

## Study of Antimicrobial Resistance among Enterococcus Species in Tertiary Care Teaching Hospital

Dr. Nirali Naranbhai Radadiya<sup>1\*</sup>, Dr. Khushi Shah<sup>2</sup>, Dr. Sanjay Mehta<sup>3</sup>

<sup>1</sup>3<sup>rd</sup> year Resident doctor, Department of Microbiology, C. U. Shah Medical College, Dudhrej Rd, Laxminarayan Society, Surendranagar, Gujarat 363001, India

<sup>2</sup>Assistant Professor, Department of Microbiology, C. U. Shah Medical College, Dudhrej Rd, Laxminarayan Society, Surendranagar, Gujarat 363001, India

<sup>3</sup>Professor & Head of the Department, Department of Microbiology, C. U. Shah Medical College, Dudhrej Rd, Laxminarayan Society, Surendranagar, Gujarat 363001, India

DOI: [10.36348/sjpm.2023.v08i06.002](https://doi.org/10.36348/sjpm.2023.v08i06.002)

| Received: 24.04.2022 | Accepted: 30.05.2022 | Published: 07.06.2023

\*Corresponding author: Dr. Nirali Naranbhai Radadiya

<sup>3</sup><sup>rd</sup> year Resident doctor, Department of Microbiology, C. U. Shah Medical College, Dudhrej Rd, Laxminarayan Society, Surendranagar, Gujarat 363001, India

### Abstract

The current study was carried out to isolate and identify Enterococcus species from clinical samples and to analyse the antimicrobial susceptibility pattern of Enterococcus Species. All clinical samples which were received in Microbiology laboratory were included in the study. A total of 2958 samples were received. These 129 Enterococci isolates were obtained over a period of 1 year from various samples namely, urine, blood, pus. Samples were processed for microscopy and culture as per the standard guidelines. All samples were inoculated on MacConkey agar and Blood agar. Identification and antibiotic sensitivity pattern of bacterial isolates were carried out by automated system. i.e. VITEK 2 Compact. Out of 2958 samples, Total 129 samples showed growth of enterococci. Out of 129 isolates, 84 were Enterococcus spp, 18 were E.faecalis, 16 were E.faceium. Out of total 129 samples, 76 samples were of males and 53 were of females. Most common samples from which enterococci were isolated was urine accounting for 85 followed by Pus accounting for 15. Medicine department showed the highest isolates with 88. Out of 129 Enterococci 64 showed resistance to primary line of drug like Benzyl penicillin, 79 Enterococci showed resistance to Ampicillin. Out of 129 enterococci 70 showed resistance to secondary line of drug like tetracycline, 59 isolates showed resistance to High level Gentamycin, 41 isolates showed resistance to Vancomycin, 23 isolates showed resistance to Linezolid. The strains of Enterococci were multidrug resistant. Antibiotic selection should be done judiciously based on the antibiotic sensitivity pattern of the organism.

**Keywords:** Enterococcus species, Antibiotic resistance, Antimicrobial susceptibility pattern.

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### INTRODUCTION

Enterococci are natural inhabitants of the oral cavity, gastrointestinal tract (GIT) and the female genital tract in both humans and animals [1]. Enterococci, though commensals in adult faeces are important nosocomial pathogens [2]. The most common nosocomial infections by these organisms are urinary tract infections followed by intraabdominal and pelvic infection [3]. Enterococci are also becoming increasing important agents of human disease because of their resistance to antibiotics. E. faecalis is most common species found in clinical specimen whereas E. faecium is more drug resistant than E.faecalis [4]. Enterococci resistant to all three antimicrobial agents (penicillin, aminoglycosides and glycopeptide like vancomycin) pose a serious challenge not only for clinicians but also

for health care institutions. It results in treatment failure, selection and spreading of resistant strains in the health care institution. Imprudent use of antibiotics and colonisation pressure are the important causes of the drug resistance in enterococci [5]. Resistance in enterococci has been increasingly reported especially vancomycin resistant enterococci (VRE). Newer antibiotics such as linezolid, daptomycin and tigecycline have shown good in vitro activity against VRE [7]. Quinupristin-dalfopristin (Q/D) is another agent that has potent in vitro activity against E. faecium but poor activity against E. faecalis [6].

