



Original Article

Bacteriological profile and antibiogram of blood culture isolate in ESIC Medical College & Hospital in Jaipur, India

Dr. Shruti Harle¹, Dr. Charu Kaushik^{2*}, Dr. Mandira Ramudamu³, Dr. Jahnvi Sharma⁴, Dr. Himani Swami⁵

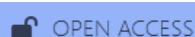
¹Associate Professor, Department of Microbiology, ESIC Medical College & Hospital Jaipur, Rajasthan

²Senior Resident, Department of Microbiology, ESIC Medical College & Hospital Jaipur, Rajasthan

³Assistant Professor, Department of Microbiology, ESIC Medical College & Hospital Jaipur, Rajasthan

⁴Tutor, Department of Microbiology, ESIC Medical College & Hospital Jaipur, Rajasthan

⁵Tutor, Department of Microbiology, ESIC Medical College & Hospital Jaipur, Rajasthan



ABSTRACT

Introduction Bloodstream infections (BSIs), also known as septicemia or bacteremia, occur when bacteria or other microorganisms enter the bloodstream and cause an infection.

Materials: The study included blood samples of all inpatients of the tertiary care hospital in the department of microbiology during January 2023–December 2024.

Results: ICU and NICU are the leading contributor of BSI in our study. Gram positive organisms (65.8%) dominated our results. Staph.aureus was isolated from (35%) were the most common isolates Among the total culture positive pathogenic isolates the CoNS (18%) were reported S. epidermidis (14.6%) a), S. haemolyticus (8 %) Escherchia coli. (17%) , Salmonella typhi (15%) and Candida spp. (8%).were isolated

Conclusion: ICUs are the point of generation of multidrug-resistant (MDR) bacterial strains, largely due to frequent and inappropriate or incorrect use of broad-spectrum antibiotics that leads to development of drug-resistant strains.

Keywords: Bloodstream Infection (BSI), Septicemia, Antimicrobial Resistance (AMR), Multidrug-Resistant (MDR) Bacteria Blood Culture.

Corresponding Author:

Dr. Charu Kaushik

Senior Resident, Department of Microbiology, ESIC Medical College & Hospital Jaipur, Rajasthan

Received: 21-06-2026

Accepted: 08-07-2026

Available online: 12-07-2026

Copyright © International Journal of Medical and Pharmaceutical Research

INTRODUCTION

Bloodstream infections (BSIs), also known as septicemia or bacteremia, occur when bacteria or other microorganisms enter the bloodstream and cause an infection¹. The most common bacteria genera responsible for BSIs are Klebsiella, Escherichia, and Staphylococcus.^{2,3} Factors contributing to BSI: Immunosuppression, excessive use of broad spectrum antibiotic can suppress the normal flora, thus allowing the emergence of resistant strains of bacteria.⁴

Diagnosis of BSIs involves blood cultures, where a sample of blood is collected and cultured to identify the presence of microorganisms.^{5,6} Prevention of BSIs is crucial, especially in healthcare settings.¹ Timely identification and appropriate treatment of infections in other parts of the body can also prevent the spread of infection to the bloodstream.⁵ It's important to consult a healthcare professional for a proper diagnosis and treatment if you suspect a bloodstream infection or have any concerns about your health.

Continuous oversight of bloodstream infections (BSIs) etiology is an indispensable drill in healthcare settings to monitor the types of pathogens causing infections and their antibiotic resistance patterns.^{7,8} Scrutiny helps healthcare facilities to identify the tendencies, execute suitable infection control measures, and make informed decisions regarding antimicrobial therapy.^{9,10}

MATERIALS AND METHODS

Study design

- This was retrospective descriptive record based study.
- Duration of study: Two year (January 2023–December 2024).

- **Place of Study:** This study was conducted at Microbiology Department of ESIC Medical College, Jaipur Rajasthan.

Study population

The study included blood samples of all inpatients of the tertiary care hospital in the department of microbiology during January 2023–December 2024. In the study, contaminants and mixed bacterial growths were not included.

METHODS:

This prospective study was conducted in the Department of Microbiology during the period from JAN. 2023 - DEC 2024. Two ml of venous blood was taken from each neonate & five 5ml blood from adult cultured by automated BacT/Alert & BD phoenix method for rapid isolation & sensitivity test^{11,12}.

