

Role of Enterococcus in Nosocomial Urinary Tract Infection In A Tertiary Care Hospital in West Bengal

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Abstract: Enterococci are one of the common causes of Nosocomial urinary tract infection (UTI) Worldwide. Objective of this cross sectional study was to identify different species of Enterococci causing nosocomial urinary tract infection in a tertiary care hospital. In addition, antibiotic susceptibility pattern of the isolated strains to set up an Empirical therapy for reduction of morbidity & mortality. Standard microbiological procedure and related automation were followed to perform the study. Out of total 369 urine samples from selected patients, 37 were culture positive (almost 10%). Out of 37 culture positive cases, Enterococci were isolated in 11 cases (29.7%). Enterococcus faecalis & Enterococcus faecium were found in five and four cases respectively. Two Enterococcus gallinarum strain was also isolated. However Escherichia coli were isolated in 19 cases (51.35%). All isolated Enterococcus gallinarum and Enterococcus faecalis were sensitive to both Benzyl penicillin and Ampicillin although all isolated Enterococcus faecium were resistant to both of the drugs. All isolates of Enterococcus faecalis and Enterococcus faecium were sensitive to Vancomycin and Linezolid but Enterococcus gallinarum isolates was Vancomycin resistant (MIC value is $\geq 32\mu\text{g/ml}$). In addition, the resistance pattern was van-A type (fingerprint was identified by VITEK 2 Advanced Expert System). All of the Enterococcus faecalis isolates were resistant to Quinupristin & Dalfopristin whereas isolated Enterococcus faecium were sensitive to those antimicrobials. All of the isolates were sensitive to Nitrofurantoin except one Enterococcus faecium isolate (MIC value = $64\mu\text{g/ml}$) was intermediately susceptible to the drug.

Keywords: Enterococcus, UTI, automation.

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I. Introduction:

Enterococci are one of the common causes of Nosocomial urinary tract infection Worldwide [1]. Enterococcus faecalis is the most prevalent isolate being associated with 80-90% of human Enterococcal infection, Enterococcus faecium ranks second and is isolated from 10-15% of infections. Other species are infrequently isolated from clinical specimens [2]. Enterococci are notorious for their resistance pattern. In vitro, Enterococci have penicillin MICs 10 to 100 fold higher than that of Streptococci [3]. In the US, >90% of isolated Enterococcus faecium are resistant to Ampicillin whereas resistance to Ampicillin is much less common in Enterococcus faecalis (4%) [4,5]. Undiagnosed and untreated Enterococcal UTI is a well known source of fatal complications such as Enterococcal bacteraemia & endocarditis especially in immunocompromised patients especially in nosocomial set up [6-8].

II. Objective

Objective of this study was to identify different species of Enterococci causing Nosocomial urinary tract infection in a tertiary care hospital. In addition, antibiotic susceptibility pattern of the isolated strains to provide appropriate treatment for reduction of morbidity & mortality. Materials and methods: This cross sectional study was performed with patients admitted in a tertiary care hospital, developing symptoms of UTI at least after 48 hours of admission. UTI cases with established non bacterial aetiology excluded from the study. The study was performed over a period of one year from the first January 2016 to the thirty first December 2016 with census population. Urine samples collected in appropriate sterile manner were screened for pus cells and bacteria. This was followed by plating on Mac-conkey's agar media (differential & partially selective media: aids in isolation of gram negative isolates, Enterococci give small pin point lactose fermenting translucent colonies), Blood agar (enriched media for Enterococci isolation, Enterococci produce mostly nonhemolytic colonies in sheep blood agar). Inoculated plates were incubated overnight at 37°C. Discrete colonies were further studied by Gram staining, tests for motility, battery of biochemical test according to Facklam-Collins scheme (Facklam and Collins, 1989) for Enterococcal speciation [7]. Isolated Enterococcus strains were preserved in glycerol broth at 4°C until tested by VITEK 2 Microbial identification system (bioMerieux) with "Advanced

Expert System” (AES) to confirm the speciation. Antibiogram was performed by disk diffusion method (modified Kirby-Bauer technique) on Muller-Hinton agar and blood agar media. MIC (Minimum Inhibitory Concentration) values of the tested antibiotics were detected by VITEK 2 with “Advanced Expert System” (AES) as per CLSI guideline. With its ability to provide accurate “fingerprint” recognition of bacterial resistance mechanisms and phenotypes, the Advanced Expert System (AES) is a critical component of VITEK 2 technology [9]. Results were analysed according to standard statistical method.