### MATERIAL AND METHODS

This study was carried out at C.U. Shah medical college and hospital, Surendranagar, over a period Of January 2019 to December 2020. In this

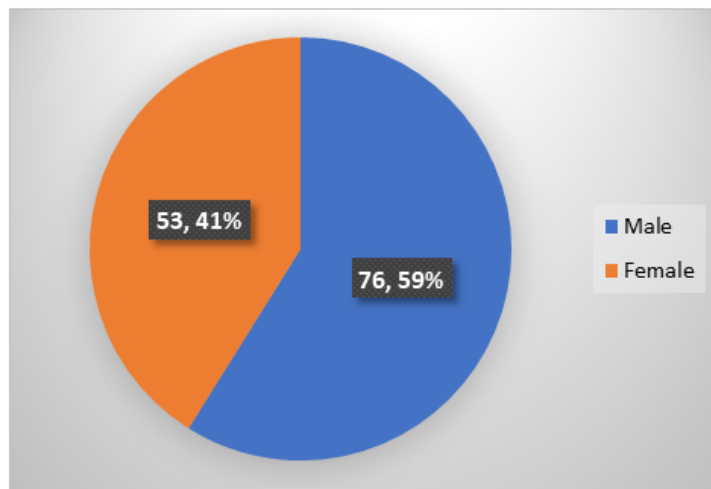
study, antimicrobial susceptibility pattern of enterococci has been evaluated. All clinical samples which were received in Microbiology laboratory were included in the study. A total of 2958 samples were received. These 129 Enterococci isolates were obtained over a period of 1 year (2019 -2020) from various samples namely, urine, blood, pus, swab and fluid. Samples were processed for microscopy and culture as per the standard guidelines. For microscopy, Gram stain was performed. For culture, all samples were inoculated on MacConkey agar and Blood agar and incubated at 37°C for 24 hours on day of sample collection. Samples which showed growth on MacConkey agar and Blood agar, identification of the colonies was done by observing its macroscopic characteristics and by Gram stain. On MacConkey agar magenta pink, small, round

colonies were considered as an Enterococci. On blood agar non hemolytic translucent considered as Enterococci. Further identification was done using gram stain which showed gram positive arranged. Results were analyzed using Microsoft Excel.

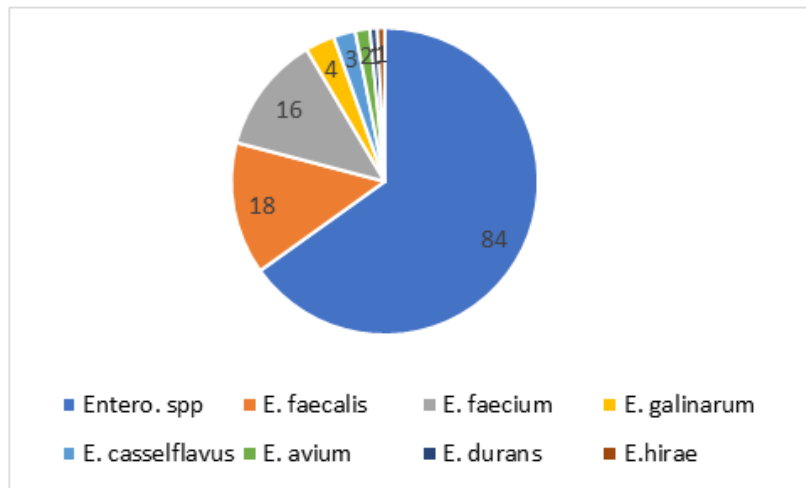
The ethical clearance for the study was obtained from the Institutional Ethics Committee prior to the study.

**RESULTS**

Total 129 samples showed growth of enterococci out of 2958 samples. Out of total 129 samples, 76 samples were of males and 53 were of females.