Processing of samples

Blood cultures: Blood samples bottles were collected from the patients as suggested the physician and earlier the administration of any antibiotic. The details of the patients were recorded in registers. Samples from neonates and adult were processed were loaded in BACT/ALERT3D Automated System^{11,12}. For negative samples blood culture bottle remains loaded in automated system and after 5 days sample is reported negative. For positive samples, the blood culture bottle is taken out from the system and then conventionally blood was inoculated with the sample were incubated at 37°C aerobically.

Laboratory identification: The growth obtained was identified by colony morphology, gram stain and standard biochemical identification tests. the BD Phoenix™ M50 AST13 system with priority given to critically important antibiotics, including NMIC/ID-421, PMIC/ID-70, and NMIC-500 panels, which contain 15 antimicrobials for GN bacteria, 11 antimicrobials for non-Streptococcus GP bacteria and 5 antimicrobials for Streptococcus, respectively. M50 AST not only provides AST (Sensitive: S/Resistant: R) results but also automatically detects MIC. Updated annually according to the standard guidelines (CLSI, EUCAST)¹⁴.

RESULT AND DISCUSSION:

Amongst the total samples processed, 282(32.8%) became culture positive among which gram positive bacteria were the most predominant (65.8%). Out of all the gram positive pathogens, Staph.aureus was isolated from (35%)were the most common isolates Among the total culture positive pathogenic isolates the CoNS (18%)were reported S. epidermidis (14.6%) a), S. haemolyticus (8 %)aEscherchia coli. (17%) and Salmonella typhi (15%). cases whereas candida spp. were isolated (8%). The age group varied from 2 days told to 82-year-old patient, and both genders were taken into the study.

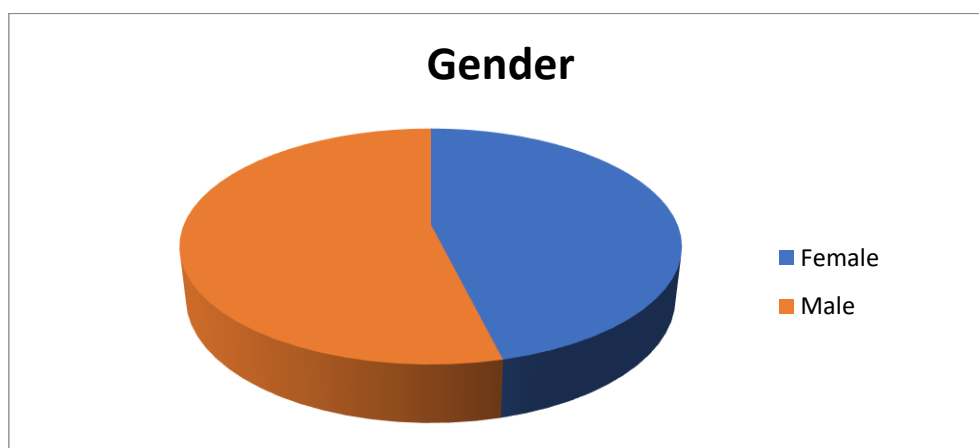


Figure 1

Gender wise ratio of male to female was 1.59:1 our study which matches with other similar studies. Neonates with low-birth-weight are highly prone to BSIs¹⁵.