III. Results:

Out of total 369 urine samples from selected patients, 37 were culture positive (almost 10%). Out of 37 culture positive cases, Enterococci were isolated in 11 cases (29.7%). *Enterococcus faecalis* & *Enterococcus faecium* were found in five and four cases respectively. Two *Enterococcus gallinarum* strain was also isolated. However *Escherichia coli* were isolated in 19 cases (51.35%). All isolated *Enterococcus gallinarum* and *Enterococcus faecalis* were sensitive to both Benzyl penicillin and Ampicillin although all isolated *Enterococcus faecium* were resistant to both of the drugs. All isolates of *Enterococcus faecalis* and *Enterococcus faecium* were sensitive to Vancomycin and Linezolid but *Enterococcus gallinarum* isolates was Vancomycin resistant (MIC value is $\geq 32\mu\text{g/ml}$). In addition, the resistance pattern was van-A type (fingerprint was identified by VITEK 2 Advanced Expert System). All of the *Enterococcus faecalis* isolates were resistant to Quinupristin & Dalfopristin whereas isolated *Enterococcus faecium* were sensitive to those antimicrobials. All of the isolates were sensitive to Nitrofurantoin except one *Enterococcus faecium* isolate (MIC value= $64\mu\text{g/ml}$) was intermediately susceptible to the drug.

IV. Discussion:

The overall occurrence of Enterococcal infection varies across continents, countries and also within hospitals. In India, the occurrence varies from 1% to 36%. In 2003, Karmakar et al carried out a study in Mumbai in which the isolation rate of Enterococci from urine samples was 10.28% [10]. A study conducted by Kaur et al in March 2006, reported an Enterococcal isolation rate of 33% from urine samples in Haryana [11]. Agarwal et al in Lucknow showed, an isolation rate of 1.46% in diverse clinical samples [12]. Our study showed 10% of Enterococcal isolation. Similar to the studies of some other workers such as Duo et al (Kuwait, 2002) & Ford et al (UK, 1994), *Enterococcus faecalis* was the most prevalent isolate [13]. Antimicrobial susceptibility pattern revealed the fact that *Enterococcus faecalis* and *Enterococcus gallinarum* isolates were sensitive to β -lactam antimicrobials (Benzyl penicillin and Ampicillin) and Aminoglycosides (Gentamicin and Streptomycin high level synergy) suggesting use of combination therapy of β -lactams and Aminoglycosides for treatment. Fluoroquinolones (66.7% resistance) and Macrolides (55.6% resistance) should not be used empirically for treatment of Enterococcal infection. As no Vancomycin and/or Linezolid resistance was present, those two drugs were the only choice for treatment of those multidrug resistant Enterococci. Two *Enterococcus gallinarum* isolates were Vancomycin resistant (MIC value $\geq 32\mu\text{g/ml}$) & this resistance pattern was diagnosed as vanA type of resistance (by VITEK 2 system). Karmakar et al (Mumbai, 2003) found more than 20% of Enterococcal isolates were VRE, whereas Agarwal et al (Lucknow, 2008) found nearly 2% of isolates to be VRE [10,12]. Similar to other studies, in our study also, VRE isolates were susceptible to Linezolid in addition to that, surprisingly enough it was also sensitive to β -lactams and aminoglycosides (high level synergy) but it was resistant to Fluoroquinolones, Macrolides and Tetracyclines. In our study, All of the isolates were sensitive to Nitrofurantoin except one *Enterococcus faecium* isolate (MIC value= $64\mu\text{g/ml}$) was intermediately susceptible to the drug. Enterococcal susceptibility pattern to Nitrofurantoin is inconsistently reported by other workers.

V. Conclusion:

Increased level of antimicrobial resistance by different isolates of Enterococcus possesses a threat to nosocomial set up as it tends to limit treatment options. This fact demands the study of the epidemiology & Resistogram of Enterococcal urinary tract infections vividly so as to set up an Empirical therapy in health care setup for reduction of morbidity & mortality.

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