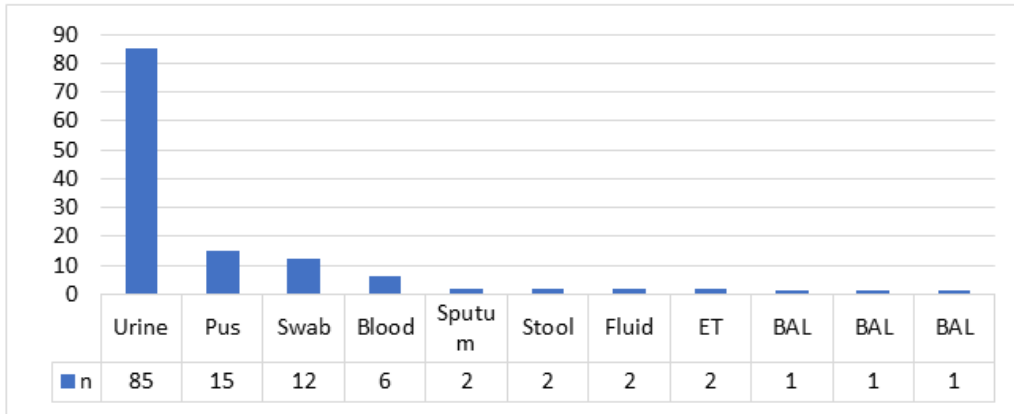
**Fig 1: Gender wise distribution of patients**



**Fig 2: Species wise detection of organisms**

Out of 129 isolates, 84 were Enterococcus spp, 18 were E. faecalis, 16 were E.faceium, 4 were E.

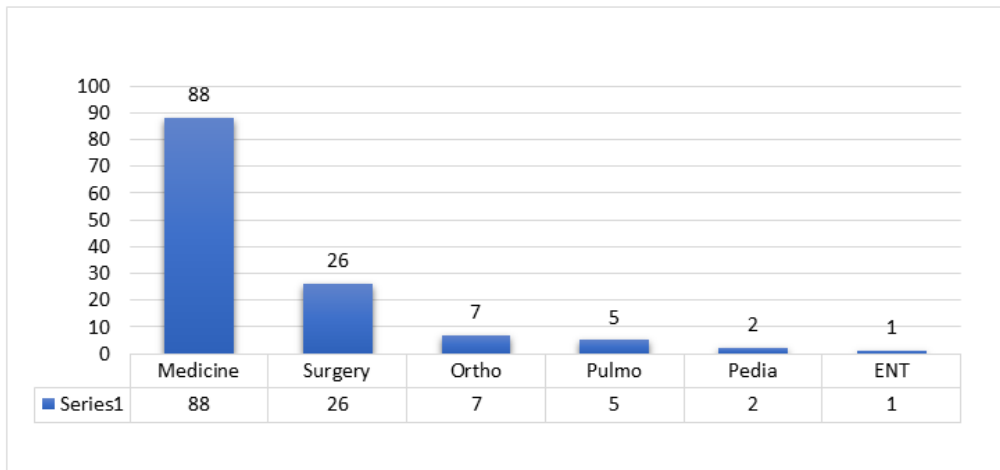
gallinarum, 3 were E.casseliflavus, 2 were E.avium, 1 was E.durans, 1 was E.hirae.



**Fig 3: Clinical Sample wise Detection of organisms**

Most common samples from which enterococci were isolated was urine accounting for 85

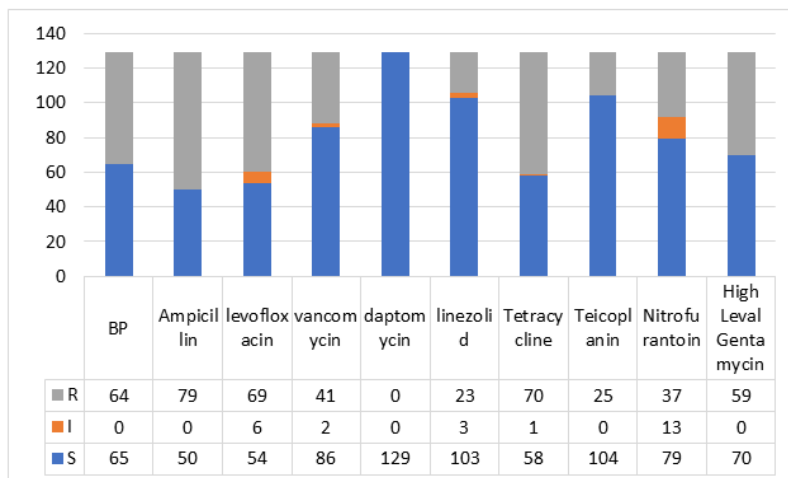
followed by Pus accounting for 15, followed by swab accounting for 12, Blood accounting for 6.



**Fig 4: Department wise detection of organisms**

Medicine department showed the highest isolates with 88 followed by surgery department showed 26 isolates, orthopedics department showed 7

isolates and pulmonology department showed 5 isolates.



