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Original Research Article

Profile of *Enterococcus* species isolated from cases of urinary tract infections in a tertiary care hospital in Uttar Dinajpur: a retrospective study

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ABSTRACT

Background: Urinary tract infection (UTI) is a leading cause of morbidity and mortality worldwide. *Enterococcus* species is a commensal in our gastrointestinal tract and a leading cause of UTI in humans. *Enterobacterales* group were the common organisms causing UTI, but in the recent years there is increase in prevalence of other organisms. This retrospective study was undertaken to understand the profile of *Enterococcus* species causing UTIs and their antibiogram.

Methods: This study was conducted in the department of microbiology, Raiganj Government Medical College for a period of 1 year from January 2025 to December 2025. Urine samples were received in sterile universal containers and cultured using standard precautions in Hichrome UTI agar. Identification (ID) and antibiotic susceptibility testing (AST) were performed by using Vitek II ID and AST cards.

Results: Out of 2908 urine samples received, 356 (12.2%) showed growth of organisms. Out of 356 isolates, the most common isolate was *Escherichia coli* 41.0%, followed by *Enterococcus* species 30.6%. Among the *Enterococcus* species, *E. faecalis* were 76.1% and *E. faecium* 23.9%. The most sensitive antibiotic was linezolid showing 100% susceptible, followed by teicoplanin 89.9% susceptible. The *Enterococcus* species were highly resistant to ampicillin. The prevalence of VRE was found to be 25.6%.

Conclusions: The increase in drug resistance and treatment failure makes it important for proper identification and AST for targeted therapy. Proper diagnosis and starting treatment at correct time will decrease the morbidity and mortality related to these infections in humans.

Keywords: Antibiotic resistance, *Enterococcus* species, Urinary tract infection

INTRODUCTION

Enterococci are one of the important causes of urinary tract infections (UTIs) worldwide and in all age groups. Enterococci are part of the normal commensal flora in gastrointestinal tract of humans.[1] Enterococci are facultative anaerobes that are able to grow under extreme conditions including 6.5% NaCl, high pH, 40% bile salts, and a temperature range of 10-45ºC.[2] They are considered as difficult to treat pathogens, due to their intrinsic resistance to several antimicrobial agents and their tendency to acquire resistance. Enterococci are gram-positive organism that occurs in singles, pairs, and short chains. Enterococci are leading cause of health care associated infections (HAIs). Among the HAIs UTI is the most common type in hospitalised patients.[3] Enterococci cause wide range of infections which include UTIs, intra-

abdominal and intra pelvic abscesses, post-surgery wound infections and blood stream infections.[4]

Clinically the most important species associated with human infections are *E. faecalis* and *E. faecium.*[5] Among them *E. faecalis* is the most pathogenic species but *E. faecium* is of growing importance as it is more frequently resistant to antimicrobials.[6] Enterococci are intrinsically resistant to two major groups of antimicrobial agents, the aminoglycosides and β-lactams.[7] Intrinsic resistance is related to inherent or natural chromosomally encoded characteristics present in all or most of the Enterococci. Recent evidences suggest that the prevalence of vancomycin-resistant Enterococci (VRE) is increasing. The resistance to vancomycin and ampicillin, is more commonly associated with *E. faecium* than with *E. faecalis.*[8]

Increase in cases of VRE, has limited the therapeutic options and is associated with increased mortality and morbidity, length of hospital stays, admission to the ICU, surgical procedures and cost of treatment.[9] This retrospective study was undertaken to understand the profile of *Enterococcus* species causing UTIs and their antibiogram which will be helpful in choosing optimal empiric therapy and formulate antimicrobial policy.

METHODS

This retrospective study was conducted in the Department of Microbiology, Raiganj Government Medical College, Uttar Dinajpur, West Bengal for a period of 1 year from January 2025 to December 2025. A total of 2908 urine samples were received in sterile universal containers for culture and sensitivity. The samples were processed according to standard microbiological procedures. The clinical specimens of urine were cultured on Hi Chrome UTI agar and incubated at 37°C for a period of 24 hours. All significant *Enterococcus* species isolated from urine samples having a colony count of ≥105 colony-forming units/mL of urine were included in the study. The organisms other than *Enterococcus* species isolated from culture and urine samples showing 3 or more colonies were excluded from the study. The significant growth from culture media was presumptively identified using conventional methods, like Gram staining, catalase test. The species-level identification, as well as antibiotic susceptibility testing (AST), was done on the VITEK 2 compact system (bioMerieux, France) using the GP ID and AST-P628 cards for species-level identification and AST, respectively.

