ORIGINAL RESEARCH PAPER

Volume - 15 | Issue - 05 | May - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

BACTERIOLOGICAL PROFILE AND ANTIBIOGRAM OF BLOOD STREAM INFECTION IN PAEDIATRIC AGE GROUP- A RETROSPECTIVE STUDY

Microbiology

Dr Sumit Gour	MBBS,3ed year Postgraduate student Department: Department of Microbiology
Dr. Avinash Laghawe*	MBBS,MD Professor & Medical Superintendent Department of Microbiology *Corresponding Author
Dr Arti Jain	MBBS, MD Associate professor and Head Department of Microbiolog
Dr. Himanshi Bansal	MBBS, MD Assistant Professor Department of Microbiology

ABSTRACT

Introduction- Bloodstream infections (BSIs) remain a major cause of morbidity and mortality in paediatric patients, particularly in neonatal and intensive care units. Prompt identification of bacterial pathogens and their antimicrobial susceptibility patterns is essential for effective management. The present retrospective study was undertaken to determine the bacteriological profile and antibiogram of blood culture isolates from paediatric patients in a tertiary care hospital. **Material and Methods-** This retrospective study included blood culture samples received from September 2023 to December 2024 in the microbiology laboratory. A total number of 928 paediatric samples (age 0–12 years) were analysed. Isolates were identified using standard microbiological procedures, and antimicrobial susceptibility testing was performed. The data were compiled and analysed for organism distribution and resistance trends. **Results-** A total of 928 paediatric blood samples were received during the study period, of which 401 (40.5%) were culture positive. Among these, Gram-positive organisms predominated, led by Staphylococcus aureus (170 isolates) and Streptococcus Spp (41 isolates) were also recovered. Among Gram-negative isolates, Klebsiella pneumoniae was the most frequent. Antibiogram analysis revealed that Gram Positive isolates showed highest sensitivity to Vancomycin (100%) and Linezolid (82%), and resistance was highest to Penicillin (94%). Among Gram-negative bacteria, sensitivity was highest for Colistin (92%), and resistance to Ampicillin (94%) was prominent. Pseudomonas and Acinetobacter isolates showed comparatively better response to Ciprofloxacin (91%).**Summary and Conclusion-** The study highlights that Gram-positive cocci remain the predominant pathogens in paediatric bloodstream infections, followed by enteric Gram-negative bacilli. So, this study emphasizes the need for periodic surveillance of antimicrobial susceptibility. Continuous monitoring and rational antibiotic use policies are crucial to limit the emergence of multidrug-resistant organisms in paediatric bloodstream infections.

KEYWORDS

Ast, Bsi, Blood Culture, Sepsis, Paediatrics. ICU

INTRODUCTION

\Bloodstream infections (BSIs) are among the most serious infections affecting paediatric patients and are associated with significant morbidity and mortality, particularly in neonates and critically ill children.[1,2] The clinical spectrum of BSIs ranges from transient bacteraemia to severe septic shock and multi-organ dysfunction, making early diagnosis and prompt treatment essential[1]. Children are more vulnerable to BSIs due to immature immune systems, low birth weight, malnutrition, and increased exposure to invasive procedures such as intravenous catheterization and mechanical ventilation. [2,3]

Blood culture remains the gold standard for the diagnosis of BSIs and plays a crucial role in identifying the causative organisms and guiding appropriate antimicrobial therapy. [1,3,4] However, the bacteriological profile of BSIs and their antimicrobial susceptibility patterns vary widely depending on geographical location, hospital settings, and time, necessitating continuous surveillance. The emergence of multidrug-resistant organisms, including methicillin-resistant *Staphylococcus aureus* (MRSA) and extended-spectrum beta-lactamase (ESBL) producing Gram-negative bacteria, has further complicated the management of paediatric sepsis.[3,4]

Studies have reported varying predominance of gram-positive and gram-negative organisms in pediatric BSIs, reflecting regional differences in etiology.[1,2] Understanding local epidemiology and resistance patterns is essential for guiding empirical therapy and improving patient outcomes.[3] Therefore, the present study was undertaken to evaluate the bacteriological profile and antimicrobial susceptibility patterns of BSIs in paediatric patients at a tertiary care hospital

AIM AND OBJECTIVES

Aim-The Bacteriological and Antimicrobial resistance profile of bloodstream infections among paediatric patients in a tertiary care hospital.

