IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

VOLUME : 9 ISSUE : 07 Print / Issue Publication Date: 09-Mar-2025

ISSN : 2455-2143

DOI : 10.33564/IJEAST.2024.v09i07.004

Indexed In

Google SCHOLAR OPEN ACCESS doi Crossref

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International Journal of Engineering Applied Sciences and Technology, 2024
Vol. 9, Issue 07, ISSN No. 2455-2143, Pages 32-34
Published Online November 2024 in IJEAST (http://www.ijeast.com)

BURDEN OF ENTEROCOCCAL ISOLATES FROM CSF IN SUSPECTED CASES OF MENINGITIS IN A TERTIARY CARE HOSPITAL, IN EAST DELHI.

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Abstract— **Pediatric meningitis pathogens like Enterococcus faecalis and faecium are rare but important. Unlike Streptococcus pneumoniae and Neisseria meningitidis, which cause most bacterial meningitis in children, enterococcal meningitis is resistant and difficult to treat. Any disturbance in host/commensal homeostasis that compromises the host defense mechanism or environmental influences, such as antibiotic use that promotes resistant enterococci, can cause life-threatening infections. High-level aminoglycoside resistance (HLAR) and vancomycin-resistant enterococci (VRE) in clinical isolates are causing global concern because they can cause more severe infections and serious health issues. Our study found Enterococcus strains with gender distribution M:F ratio 2.07, 65% E. faecalis and 35% E. faecium. 70% from NICU, 50% from children. Enterococcus isolation raises epidemiology concerns. Due to the sample's sensitivity, repeated isolation rarely confirms the isolate's presence. Thus, the current study suggests investigating newer organisms in such infections.**

Keywords— **Pediatric, Meningitis, Enterococcus**

I. INTRODUCTION

It has been known for a long time that the microorganisms that belong to the Enterococcus species (E. species), specifically Enterococcus faecalis (E. faecalis) and Enterococcus faecium (E. faecium), are common opportunistic bacteria found in the GI tract, vagina, and oral cavity. They can cause severe infections in individuals under certain conditions. The fact that they are able to survive in the environment with their intrinsic resistance to numerous antimicrobial agents and capacity to acquire antibiotic resistance through genetic mutation has resulted in their widespread distribution in clinical settings. Both E. faecalis and E. faecium are particularly notable for their ability to cause significant management problems as a result of instances of antimicrobial resistance [1].

E. species were generally considered innocuous commensals until recent years, and their role in human infections was routinely underestimated. These have now proven to be significant human pathogens, capable of causing a variety of healthcare associated (HAI) and community-acquired infections. In recent decades, HAI caused by them including infective endocarditis (IE), urinary tract infections (UTIs), bacteraemia, nosocomial meningitis, and intraabdominal, wound, and pelvic infections are on a rise [2,3]

Bacterial meningitis is a serious condition which require careful diagnosis and treatment. The time bound approach with accurate laboratory support can considerably improve the morbidity and mortality associated with the condition. The known pathogen usually associated with CNS aetiology are Streptococcus pneumoniae, Neisseria meningitides and Hemophilus influenza in adults while Listeria monocytogenes, Group B streptococcus, and Escherichia coli dominate the pediatric and neonatal population with improving diagnostics, newer pathogen which were previously not associated with CNS infections have now a been proven to have a role which needs to be further studied [4].

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Among these is Enterococcal meningitis, which is a rare condition, representing only 0.3% to 4.0% of cases of bacterial meningitis with limited published literature. Therefore, the epidemiology, clinical features, optimal therapy, and prognostic factors of enterococcal meningitis are not well understood. It is frequently observed in patients with neurosurgical conditions, such as head trauma, shunt devices, or cerebrospinal fluid leakage, it is also known to cause "spontaneous" CNS infection are known complications of remote enterococcal infections, such as endocarditis or pyelonephritis [5].

The gap in knowledge highlights how important it is to investigate the epidemiology of enterococcal isolates as well as the antibiotic resistance profiles of these agents' role in CNS infections. The purpose of the current study is to fill this void by analyzing the prevalence of enterococcal infections.

II. MATERIAL AND METHODS

This study involved retrospective analysis of 40 cases of enterococcal isolates from CSF samples that were submitted for bacterial diagnosis suspected cases of meningitis based on clinical diagnosis and preliminary biochemistry parameters. The samples were submitted as part of routine diagnosis in the Department of Microbiology, University College of Medical Sciences and GTB hospital, Delhi between January 2023 to August 2024.

Cerebrospinal fluid (CSF) samples that were collected from patients presenting with symptoms of meningitis underwent microbiological analysis, including culture and sensitivity testing to identify bacterial etiology.

Samples were processed as per standard guidelines including routine microscopy. Enterococcal isolates were identifies as per standard microbiological methods.