RESULTS

A total of 2908 urine samples were received by the department of microbiology for culture and sensitivity for a period of 1 year from Jan 2025 to December 2025. Out of 2908 urine samples culture positive was seen in 356 (12.2%) number of urine samples. The most common organism isolated was *Escherichia coli* 146 (41.0%) followed by *Enterococcus* species 109 (30.6%). Other organisms isolated were *Klebsiella pneumoniae* 75 (21.1%), *Pseudomonas aeruginosa* 13 (3.6%), *Acinetobacter species* 8 (2.3%), *Staphylococcus aureus* 3 (0.8%) and *Staphylococcus saprophyticus* 2 (0.6%) (Figure 1).

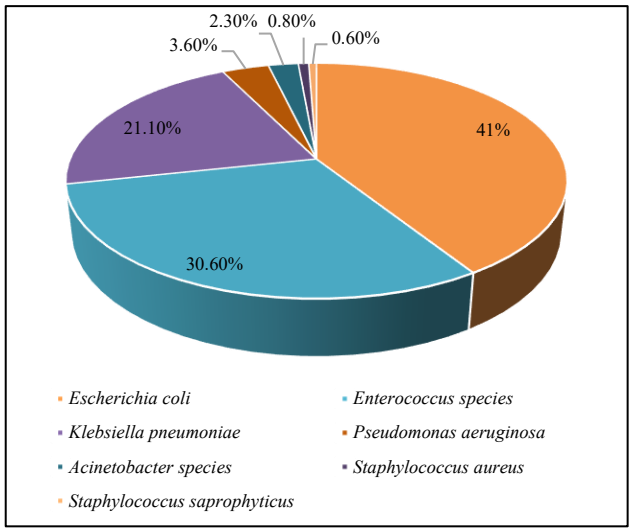

Figure 1: Distribution of organisms among the culture positive samples.

Enterococcus species 109 (30.6%) was the second most common organism isolated after *Escherichia coli* 146 (41.0%). Among the Enterococcus species isolates *Enterococcus faecalis* constituted 83 (76.1%) and *Enterococcus faecium* 26 (23.9%). The number of *Enterococcus* species isolated from male were 42 (38.6%) and female were 67 (61.4%). The most common age group affected were adults >19 years age with 81 (74.2%) followed by 0-12 years age group with 19 (17.5%) and the least infected were 13-18 years age 9 (8.3%) (Figure 2).

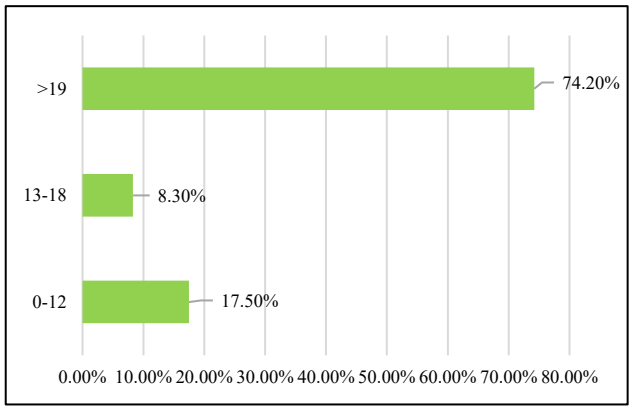

Figure 2: Age group wise distribution of *Enterococcus* species isolates.

Among the *Enterococcus* species isolated most of them were from the outpatient department 45 (41.2%), followed by female medicine ward (FMW) 18 (16.6%)

and intensive care unit (ICU) constituted 9 (8.3%). (Figure 3).

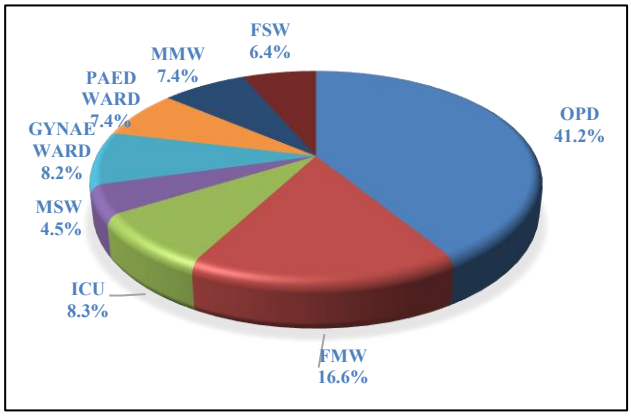

Figure 3: Location wise distribution of *Enterococcus* species isolates

The result of antibiotic sensitivity testing (AST) showed 100% sensitive to linezolid, followed by teicoplanin 89.9%, vancomycin 74.2%, nitrofurantoin 69.7%. *Enterococccus* species isolates showed 0% sensitive to Ampicillin. The prevalence of vancomycin resistant *Enterococcus* (VRE) species was 25.6% (Figure 4).