Objectives -

- To identify the spectrum of bacterial isolates obtained from blood cultures of paediatric patients
- To analyse the antimicrobial susceptibility patterns of the isolated organisms.

MATERIALS AND METHOD-

This retrospective observational study was conducted in the Department of Microbiology at Government Medical College, Vidisha, Madhya Pradesh, India, over a period of two years (September 2023 to August 2025).

All blood culture records of pediatric patients aged 0–12 years received during the study period were included. A total of 928 blood culture samples were analyzed.

Inclusion criteria-

Record of all blood culture results of paediatrics age group (0-12 years) reported during the study period.

Duration of sample collection within 48 hours of hospital admission as Community acquired BSIs

Exclusion criteria –

Blood cultures records with missing essential information like Age, Gender, UHID, OPD/IPD number Hospital associated BSIs or (>48 hours of hospital admission) not included in our study

RESULT-

A total of 928 blood culture samples were received from paediatric patients during the study period, out of which 401 samples were culture positive, giving a culture positivity rate of 43.2%. Males were 228 (56.9%) and females were 173 (43.1%) [male: female ratio was 1.3:1]. The majority of BSIs were observed in the neonatal age group (<1 month), accounting for 57.8% of total cases, followed by 1–12 months (24.7%).

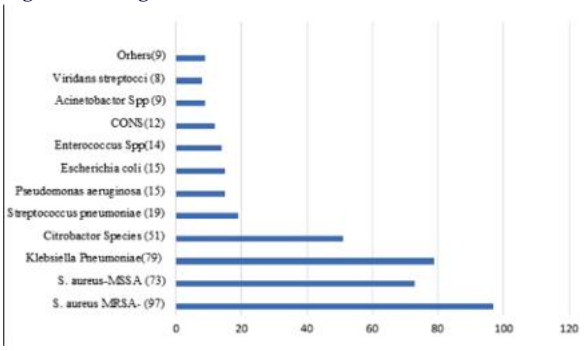
In the present study, out of a total of 401 culture-positive isolates, Gram-positive cocci (GPC) constituted the majority with 223 isolates (56%), whereas Gram-negative bacilli (GNB) accounted for 178 isolates (44%).

Staphylococcus aureus was the predominant organism, accounting for

the highest number of cases. Within this group, methicillin-resistant *Staphylococcus aureus* (MRSA) constituted 97 isolates, while methicillin-sensitive *Staphylococcus aureus* (MSSA) accounted for 73 isolates, indicating a high prevalence of methicillin resistance. The Streptococcus group, including *Streptococcus pneumoniae* (19), *Enterococcus* species (14), and *Viridans streptococci* (8), also contributed to the overall burden of BSIs. Additionally, Coagulase-negative staphylococci (CONS) accounted for 12 isolates only.

Among GNB, *Klebsiella pneumoniae* (79) was the most common pathogen, followed by *Citrobacter* species (51). Other Gram-negative organisms included *Escherichia coli* (15), *Pseudomonas aeruginosa* (15), and *Acinetobacter* species (9).

Figure 1-Pathogenic Isolates from BSIs

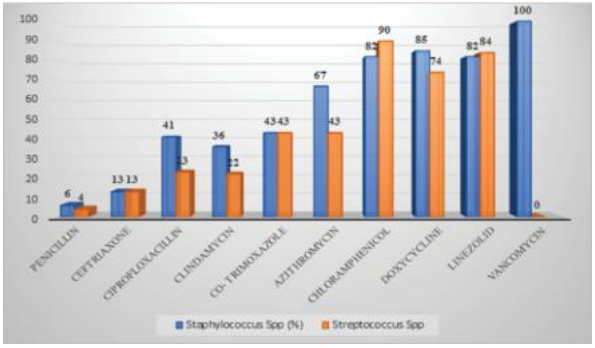


Anti-Microbial Susceptibility (AST) Pattern-

Out of the total 223 GPC isolates, Staphylococcus aureus accounted for 170 (76.2%) isolates, out of which 57% were MRSA and 43% were MSSA. AST pattern shown maximum sensitivity was observed to Vancomycin (100%), followed by Doxycycline (85%), Chloramphenicol (82.48. Moderate sensitivity was seen with Azithromycin (67.5%), Cotrimoxazole (43.44%) and Ciprofloxacin (41%). A high level of resistance was observed to beta-lactam antibiotics, with Penicillin (6%) and Ceftriaxone (16%) showing poor efficacy.