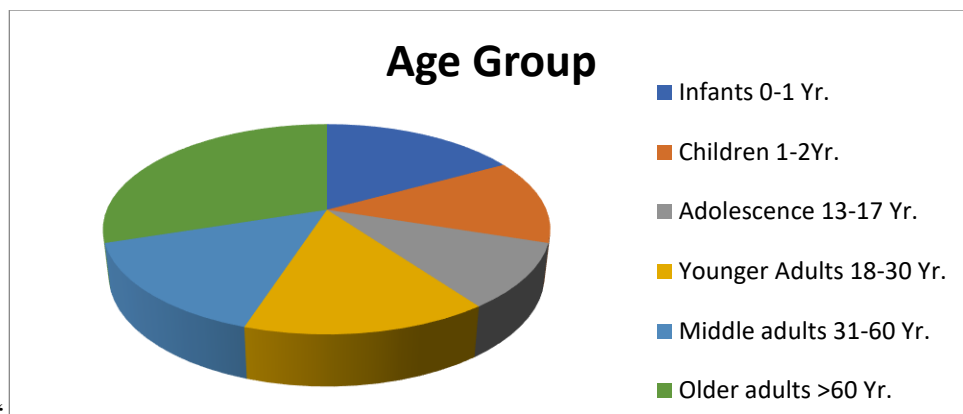


Figure 2

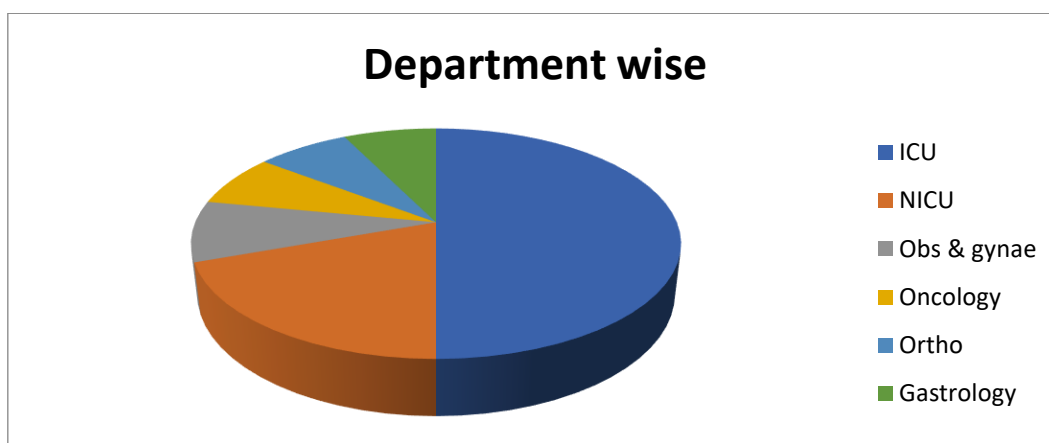


Figure 3

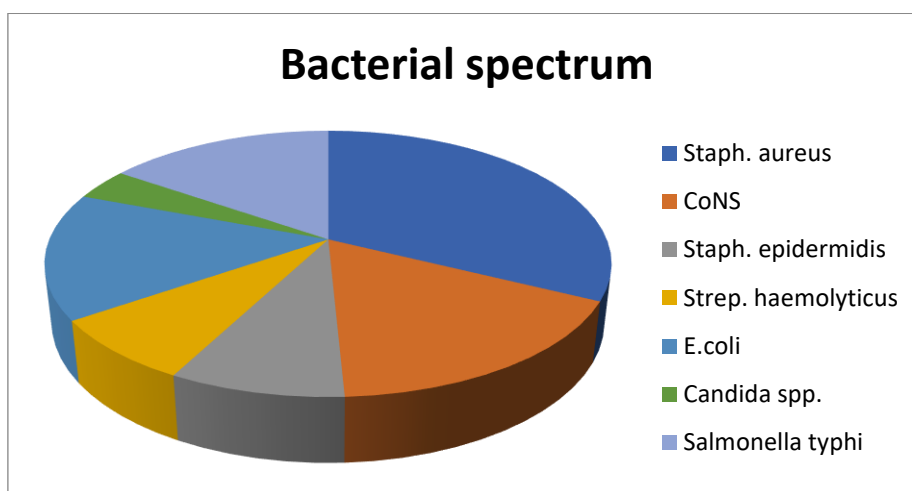


Figure 4

Antibiogram: Gram-positive and Gram-negative bacteria showed very high resistance to most the antibiotics tested, and the statistical analysis clearly suggest that the drug resistance is undeniably significant and poses threat more-so to high-risk patients having blood culture positive.

BSIs are the most common nosocomial infections. Studies^{15,16} including ours revealed that ICU patients are at higher risk of nosocomial BSIs than those admitted to other types of units. The reason for high infectious incidence in ICU patient is self-explanatory. The causative agents are affected by underlying comorbidities such as chronic disease conditions, immunodeficiency, age, socioeconomic and environmental factors.

