

Original Research Article

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A Study on Antibacterial Resistance Patterns on the *Enterococcus* Species Isolated in a Tertiary Care Hospital in South India

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ABSTRACT

Enterococci are normal inhabitants of human colon and biliary tracts. In recent years, emerged as much important opportunistic pathogen of human diseases, causing life threatening hospital acquired infections. They have gained great significance globally, because of their increased resistance to the widely used antimicrobials and Vancomycin. The objective was to analyze antibiotic resistance pattern of *enterococci* from clinical samples. The current study was carried out in the department of Microbiology, Chengalpattu medical college from January 2015 to December 2015. *Enterococci* isolated from the clinical samples like urine, blood pus and samples were confirmed and antibiotic susceptibility pattern were observed. *Enterococcus spp.* isolated in the present study from various clinical specimens was 120. *Enterococcus faecalis* (93.3%) and *Enterococcus faecium* (6.7%) were exclusively isolated species. Antibiotic susceptibility pattern revealed maximum resistant to Penicillin (91%), followed by Ciprofloxacin (81%), Ampicillin (69%), Doxycycline (62%) and high level Gentamycin (48%). Among the isolates 3% were resistant to Vancomycin. The rational and appropriate usage of antimicrobials in the community and health care centers will minimize the emerging multidrug and Vancomycin resistant strains of *enterococci*. Any therapeutic management should be based on the antibiotic policy of the concerned center and susceptibility pattern of the isolates from the clinical specimens.

Keywords

Enterococci,
nosocomial
infections,
Antibiotic
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Introduction

Enterococci are normal inhabitants of human gastrointestinal and biliary tracts, female genital tract and male urethra. They have emerged as important hospital associated pathogen causing both complicated and uncomplicated urinary tract

infections, intravascular catheter associated blood stream infections, intra-abdominal infections, surgical site skin and soft tissue infections. Based on the Centers for Disease Control and Prevention's (CDC) data the enterococcal species are the second most

common organism causing nosocomial infections worldwide (Desai *et al.*, 2001).

Urinary tract infections are the most frequent enterococcal infection, mostly health care associated, secondary to catheterization or instrumentation, or due to structural abnormalities of the urinary tract (Schaberg *et al.*, 1991). Enterococcal bacteremias are most often nosocomial in origin, associated with intravascular lines, urethral catheterization, long-term hospital stay and other sites infections. *Enterococci* are identified in 5-20% of all cases of infective endocarditis and also in prosthetic valve endocarditis (Megam, 1991). They are the third most common pathogen isolated from wound infections.

Two species of *Enterococci* are the frequently isolated agents in human infections- *Enterococcus faecalis* in 80-90% and *Enterococcus faecium* in 5-10% of enterococcal infections (Ross, 2006). The inherent resistance of *Enterococci* to commonly used antimicrobials agents and acquired resistance to aminoglycosides (high level resistance), glycopeptides, β – lactams and fluroquinolones has increased their clinical importance in recent years. So the present study was conducted to know the antimicrobial resistance pattern and prevalence of *Enterococci* isolates from clinical samples.

Materials and Methods

The present study was a retrospective study conducted in a tertiary care centre in South India for a period of one year from January 2015 to December 2015. Aseptically collected clinical samples like urine, blood, pus and body fluids were processed by standard methods.

Enterococcus spp. isolated were confirmed by colony morphology, Gram's staining,

catalase negativity, salt tolerance test-growth in the presence of 6.5% NaCl, esculin hydrolysis in the presence of 40% bile salts, growth at 10°C & 45°C and ability to produce PYR (Forbes *et al.*, 2007; Collee *et al.*, 2008). *Enterococcus* species was identified by using conventional Facklam and Collins biochemical tests based on fermentation of sugars, pyruvate utilization and arginine decarboxylation.

The antimicrobial susceptibility test by Kirby Bauer disc diffusion method was carried on 5% Mueller Hinton blood agar, as per CLSI guidelines. All isolates were tested for following antimicrobials – Penicillin (10 μ g), Ampicillin (10 μ g), Doxycycline (30 μ g), Ciprofloxacin (5 μ g), Gentamycin (200 μ g). Vancomycin screen agar was used for the identification of Vancomycin resistant enterococci as recommended by CLSI.