Out of the total 223 GPC isolates, 41 isolates (18.4%) were identified as belonging to the Streptococcus group, which included Streptococcus pneumoniae, Viridians streptococci, and Enterococcus species. (Figure-2). Maximum sensitivity was observed to Chloramphenicol (90%), Linezolid (84%), and Doxycycline (74%), indicating their effectiveness in treatment. Moderate sensitivity was noted with Cotrimoxazole (43%) and Azithromycin (43%), while lower sensitivity was observed with Penicillin (4%)

Figure 2 - AST pattern of Gram Positive Cocci

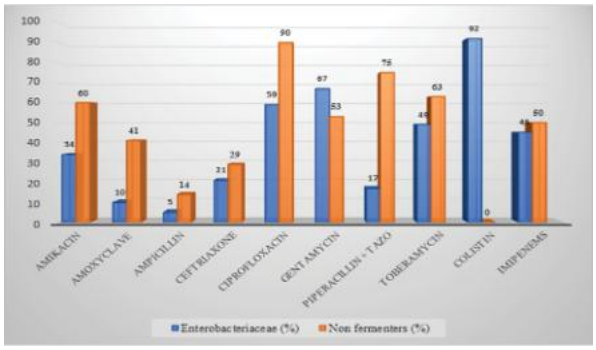


Out of the 178 GNB isolates, 154 (86%) were from Enterobacteriaceae family, comprising *Klebsiella* spp., *Escherichia coli*, *Citrobacter* spp., and *Enterobacter* spp.

AST Pattern of GNB, Enterobacteriaceae family showed maximum sensitivity to Colistin (92%), followed by Gentamicin (67.34%), Moderate sensitivity was seen with Ciprofloxacin (59.66%). While lower sensitivity was seen against Ampicillin (5%) and Amoxiclav (10%), indicating poor efficacy of first-line drugs. (Figure-3)

Out of the 178 GNB isolates, 24 (14%) were non-fermenters, comprising *Pseudomonas* spp and *Acinetobacter* spp. Among the tested agents, Ciprofloxacin showed the Highest sensitivity (90.9%), indicating its strong efficacy against non-fermenters in the present study. Good sensitivity was also observed with **Piperacillin-tazobactam (75%)** and **Tobramycin (63.66%)**, suggesting their usefulness in clinical management. While lower sensitivity was observed against several beta-lactam antibiotics like **Ampicillin(14%)**.

Figure 3- AST Pattern of Gram Negative Bacilli



DISCUSSION-

BSIs remain a significant cause of morbidity and mortality in paediatric patients, particularly in neonates and infants. In the present study, the culture positivity rate was 43.2%, which is comparable to the findings of Prabhu *et al.* [2], who reported a positivity rate of 44%. However, this rate is considerably higher than that reported by Mukherjee *et al*. [4] (15.74%). The higher positivity rate in our study may be attributed to inclusion of clinically suspected cases and differences in patient population and sampling techniques.

Age-wise distribution revealed that neonates (<1 month) constituted the majority (57.8%) of cases. Similar findings were reported by Palewar *et al.*[3], where the highest incidence was also seen in neonates. In contrast, Mukherjee *et al.* [4] observed a higher prevalence in the 1 month–1 year age group. The increased susceptibility in neonates can be explained by their immature immune system, low birth weight, and higher exposure to invasive procedures.

In the present study, GPC (56%) predominated over GNB (44%), which is consistent with the findings of Prabhu *et al*. [2]. However, Mukherjee *et al*. [4] reported a predominance of Gram-negative organisms (81.7%), indicating regional variation in bacterial etiology. Among the isolates, *Staphylococcus aureus* (42%) was the most common organism, which is in agreement with other studies.[2,3], where *S. aureus* was also the predominant pathogen, in contrast, Mukherjee *et al.* [4] reported *Klebsiella* spp. as the most common isolate. This difference may be due to variation in hospital settings and patient demographics.

