial to provide accurate and complete description of antimicrobial susceptibility pattern and current possibility for treatment of *Enterococcal* urinary tract infections. Recent years have witnessed an increasing interest in *Enterococci* not only because of their ability to cause serious infections but also because of increasing resistance to many antimicrobial agents (Wavare Sanjay, 2015). The irrational use of antibiotics in our set up has immensely contributed to the

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antimicrobial resistance and emergence of multidrug resistant urinary isolates (Kahlmeter, 2003). The purpose of this study was to analyze urinary tract infections caused by *Enterococcus spp.* and their antimicrobial susceptibility pattern, isolated from urine samples as it would help in making optimal empirical choices.

MATERIALS AND METHODS

The study was conducted in the Microbiology Department of Bhagat Phool Singh Government Medical College for women, Khanpur Kalan, Sonapat, Haryana, India. A prospective study was conducted over a period of 6 months from January 2015 to June 2015. During the course of study 1950 patients with complaints of UTI were enrolled in the study. Mid-stream urine samples were collected in a sterile screw capped containers. Urine microscopy was done for pus cells and was cultured on blood agar & Mac-conkey agar (Cappuccino, 1996). The plates were incubated aerobically at 37°C for 24-48 hours. Any significant growth obtained was identified using general appearance of the colonies and characters like pigment production, hemolysis and negative catalase, growth in 6.5% sodium chloride broth and Esculin hydrolysis. Gram stain was done to see for the characteristic morphology of Gram positive cocci in pairs or short chains (Murray, 2011). Antimicrobial susceptibility testing of the isolates was carried out using Kirby-Bauer disc diffusion method on Mueller-Hinton agar as recommended by Clinical and Laboratory Standards Institute (CLSI). Isolates were interpreted as susceptible or resistant according to the sensitivity zones of the particular antimicrobial as recommended by CLSI (CLSI, 2012).

RESULTS & DISCUSSION

The present study concludes that the overall incidence of *Enterococci* among urinary tract infections is 10.05% in this region, out of 1950 urine samples, 1015 specimens yielded growth and of these 102 were identified as *Enterococci*. In 97% of the cultures a single uropathogen was identified. The highest incidence was seen in the age group of 21 to 40 years comprising 47.05% each. The incidence of *Enterococcal* infections among males (24.5%) and females (75.5%) (Table -1). Linezolid has the 100% susceptibility followed by vancomycin (89.47%) (Table -2).

Table 1: Distribution of Patients with Respect to Age and Sex

Age (Years)	1-20	21-40	41-60	61-80	Total	%
Male	10	05	03	7	25	24.5
Female	06	43	21	7	77	75.5
Total	16	48	24	14	102	

Table 2: In Vitro Susceptibility of the *Enterococcal* Isolates to Different Antimicrobials (n=102)

S. No.	Antibiotics	Susceptible (↓)	Resistant (↑)
1	Linezolid	100%	00%
2	Vancomycin	89.47%	10.53%
3	Nitrofurantoin	36.84%	63.16%
4	Doxycycline	31.57%	68.43%
5	Pristinomycin	21%	79%
6	Norfloxacin	21%	79%
7	Ofloxacin	15.78%	84.22%

Urinary tract infections are the most common cause of infectious disease produced by *Enterococci*, both within and outside hospital settings (Morrison, 1986; Lemoine, 1987; Courvalin, 2006). Despite the fact that *Enterococci* have been considered to be relatively low virulent, in the past few years these organisms, among all nosocomial pathogens, have emerged as a significant concern. Data indicates that incidences of nosocomial *Enterococcal* infections have been increasing, and *Enterococci* have become the second

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leading cause of nosocomial infections (Murray, 1998). The reported frequency of *Enterococcal* urinary tract infection is variable in the different studies as Bagshaw *et al.*, (2006) recorded *Enterococci* as the third most frequent uropathogen in intensive care unit-acquired urinary tract infections after *E. coli* and *P. aeruginosa*.

In the present study *Enterococcus* reported as commonest among the Gram positives. *Enterococcal* isolates were 100% susceptible to linezolid which is compatible with Ali *et al.*, (2014) and 89.47% were susceptible to vancomycin. This correlates with the study conducted by Bhat *et al.*, (1997). The majority of VRE are encountered in *E. faecium*, but of late strains of *E. gallinarium* and *E. faecalis* resistant to vancomycin have also been reported (Ali *et al.*, 2014).

Emergence of vancomycin resistance was reported in few more studies (Parvati, 2003; Desai, 2001). Gordon *et al.*, 2000, Udo *et al.*, 2003, (99.6%) and Miskeen *et al.*, 2002 (100%). An antimicrobial which has given increasingly encouraging results is linezolid as all our isolates (100%) remained susceptible to this antimicrobial. It is imperative that clinical trials of linezolid are undertaken for the patients suffering from *Enterococcal* UTIs so that effective empirical treatment strategy could be chalked out for this antimicrobial.

Conclusion

Enterococci have emerged from being harmless commensals to versatile lethal pathogens. The rising antibiotics resistance is worrisome as the commonly used antibiotics for the treatment of nosocomial UTI are less effective. It has been considered a threat to the public health problem worldwide. This important issue is to be addressed by the policy makers to formulate a strict antibiotics prescription policy in our country, which would aware the practitioners and care giver to make a prudent use of antibiotics.

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