Results and Discussion

Enterococcus spp. isolated in the present study from various clinical specimens was 120. Of the 120 isolates *Enterococcus faecalis* were 112 (93.3%) and *Enterococcus faecium* were 8 (6.7%).

The highest number of isolates were uropathogen 89 (74%). Organisms isolated from pus, blood and tissue fluids were 18(15%), 7(6%) and 6(5 %) respectively. Antibiotic susceptibility pattern revealed maximum resistant to Penicillin (91%), followed by Ciprofloxacin(81%), Ampicillin (69%), Doxycycline (62%) and high level Gentamycin (48%). Enterococci were highly susceptible to Vancomycin (97%). All Vancomycin resistant enterococci4(3.3%) were isolated from urine specimen and all belong to *Enterococcus faecium* species. Nearly 85% of the strains were isolated from hospitalized patients and 15% were from outpatient department.

Table.1 *Enterococcus* species isolated from various clinical samples.

Sample	Number of Isolates (120)	Percentage (%)
Urine	89	74%
Pus	18	15%
Blood	7	6%
Tissue Fluids	6	5%

Table.2 Antibiotic resistance pattern of *Enterococcus* spp. isolated from various clinical samples.

Antibiotics	Number of resistant Isolates	Percentage
Penicillin	109	91%
Ampicillin	83	69%
Ciprofloxacin	97	81%
Doxycycline	74	62%
High Level Gentamycin	57	48%
Vancomycin	4	03%

Enterococcus spp. were considered as low virulent resident flora of man, but very recently emerged as much important hospital acquired opportunistic pathogen of human diseases. They have gained great significance globally, because of their increased resistance to the widely used antibacterial drugs and transmission in hospitalized patients by contaminated hands of health care providers. The emergence of Vancomycin resistance in these bacteria is often involved in serious super infections among patients receiving broad spectrum antimicrobials therapy.

In this study 2.8% of organisms isolated from various clinical samples were *Enterococci* spp., almost the same results were obtained in the study conducted by Mukherjee *et al.* In our study 56% female were affected where as only 44% of male were infected with enterococcal infections, which was concurrence with study of Bose *et al.*, (2012).

Enterococcus faecalis (93.3%) and *Enterococcus faecium* (6.7%) were

exclusively isolated species, which was accordance with the findings of previous studies (Gullberg *et al.*, 1989).

Enterococci isolated were predominantly from urine (74%) specimen followed by pus (15%) and blood (6%), the results were similar with findings of Chakraborty *et al.*, (2015). Regarding the antimicrobial susceptibility pattern of the isolates, they were more resistant to Penicillin (91%), Ciprofloxacin (81%) and Ampicillin (69%). The results were almost in concurrence with some recent Indian studies (Parameswarappa *et al.*, 2013). High level Gentamycin resistance in our study was 48%, this observation was comparable with many studies (Oberoi *et al.*, 2013; Fernandes *et al.*, 2013).

In developing countries higher irrational empirical usage of antimicrobials resulted in increased therapeutic resistance of antibacterials in the community as compared to the developed nations, which is a real major concern in health system worldwide

(Kumar *et al.*, 2013). The high prevalence of Vancomycin resistant *enterococci* in the nosocomial infections was reported in many studies from all over the world, but in our study it was only 3%. Near similar result was observed by Mukherjee *et al.*

In conclusion, in the present study the *enterococci* from various clinical samples were resistant to most of the commonly used antibacterials. Increased incidence of Vancomycin resistant *enterococci* from different studies emphasize the immediate need for intervention in current antimicrobial management and monitoring. Our study concludes that the rational and appropriate usage of antimicrobials in the community and health care centers will minimize the emerging multidrug and Vancomycin resistant strains of *enterococci*. Any therapeutic management should be based on the antibiotic policy of the concerned center and susceptibility pattern of the isolates from the clinical specimens.

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