The prevalence of MRSA in our study was 57%, which is comparable to Palewar *et al.* [3], who reported MRSA prevalence ranging from 62% to 70%. This indicates a rising trend of methicillin resistance, posing a significant challenge in treatment.

Among Gram-negative isolates, *Klebsiella pneumoniae* was the predominant organism, which is consistent with findings from Mukherjee *et al.*[4] The high prevalence of Gram-negative pathogens highlights their continued role in paediatric BSIs.

CONCLUSION-

BSIs are a major cause of morbidity and mortality in children; the present study highlights a significant burden of BSIs, particularly among neonates, along with their antimicrobial susceptibility patterns in a tertiary care centre in Vidisha, Madhya Pradesh, India.

Overall, the present study highlights the changing trends in bacterial profile and increasing AMR among paediatric BSIs.Continuous surveillance of antimicrobial susceptibility in the pediatric population is essential. Implementation of antibiotic stewardship programs, along with hospital antibiotic policies and treatment protocols, is crucial for effective management and prevention of drug resistance. This approach can reduce hospital stay, healthcare costs, and mortality, while promoting rational antibiotic use and limiting the emergence of resistant strains.

REFERENCES

1. Prakash Hindurao Waghmare *et al.* Bacteriological profile of bloodstream infections in paediatric age group in a tertiary care centre, Solapur. Indian Journal of Microbiology Research. 2024 Jul 15 [cited 2025 Sep 22];11(2):113–8.
2. Sharew B, Tilahun M. Bacterial profile and antimicrobial resistance patterns among paediatrics patients with suspected bloodstream infections in Ethiopia: a systematic review and meta-analysis. BMC Infectious Diseases [Internet]. 2025 Aug 9 [cited 2025 Sep 22];25(1).
3. Mudshingkar S, Palewar M, *et al.* Bacteriological profile and antibiogram of blood culture isolates from a tertiary care hospital of Western India. Journal of Datta Meghe Institute of Medical Sciences University. 2020;15(2):261.
4. Panchal, K. Bacteriological Profile and Antibiogram of Blood Culture Isolates In Pediatric Population From A Tertiary Care Hospital: A Hospital-Based Observational Study. International Journal of Medical and Pharmaceutical Research [Internet]. 2025 Aug 5 [cited 2025 Sep 22];6:369–74
5. Habyarimana T, Murenzi D *et al*. Bacteriological Profile and Antimicrobial Susceptibility Patterns of Bloodstream Infection at Kigali University Teaching Hospital. Infection and Drug Resistance. 2021 Feb;Volume 14:699–707.
6. Mahesh C, Alex AM, Navaneeth BV. Bacteriological profile and antibiotic susceptibility test of blood culture isolates in pediatric patients at a tertiary care teaching hospital. Ijmmtdorg s[Internet]. 2025 Jul 22 [cited 2025 Sep 23];3(1):31–6. Available from: https://ijmmtd.org/archive/volume/3/issue/1/article/8460#article
7. Shyam Prasad Pant, Dhruba Hari Chandi, *et al*. Bacteriologic Profile and Antibiogram of the Blood Culture Isolates in Febrile Children. International Journal of Innovative Research in Medical Science. 2017 Nov 25;2(11).
8. Meremkwer MM, *et al.* Bacterial isolates from blood cultures of children with suspected septicaemia in Calabar, Nigeria. BMC Infect Dis 2005; 5:110-5.
9. De A, Saraswathi K, Gogate A, *et al.* Bacteremia in hospitalized children-A one year prospective study. Indian J Med Microbiol 1995; 13:72-5.
10. Enrione MA, Powell KR. Sepsis, septic shock and systemic inflammatory response syndrome. In: Nelson textbook of paediatrics. Kleigman RM, Behraman RE, Jenson HB, Stanton BF, editors. 18th ed. Philadelphia: WB Saunders; 2007. p. 1094. 4. Richard B, Thomson JR. S
11. Roy I, Jain A, Kumar M, Agarwal SK. Bacteriology of neonatal septicaemia in a tertiary care hospital of northern India. Indian J Med Microbiol 2002; 20:156-9.