CONCLUSION:

Prevention is most effective cure in BSIs. Proper implementation of hospital infection control^{15,16}, well trained staff and strictly imposing the rules of infection control in hospital, reducing footfall in ICUs and wards, proper use of PPE in

infection prone areas and including hand hygiene practices in routine .Periodically, training the hospital staff to practice infection control and hand hygiene¹⁷.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

REFERENCE:

1. Gupta S, Dhar A, Gohel D, Dingankar R. Bloodstream infections and its antibiogram from a tertiary care hospital of western India. *Indian J Microbiol Res* 2023;10(4):202-208.
2. F Timsit E Ruppé F Barbier A Tabah M Bassetti Bloodstream infections in critically ill patients: an expert statement *Intensive Care Med* 2020;46:226684
3. M Bassetti E Righi A Canelutti Bloodstream infections in the Intensive Care Unit *Virulence* 2016;7:326779
4. Apurba Shankar sastry- Essentials of medical microbiology. Jaypee the health science publisher. 2016: pp- 295.
5. L Tian Z Sun Z Zhang Antimicrobial resistance of pathogens causing nosocomial bloodstream infection in Hubei Province, China, from 2014 to 2016: a multicenter retrospective study *BMC Public Health* 2018;18:1121
6. I Blanco-Mavillard E Castro-Sánchez E Castro-Sánchez G Parra-García What fuels suboptimal care of peripheral intravenous catheter-related infections in hospitals? A qualitative study of decision-making among Spanish nurses *Antimicrob Resist Infect Control* 2022;11:105
7. J Cohran E Larson H Roach C Blane P Pierce Effect of intravascular surveillance and education program on rates of nosocomial bloodstream infections *Heart Lung* 1996;25:21614
8. JR Leal DB Gregson DL Church EA Henderson T Ross KB Laupland The Validation of a Novel Surveillance System for Monitoring Bloodstream Infections in the Calgary Zone *Can J Infect Dis Med Microbiol* 2016;2016:293587010.1155/2016/2935870
9. ERM Sydnor TM Perl Hospital epidemiology and infection control in acute-care settings *Clin Microbiol Rev* 2011;24:114173
10. K Iskandar L Molinier S Hallit M Sartelli TC Hardcastle M Haqu Surveillance of antimicrobial resistance in low- and middle-income countries: a scattered picture *Antimicrob Resist Infect Control* 2021;10:163
11. Junkins A, et al. Comparison of BD Phoenix™ AP Workflow with Vitek 2. *J. Clin. Microbiol.* 2010. 48 (5): 1929-1931. – Study was a supported grant from BD Diagnostic Systems
12. Jungkind D, et al. Workflow evaluation of the BD Phoenix™ AP Compared to the MicroScan Walkaway overnight system for identification and susceptibility testing of bacteria. As presented at the 110th General Meeting of the American Society of Microbiology. May 2010. – Study was a supported grant from BD Diagnostic Systems.
13. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing. 35th Informational Supplement. Wayne, PA: Clinical and Laboratory Standards Institute; 2025.
14. AM Minassian R Newnham E Kalimeris P Bejon BL Atkins ICJW Bowler Use of an automated blood culture system (BD BACTECTM) for diagnosis of prosthetic joint infections: Easy and fast *BMC Infect Dis* 2014;14:1233.
15. Chawda H, Mistry M, Parmar T, A study of microbiological profile and antibiotic susceptibility pattern of the organisms isolated from blood stream infection in patients of critical care units in tertiary care hospital in Western India. *IP Int J Med Microbiol Trop Dis* 2019;5(2):83-86
16. Bhabhor U, Bhabhor H, Shingala H, Sinha M, Bacteriological study of blood stream infection (BSI) in ICU patients. *Indian J Microbiol Res* 2018;5(3):368-373
17. Sarwariya M, Sadawarte K, Rukadikar A R, Prabhu T, Aerobic bacterial profile of blood stream infections and its antimicrobial sensitivity pattern in tertiary care hospital. *Indian J Microbiol Res* 2017;4(4):363-366