

# PREVALENCE OF ENTEROCOCCI WITH HIGHER RESISTANCE LEVEL IN A TERTIARY CARE HOSPITAL: A MATTER OF CONCERN

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## ABSTRACT

**Aims:** *Enterococcus* species are major nosocomial pathogen and are exhibiting vancomycin resistance with increasing frequency. Continuous monitoring and determination of antimicrobial susceptibility pattern is a necessity. The present study aims to determine the prevalence and susceptibility pattern of *Enterococci* in tertiary care hospital.

**Methods and Material:** Total of 92 enterococcal strains isolated from various samples were identified and speciated as per scheme of Facklam and Collins. Antibiotic susceptibility was determined for various drugs by Kirby bauer disc diffusion method. Results were interpreted as per CLSI guidelines and were even compared with Vitek2 automated system.

**Results:** 69 strains were *E. faecalis*, 21 were *E. faecium* and two were *E. gallinarum*. High level resistance to penicillin, ampicillin, gentamicin and streptomycin were observed. All strains were sensitive to linezolid and teicoplanin. 8% strains showed vancomycin resistance which was detected by Vitek2 automated system.

**Conclusions:** High rate of resistance to penicillin and amino glycosides is observed in our tertiary care hospital and emergence of VRE has further worsened this situation. So, there is an urgent need for more rational and restricted use of antimicrobials.

**Keywords:** Antimicrobial susceptibility, VRE

## INTRODUCTION

*Enterococci* have become increasingly important not only because of their ability to cause serious infections but also because of their increasing resistance to many antimicrobial agents. Serious enterococcal infections are often refractory to treatment and mortality is high.<sup>1</sup> Infections by *Enterococci* have traditionally been treated with cell wall active agents in combination with an aminoglycosides however emergence of high level resistance to aminoglycosides,  $\beta$  lactam antibiotics and to vancomycin by some strains together with association of HLAR with multidrug resistance has led to failure of synergistic effects of combination therapy.<sup>1,2,3</sup>

Since the advent of VRE by Utley et al<sup>5</sup> in 1988, enterococcal infections have been a cause of great concern among the health professionals. Therefore, VRE along with HLAR is making the treatment of such infections extremely difficult and pose a great challenge to clinicians.

Although 12 species in genus *Enterococcus* have been recognized, most common species is *E. faecalis* followed by *E. faecium*. *E. faecium* predominantly is more resistant species than *E. faecalis* and emergence of vancomycin resistance in it has caused an increase in frequency of its isolation.<sup>6</sup>

Considering these, the present study was conducted in tertiary care hospital to determine the susceptibility pattern of enterococcal strains.

## METHODOLOGY

The present study was conducted in department of microbiology. Total of 92 enterococcal strains were isolated from various clinical samples (urine, blood, csf). The strains were identified and speciated according to standard laboratory procedures as per the scheme of Facklam and Collins.<sup>7</sup>

Antimicrobial susceptibility was determined by Kirby Bauer disc diffusion

Method. Various antibiotics tested were: Penicillin (10U/disc), Ampicillin (10µg), High levelgentamicin (120µg), High level Streptomycin (300µg), Ciprofloxacin (5µg), Vancomycin (30µg), Teicoplanin (30µg) and Linezolid (30µg). The minimum inhibitory concentrations of vancomycin were detected by automated Vitek2 system.

The source of media and antibiotic discs were Himedia ltd. Standard strains *E. faecalis* ATCC 29212 was used as control.

## RESULTS

Total 92 enterococcal strains isolated, 69 strains were *E. faecalis*, 21 were *E. faecium* and 2 were *E. gallinarum*. Antibiotic susceptibility tests showed high level resistance to various antibiotics tested. [Table 1] all the strains were sensitive to linezolid and teicoplanin. 8% strains showed vancomycin resistance which were even compared with Vitek2 automated system. Similar results were observed in study by Anbumani et al.<sup>16</sup> [Table 2]

**Table 1: Antimicrobial susceptibility pattern of Enterococci by Kirby bauer disc diffusion method**

Antibiotic tested	% Sensitive	% Resistant
Penicillin	56	44
Ampicillin	60	40
Gentamicin [HLR]	47	53
Streptomycin [HLR]	60	40
Ciprofloxacin	38	62
Vancomycin	92	8
Teicoplanin	100	0
Linezolid	100	0

## DISCUSSION

Recent years have witnessed increased interest in *Enterococci* not only because of their ability to cause

serious infections but also because of their increasing resistance to many antimicrobial agents.<sup>1,2,3</sup>

**Table 2: Comparison of resistance pattern with other similar study**

Antibiotics tested	Anbumani study (n=360)	Present study (n=92)
Penicillin	42	44
Ampicillin	31	40
Gentamicin [HLR]	56	53
Streptomycin [HLR]	42	40
Ciprofloxacin	58	62
Vancomycin	0	8
Teicoplanin	0	0
Linezolid	0	0

In the present study, *E. faecalis* (75%) was predominant isolate. *E. faecium* (23%) in our tertiary care hospital. Most of the studies done on *Enterococci* support the same findings. Reason could be predominance of *E. faecalis* in the endogenous flora of the body.<sup>9</sup>

