



PREVALENCE OF HIGH LEVEL AMINOGLYCOSIDE RESISTANCE AND VANCOMYCIN RESISTANT ENTEROCOCCI IN ENTEROCOCCAL ISOLATES IN A TERTIARY CARE HOSPITAL.

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ABSTRACT

Introduction: The emergence of High Level Aminoglycoside Resistance (Resistant to Gentamycin and Streptomycin) and Vancomycin Resistant Enterococci among Indoor and Intensive Care Unit admitted patient presents a serious challenge for clinicians. **Objective:** To determine Enterococcal burden in blood and urine specimens and to detect the prevalence of High Level Aminoglycoside Resistance and Vancomycin Resistant Enterococci. **Material & Methods:** One hundred ten Enterococci were isolated from blood and urine samples and processed according to standard laboratory protocol. Species identification and sensitivity was done using the VITEK 2 automated system (Biomerieux France) with the cards GPID and AST 67 respectively. **Results:** Out of 110 Enterococci isolates, 36 were from blood and 74 from urine were detected. Different Species isolated were Enterococcal faecium (59%), Enterococcal faecalis (34%), Enterococcal raffinosus (2.7%), Enterococcal gallinarum (1.8%), Enterococcal casseliflavus (0.9%) and Enterococcal duran (0.9%). Out of 36 blood isolates, 14 (38%) were found to be both High Level Gentamycin Resistant (HLGR) & High Level Streptomycin Resistant (HLSR), 10 (27%) were only HLGR and 8 (22%) were only HLSR. 20 strain (55%) of Enterococcus species isolated in blood were VRE. All VRE strains were found to be resistant to both aminoglycosides (HLAR). Among the 74 urinary isolates, 24 (34%) were found to be both HLGR & HLSR, only HLGR was observed in 20 (27%) and HLSR was observed in 11 (14%) isolates. 24 strains (34%) of Enterococcus species were found to be vancomycin resistant in urine. 23 strains out of 24 were resistant to high level of aminoglycosides. **Conclusion:** The prevalence of HLAR and VRE is very high among Enterococcus specimens from indoor/intensive care unit patients. Early species identification and antibiotic sensitivity result can help in better clinical outcome.

KEYWORDS : High Level Aminoglycoside, Vancomycin Resistant Enterococci, Enterococci

INTRODUCTION

Enterococci are gram-positive bacteria. Enterococci are normal flora of the gastrointestinal tract and female genital tract. Enterococci are important nosocomial pathogens. The most common enterococcal pathogens cause urinary tract infections, intraabdominal infections, and bacteremias. Community-acquired infections such as endocarditis, intraabdominal, and skin/soft tissue can be caused by these organisms.

Vancomycin-resistant enterococci (VRE) have been noted throughout the United States and are posing a serious problem because of the lack of effective antimicrobial therapy. The possibility exists that the vancomycin-resistant genes present in VRE can be transferred to other gram-positive microorganisms such as Staphylococcus species.

The cell wall inhibitors such as penicillin, ampicillin or vancomycin have been administered in combination with the aminoglycosides such as streptomycin and gentamycin in the treatment of serious infections caused by enterococci[1]. A synergistic effect between the cell wall synthesis inhibitors and aminoglycosides disappears in the presence of high-level resistance to aminoglycoside and causes difficulties in the treatment of severe enterococcal infections[2]. Intrinsic low level cross resistance to all aminoglycosides due to decreased uptake of antibiotics. It also exhibit acquired resistance to high level of aminoglycosides. Addition of cell wall inhibitor helps in the penetration of the aminoglycoside into bacterial cytoplasm, making intrinsically resistant enterococci, now sensitive to aminoglycosides the emergence of High Level Aminoglycoside Resistance (Resistant to Gentamycin and Streptomycin) and Vancomycin Resistant Enterococci among Indoor and Intensive Care Unit admitted patient presents a serious challenge for clinicians. Reduced susceptibility to vancomycin (VRE) interferes with the penetration of the

aminoglycoside into the bacterial cytoplasm, making synergism ineffective. Prevalence of HLAR & VRE is increasing. Early detection of HLAR & VRE in serious enterococcal infection is important for the management.

Objectives of this study are:

1. To determine Enterococcal burden in blood and urine specimens.
2. To detect the prevalence of High Level Aminoglycoside Resistance and Vancomycin Resistant Enterococci.

MATERIAL & METHODS:

The study was performed in the Microbiology laboratory of SMS medical college, Jaipur. Study population were admitted patients of all age groups at SMS Hospital, Jaipur. Urine & Blood samples were included in this study. Enterococci were isolated from positive cultures by using standard method (Gram staining, catalase reaction, bile aesculin, growth on 6.5% NaCl). Species identification and sensitivity was done using the VITEK 2 automated system (Biomerieux France) with the cards GPID and AST 67 respectively. One hundred ten Enterococci were isolated from blood and urine samples and processed according to standard laboratory protocol.

RESULTS:

Out of 110 Enterococci isolates, 36 were from blood and 74 from urine. Different Species isolated were Enterococcal faecium (59%), Enterococcal faecalis (34%), Enterococcal raffinosus (2.7%), Enterococcal gallinarum (1.8%), Enterococcal casseliflavus (0.9%) and Enterococcal duran (0.9%).

Out of 36 blood isolates twenty four (67%) enterococci in blood were e. faecium. Nine (25%) were e. faecalis and one each of them were e. casseliflavus and durans (figure 1). Out of 36 blood isolates, 14 (38%) were found to be both High Level

Gentamycin Resistant (HLGR) & High Level Streptomycin Resistant (HLSR), 10 (27%) were only HLGR and 8 (22%) were only HLSR. 20 strain (55%) of *Enterococcus* species isolated in blood were VRE. All VRE strains are resistant to both aminoglycosides (HLAR).