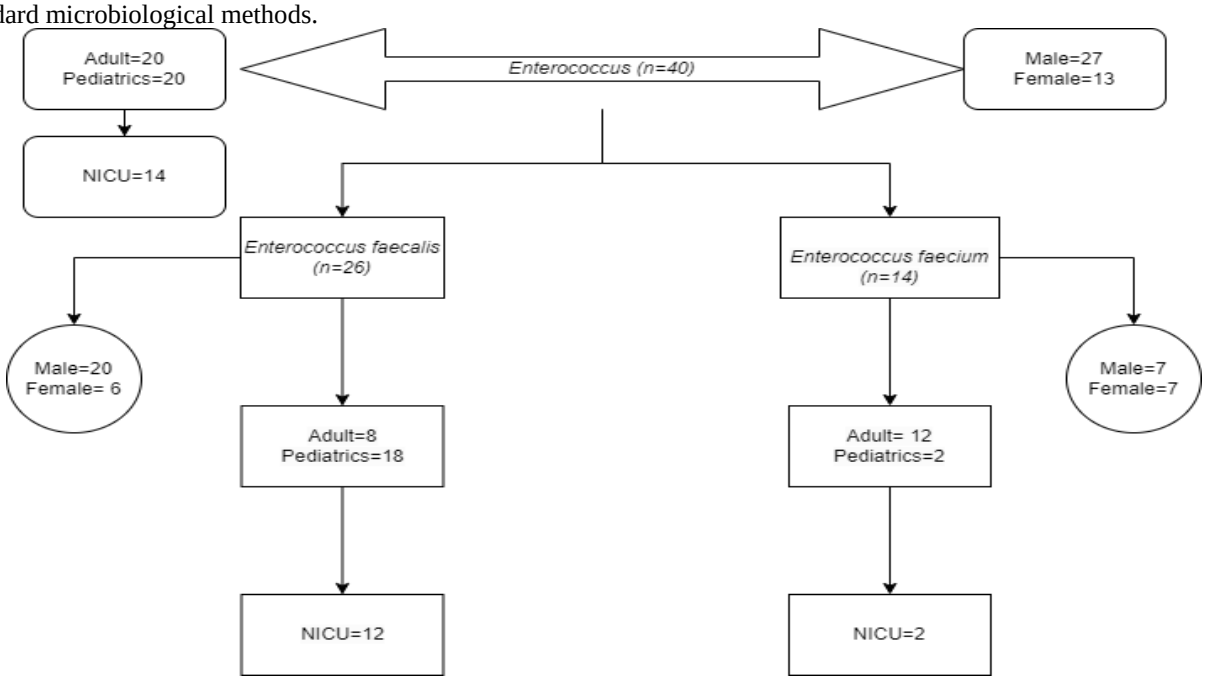
Culture and Identification of Enterococcal Isolates. The colonies from the primary cultures were subjected to standard conventional biochemical tests for the identification of isolates. To achieve this objective, Gram staining was employed to examine all suspected Enterococcus spp. colonies. Subsequently, the catalase test, hemolysis examination, bile-esculin agar, and growth in 6.5% NaCl were employed to further identify the colonies. The isolates were stored at −70°C in trypticase soy broth containing 10% glycerol for subsequent analysis.

III. STATISTICAL ANALYSIS

Data analysis was performed using Excel 2022 and IBM SPSS Statistics version 20.0 (Chicago, IL, USA)

IV. EXPERIMENT AND RESULT

Between January 2023 and August 2024, the laboratory received 3342 CSF samples out of which 359 were positive and from them 40 were positive for Enterococcus strains. Forty patients samples were positive for Enterococcus strains with gender distribution comprising 27 males and 13 females, (M:F ratio 2.07). All patients had a single pathogen isolated from the cerebrospinal fluid. Of the forty Enterococcus - positive samples, twenty-six (65%) were E. faecalis and fourteen (35%) were E. faecium. Twenty samples (50%) were obtained from the pediatric age group (under 12 years), of which fourteen were collected from the neonatal intensive care unit (NICU) (70%). Twelve patients in the NICU had E. faecalis, and two had E. faecium as shown in figure 1.



V. DISCUSSION

Enterococcus species, particularly Enterococcus faecalis and Enterococcus faecium, are rare but significant pathogens in pediatric meningitis. While most cases of bacterial meningitis in children are caused by Streptococcus pneumoniae and Neisseria meningitidis, enterococcal meningitis poses unique challenges due to its resistance profiles and associated comorbidities. Any disturbance in the host/commensal homeostasis that compromises the host defense mechanism or environmental influences, such as antibiotic usage that accidentally favors the proliferation of resistant enterococci, may result in life-threatening enterococcal infections [6].

The global community is increasingly concerned about the increasing prevalence of high-level aminoglycoside resistance (HLAR) and vancomycin-resistant enterococci (VRE) in clinical isolates, which can result in more severe infections and pose significant health risks [7,8].

In our study, Enterococcus strains with gender distribution M:F ratio 2.07, with 65% were E. faecalis and 35% were E. faecium. 50% were obtained from the pediatric age group , of which 70% were collected from NICU. Udo et al. (2003) found that E. faecalis and E. faecium were the most common Enterococcus species in Kuwait, with prevalence rates of 85.3% and 7.7%, respectively [9]. Another study by Almeida et al. (2004) found E. faecalis (76%) and E. faecium (9%) to be the most common species isolated from two Brazilian hospitals [10]. However, Jia et al. (2014) found that E. faecium was the most common species in China, with a prevalence rate of 58.7%, followed by E. faecalis (33%) [11].

We have observed that the infection can occur at any age, although it appears to be more prevalent in children. Spontaneous infection typically manifests in the context of neonatal sepsis, as previously described [12,13,14].

The isolation of enterococcus should be considered as an alarm to raise concerns about the changing epidemiology. The mere presence of the isolate from a sample has to be confirmed by repeated isolation but due to the sensitive nature of the sample, repeat confirmation is usually not feasible. Therefore, the current study highlights that newer organisms are of concern in such infections and need to be further evaluated.

VI. CONCLUSION

Enterococci are a group which has diverse implication and association in the human body. The evolving diagnostic modalities may help us to identify these organisms earlier than before. The changing resistance profile along with the antibiotic pressure in the environment has caused a shift the microbiological community and their target sites. Thus, a sharp lookout is essential to combat this issue of an organism in causing disease at a higher incidence than previously noted. The factors of their association and actual role in causing meningitis needs thorough evaluation.

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