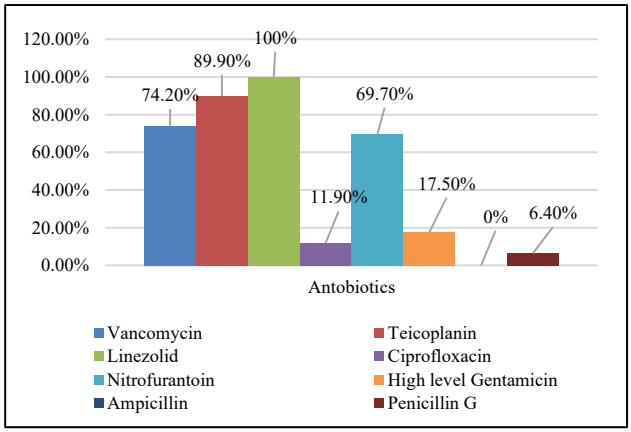

Figure 4: Antibiotic susceptibility pattern of *Enterococcus* species isolates.

DISCUSSION

The Enterococci harbours as normal commensal flora in human gut. They are capable of causing serious infections in humans, especially among the patients admitted in the healthcare settings. With rising vancomycin resistance and rising mortality rates, enterococci have become an important pathogen, especially implicated among HAIs.[10,11]

In this study significant growth of different pathogenic organisms implicated in UTI was observed in 12.2% of urine cultures. This culture positivity rate was found to be less compared with the culture positivity rate of other studies. Sharma et al reported culture positivity rate of 29.1%.[12] Rajni et al in 2022 and Ahirwar et al in 2024, reported culture positivity rate of 34.0% and 22.93% respectively which were quite higher than this study.[13,14] The culture positivity depends on many factors, including the factors related to the healthcare setting as well as patient-related factors such as age, gender, immunity status, and geographical distribution of the individuals.[15]

In this study, the species distribution of all Enterococci comprised 30.6%. Among them *E. faecalis*, 76.1% and *E. faecium*, 23.9%. The rates of isolation of various *Enterococcus* species from urine as reported in other studies were consistent with our findings, highlighting the predominance of *E. faecalis* over *E. faecium,* including the studies by Smout et al in 2023, Sumangala et al in 2020, and Yenisehirli et al in 2016.[16-18]

In this study among the *Enterococcus* species isolated most of them were from the OPD 41.2%, followed by FMW 16.6% and ICU constituted 8.3%. There variations are due to various factors including the type of healthcare facility, catheterization status, immunity status and demographic profile as mentioned by Yilema et al and Medina-Polo et al in 2017.[19,20]

As there is increase in resistant strains exhibiting higher resistance against most of the antibiotics used to treat enterococcal infections, particularly involving high-end antibiotics such as glycopeptides and linezolid, the treatment has become more difficult and challenging. Species-level identification along with the susceptibility tests should be performed for better management of patients. The approved treatment option for the treatment of simple as well as complicated UTIs such as chronic bacterial prostatitis, cystitis, and pyelonephritis is ciprofloxacin.[21] In this study, we observed Enterococci were 11.9% sensitive to ciprofloxacin. Similar findings were reported in studies by Sattari-Maraji et al in 2019, Perdana et al in 2023, Anjum et al in 2023, and Ohri et al in 2023.[22-25]

Nitrofurantoin is an antibiotic that can be used to treat simple UTIs. In this study, we observed 69.7% of Enterococcus isolates were susceptible to nitrofurantoin. A similar susceptibility pattern to nitrofurantoin was also reported by Chanda et al in 2022.[26] We observed 74.2% and 89.9% of sensitivity against vancomycin and teicoplanin, respectively. The increasing trends of vancomycin resistance have been reported in various studies, including a systematic review and meta-analysis by Smout et al in 2023 in which they reported and highlighted an upsurge in VRE over time in India from 2000 to 2020. The reported VRE was 4.8% between 2000 and 2010 while it was 14.1% between 2011 and 2020.[27] In our study the rate of VRE was found to be 25.8%, which was higher compared to other studies. The possible reason for the increasing trends of VRE can be the indiscriminate use of glycopeptides to treat infections with Gram-positive bacteria. Linezolid, an antibiotic from the oxazolidinone class, is active against a variety of

Gram positive organisms, including VRE. In this study, we reported 100% susceptibility of Enterococci to linezolid.

CONCLUSION

Antibiotic resistance trends depend on a particular healthcare facility as well as the community, the understanding regarding the resistance trends among Enterococcus isolates is important to guide the policymakers in the formulation of policy guidelines to treat these infections. The continuous upsurge in the incidence of VRE has to be dealt with seriously. The appropriate guidelines for hospital infection prevention and control along with the antibiotic policy have to be strictly followed to prevent antimicrobial resistance and transmission of these strains in the hospital environment.

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