**Table 3-Total VRE isolation from different samples**

Sample	Total No.	No. of VRE
Urine	54	5
Blood	23	2
CSF	4	2
Pus/Swab	10	0
Ascitic fluid	1	0

Penicillin along with amino glycosides considered as treatment of choice. Therefore resistance of *Enterococci* against these antibiotics has important clinical implications. Present study showed 41% resistance to penicillin due to resistance mechanism involving low affinity penicillin binding proteins or production of β lactamases. Resistance to amino glycosides in *Enterococci* is with multidrug resistance.<sup>1</sup>

**Table 4: Comparison of VRE isolation with other studies**

	Mathur et al (2003)	Karmarker et al (2004)	Ghoshal et al (2006)	Present Study (2011)
Total samples	444	52	685	92
VRE (%)	5(1%)	12(23%)	10(1.4%)	8(8%)
Sample (positive)	Blood(3),Urine(1),s of tissue(1)	Urine*, Blood*, Pus*	Blood*,Tissue*, Urine*, CVP tip*	Urine(5), Blood(2),CSF(1)
Phenotype	Van A, Van B	Van B	Van A	Van A, Van B
MIC values (µg/ml)	26-512	>4	62-256	8-32

\*Sample size not mentioned.

In present study, HLR was seen in 53% of the strains for gentamicin (High level) and 40% for streptomycin (High level). HLR was more in *E. faecium* than

*E. faecalis*. These finding also reported in some study.<sup>10,12</sup> HLR in these strains can well nullify the efficacy of combination therapy. Therefore, distinguishing HLR

from simple intrinsic resistance is important and should be adopted as a part of routine microbiology laboratory.

Present study showed 8% vancomycin resistance. Table 3 6% strains were *E.faecalis* and 2% were *E.faecium*. Results were also compared with automated Vitek2 system which is based on MIC values. VanA and VanB phenotype were found to be predominant with MIC value 8-32µg/ml. Previously from India, there are few reports of emergence of VRE strains with increased MIC values. <sup>12,13,14,15</sup>[Table 4]

All isolates were susceptible to linezolid and teicoplanin. So; these drugs are choice of treatment.

## CONCLUSION

High rate of resistance to penicillin and amino glycosides along with increased MIC values is observed in our tertiary care hospital and emergence of VRE strains has further worsened this situation. Prompt diagnosis and efficient infection control measures can restrict its spread. There is a need to study the antibiogram of enterococcal strains in order to minimize the selection and spread of such strains.

## REFERENCES

- Murray BE. The life and times of *Enterococci*. Clin Microbial Rev 1990; 3: 46 - 65.
- Jesudason MV, Pratima VL, Pandian R, Abigail S. Characterisation of penicillin resistant *Enterococci*. Indian J Med Microbiol 1998; 16(1):16-8.
- Patterson JE, Zervos M. High level gentamicin resistance in *Enterococcus*: microbiology, genetic basis and epidemiology. Rev Infect Dis. 1990; 12:644-51.
- Anbumani Narayanaswamy et al. Speciation and antimicrobial susceptibility pattern of *Enterococci* from a tertiary health care center of south India. Journal of Pharmacy Research 2011; 4(4): 989-990.
- Utley A, Collins C, Naidoo J, George R. Vancomycin resistant *Enterococci*. Lancet 1988; i:57-8.
- Rice LB. Emergence of vancomycin resistant *Enterococci*. Emerg Infect Dis 2001; 7: 83-187.
- Facklam RR, Collins MD. Identification of *Enterococcus* species isolated from human infections by a conventional test scheme. J Clin Microbiol 1989; 27:731-4.
- Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial susceptibility testing; 20th informational supplement. CLSI/NCCLS M100- S20. Wayne (PA). The Institute; 2010.
- Hall LMC. Recent advances in understanding of the epidemiology of *Enterococci*. Rev Med Microbiol 1993; 4:192-7.
- Bhat KG, Paul C, Bhat MG. Neonatal bacteremia due to high level aminoglycoside resistant (HLAR) *Enterococci*. Indian J Pediatr 1997; 64:537-9.
- Miskeen PA, Deodhar L. Antimicrobial susceptibility pattern of *Enterococcus* species from Urinary Tract Infections. J Assoc Physicians India 2002; 50:378-81.
- Taneja N, Rani P, Emmanuel R, Sharma M. Significance of vancomycin resistant *Enterococci* from urinary specimens at a tertiary care centre in northern India. Indian J Med Res 2004; 119:72-4.
- Karmarkar MG, Gershom ES, Mehta PR. Enterococcal infections with special reference to phenotypic characterization and drug resistance. Indian J Med Res 2004; 119:22-5.
- Kapoor L, Randhawa VS, Deb M. Antimicrobial resistance of enterococcal blood isolates at a pediatric care hospital in India. Jpn J Infect Dis 2005; 58:101-3.
- Ghoshal U, Garg A, Tiwari DP, Ayyagiri A. Emerging vancomycin resistance in *Enterococci* in India. Indian J Pathol Microbiol 2006; 49(4): 620-2.