**Fig 5: Antibiotic resistance pattern of Enterococci**

Out of 129 Enterococci 64 showed resistance to primary line of drug like Benzyl penicillin, 79 Enterococci showed resistance to Ampicillin, 69 Enterococci showed resistance to Levofloxacin. Out of 129 enterococci 70 showed resistance to secondary line of drug like tetracycline, 59 isolates showed resistance to High level Gentamycin, 41 isolates showed resistance to Vancomycin, 23 isolates showed resistance to Linezolid and 25 isolates showed resistance to Teicoplanin, 37 isolates showed resistance to Nitrofurantoin. All Enterococci were sensitive to Daptomycin, PIPTAZ, Ampicillin sulbactam.

## DISCUSSION

In this study Total 129 samples showed growth of Enterococci. Out of which 84 were enterococcus spp., 18 were *E. faecalis*, 16 were *E. faecium*, 4 were *E. gallinarum*. 3 were *E. casseliflavus*, 2 were *E. avium*, 1 was *E. durans* and 1 was *E. hirae*. Elham Jannati *et al.*, reported 118 enterococcus spp., 235 *E. faecium*, 56 *E. faecalis*. in this study 84 Enterococcus spp. Isolated followed by *E. faecalis* (18) out of 409 isolates. Barreto *et al.* and Poeta *et al.*, which showed that *E. faecium* accounting for >50% of Enterococcal isolates recovered from the patients. Most of the isolates from Urine (56) followed by Pus (15) and Swab (12). Kaarthiga *et al.* reported that out of 310 sample, most of the isolates from Urine (68) followed by Pus (16) and Blood (14). Globally Ampicillin resistance is significantly high in clinical isolates. In our study 79 isolates showed Ampicillin resistance. Elham Jannati *et al.*, reported a small number of isolates (10/409). Out of 129, 41 isolates showed resistance to Vancomycin and 59 isolates showed resistance to High level gentamycin. Kaarthiga *et al.*, reported Vancomycin resistance was seen in (29/310) isolates and HLG (69/310) isolates. Jacopo Monticelli *et al.*, reported that *E. gallinarum* and *E. casseliflavus* are intrinsically resistant to Vancomycin. In Our study (3/4) *E. gallinarum* and (1/3) *E. casseliflavus* strain showed resistance to Vancomycin. Out of 129, 23 isolates showed resistance to Linezolid. A. Raddaoui *et al.*, reported 2 (out of 438) strain only were resistant to Linezolid.

## CONCLUSION

Enterococci was isolated and identified in 129 samples and the most common sample from which enterococci was isolated was urine. The strains of Enterococci were multidrug resistant.

Multidrug resistance of Enterococci indicates that antibiotic selection should be done judiciously based on the antibiotic sensitivity pattern of the organism.

## REFERENCES

1. Varsha, G., Nidhi, S., Preeti, B., Tripti, S., & Jagdish, C. (2015). Department of Microbiology, Government Medical College Hospital, Sector 32, Chandigarh 160 030, India. *Indian J Med Res*, 141, 483-486.
2. Murray, B. E., & Tenenbaum, G. M. (1999). Enterococci: new aspects of an old organism. *Proceedings of the Association of American Physicians*, 111(4), 328-334.
3. Marothi, Y. A., Agnihotri, H., & Dubey, D. (2005). Enterococcal resistance—an overview. *Indian journal of medical microbiology*, 23(4), 214-219.
4. Clinical updates in infectious diseases. April 1998. Available at <http://www.nfid.org/publications/clinicalupdates/id/enterococcal.html>. 2005.
5. Sastry, S. A., & Sandhya, B. Essential of medical microbiology second edition, enterococcus, pg no. 237.
6. Karmarkar, M. G., Gershom, E. S., & Mehta, P. R. (2004). Enterococcal infections with special reference to phenotypic characterization & drug resistance. *Indian Journal of Medical Research*, 119, 22-25.
7. Jones, R. N., Ballou, C. H., Biedenbach, D. J., Deinhart, J. A., & Schentag, J. J. (1998). Antimicrobial activity of quinupristin-dalfopristin (RP 59500, Synercid®) tested against over 28,000 recent clinical isolates from 200 medical centers in the United States and Canada. *Diagnostic microbiology and infectious disease*, 31(3), 437-451.