Faecium was species in urine also, constituting 53% of all. *E. faecalis* was 38% and *e. gallinarum* was 4% and *e. raffinosus* was 5.4% (figure 2). Among the 74 urinary isolates, 24 (34%) were found to be both HLGR & HLSR, only HLGR was observed in 20 (27%) and HLSR was observed in 11 (14%) isolates. 24 strains (34%) of *Enterococcus* species were found to be vancomycin resistant in urine. 21 out of 44 VRE strains were resistant to both Gentamycin and streptomycin. 12 were resistant to only Gentamycin and 9 to only streptomycin. Only 5% (2 VRE) were sensitive to both gentamycin and streptomycin. While 33% (21) of VSE strains were sensitive to both Gentamycin and streptomycin.

Enterococcal Species in Urine

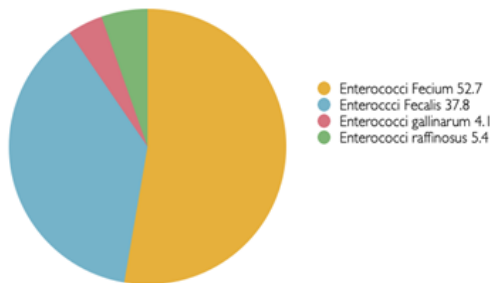


Figure 1

Enterococcal Species in Blood (36)

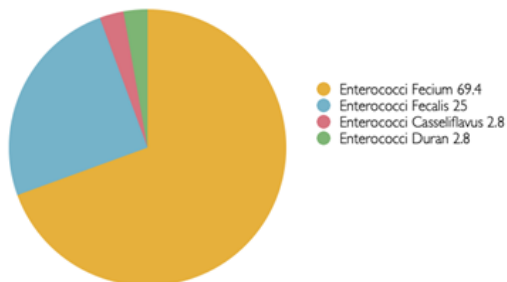


Figure 2

DISCUSSION:

In this study, the predominant enterococcal species that was recovered from blood and urine samples is *E. faecium*. Prevalence of relatively high proportion of *E. faecium* from the study setting was consistent with those reported in other Indian studies from various clinical samples (40-71%) [3,4,5,6]. *E. faecium* constituted 59% of total enterococci in our study, as against 10-15% reported in most studies in the USA, Europe, and the Middle East[7,8]. The predominance of *E. faecium* could be explained by the fact that we took samples only from hospitalized patients with serious infections.

E. faecium was the predominant species. And almost all VRE were *E. faecium*. *E. faecalis* was second most common enterococci species in this study. And all of them were VS. Almost all VRE were *E. faecium* in our study. Pattern seen in the isolates.

Many studies have also demonstrated that *E. faecium* is comparatively more resistant than *E. faecalis* [10,11,12,13]. In this study VRE strains were resistant to most of other antibiotics (Ampicillin, ciprofloxacin, Levofloxacin, Erythromycin & Nitrofurantoin).

In our study out of 36 blood isolates, 14 (38%) were found to be both High Level Gentamycin Resistant (HLGR) & High Level Streptomycin Resistant (HLSR), 10 (27%) were only HLGR and 8 (22%) were only HLSR. 20 strain (55%) of *Enterococcus* species isolated in blood were VRE. Among the 74 urinary isolates, 24 (34%) were found to be both HLGR & HLSR, only HLGR was observed in 20 (27%) and HLSR was observed in 11 (14%) isolates. 24 strains (34%) of *Enterococcus* species were found to be vancomycin resistant in urine. 21 out of 44 VRE strains were resistant to both Gentamycin and streptomycin. 12 were resistant to only Gentamycin and 9 to only streptomycin.

Jain S, Kumar Jain S, Kumar et al study demonstrated high prevalence of HLGR, HLSR, and HLAR (resistance to both gentamycin and streptomycin) among enterococci (60%, 55% and 54%, respectively). Though the detection of HLAR in hospitalized patients (92%) was high, nevertheless, occurrence of such strains in community is also evident (8%). A recent study from South India reported a low fecal carriage of 2% and 4% of HLGR and HLSR enterococci, respectively.[9] HLAR was more frequently observed in *E. faecium* isolates (71%) than other species. Previous studies on HLAR have been done almost exclusively on *E. faecalis*. In a study during 1989-1996, quite a low prevalence of *E. faecalis* isolated from blood was found to be HLGR, HLSR and HLAR (16%, 10% and 3.6%, respectively)[13]. In another study from North India in 2004, HLGR was reported in 62% of *E. faecalis* and 77% of *E. faecium*. The most worrisome fact noticed in my study was that, VRE were resistant to all other routine antibiotics as well. The VRE were having 100% resistance to ampicillin, ciprofloxacin, erythromycin, levofloxacin and nitrofurantoin. In fact, the drug of choice for VRE, Linezolid is also not spared. VRE started developing resistance against linezolid as well. There is emerging resistance for reserved antibiotics also: Quinipristine 25%, Tigecyclin 15%

CONCLUSION & IMPLICATIONS:

- The prevalence of VRE & HLAR is very high in our setup.
- The resistance to other antibiotics, particularly High level Aminoglycosides among VRE is a very serious challenge.
- These VRE are resistant to most of other antibiotics.
- Rapid and reliable identification of these antibiotic resistant organisms is crucial for patient management and infection control measures.
- Strict Infection control policies should be followed up to prevent further spread of these resistant organisms

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