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Original Research Article

Bacteriological Profile and Antimicrobial Susceptibility Pattern of Blood Culture Isolates Among Septicemia-Suspected Children

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Abstract:

Background: One of the leading causes of illness and death in children is still septicemia. Appropriate care depends on early detection of the pathogenic organisms and their patterns of antibiotic susceptibility.

Objective: To ascertain the antibiotic susceptibility pattern and bacteriological profile of blood culture isolates from children suspected of having septicemia who were hospitalized to a tertiary care hospital.

Methods: 140 blood culture samples from clinically suspected cases of septicemia over a one-year period were included in this retrospective investigation. Analysis was done on isolated organisms, culture findings, demographic information, and patterns of antibiotic susceptibility. The chi-square test was used for statistical analysis, and a p-value of less than 0.05 was deemed statistically significant.

Results: 60 (42.8%) of the 140 samples tested positive for culture. The majority of organisms were Gram-negative (70%) as opposed to Gram-positive (30%). The most frequent isolates were Klebsiella spp. (30%) and Staphylococcus aureus (25%). Gram-negative isolates were more sensitive to carbapenems but more resistant to third-generation cephalosporins (p=0.02). High sensitivity to vancomycin and linezolid was demonstrated by gram-positive isolates.

Conclusion: The most common pathogens in pediatric septicemia were gram-negative bacteria. The necessity of routine surveillance and antibiotic stewardship initiatives is highlighted by the rise in antimicrobial resistance.

Keywords: Klebsiella spp, Staphylococcus aureus, pediatric, Gram-negative, Gram-positive.

Introduction

Pathogenic germs in the bloodstream can induce septicemia, a potentially fatal systemic infection [1]. It is a major reason why children are admitted to hospitals, especially in underdeveloped nations. The most reliable method for determining the causative organisms is still an early diagnosis made via blood culture [2]. But new antibiotic resistance has made empirical treatment more difficult, increasing morbidity, lengthening hospital stays, and raising medical expenses [3]. To guide empirical antibiotic therapy, it is crucial to comprehend the local bacteriological profile and patterns of antimicrobial sensitivity. Assessing the variety of organisms identified and their resistance patterns in a tertiary care setting is the goal of this investigation [4].

Methods

Study Design: Retrospective observational study.

Study Setting: Patna medical college and hospital, Patna.

Study Duration: One year.

Study Population: 140 children clinically suspected of septicemia.

Inclusion Criteria

- Children aged 1 month to 15 years
- Clinical suspicion of septicemia
- Blood culture performed

Exclusion Criteria

- Incomplete records
- Contaminated samples

Data Collection

Hospital microbiology records were reviewed for:

1. Age and gender
2. Blood culture results
3. Organism isolated
4. Antimicrobial susceptibility pattern

Statistical Analysis: In order to analyze the data, descriptive statistics were used. The chi-square test was performed to evaluate the relationship between

organism type (Gram-negative vs. Gram-positive) and resistance to routinely used antibiotics. P-values less than 0.05 were regarded as statistically significant.

Results

Table 1: Culture Positivity Rate

Total Samples	Culture Positive	Culture Negative	Positivity Rate
140	60	80	42.8%

Table 2: Distribution of Isolated Organisms (n=60)

Organism	Frequency	Percentage (%)
Klebsiella spp.	18	30%
Staphylococcus aureus	15	25%
E. coli	10	16.7%
Pseudomonas spp.	9	15%
Acinetobacter spp.	5	8.3%
Others	3	5%

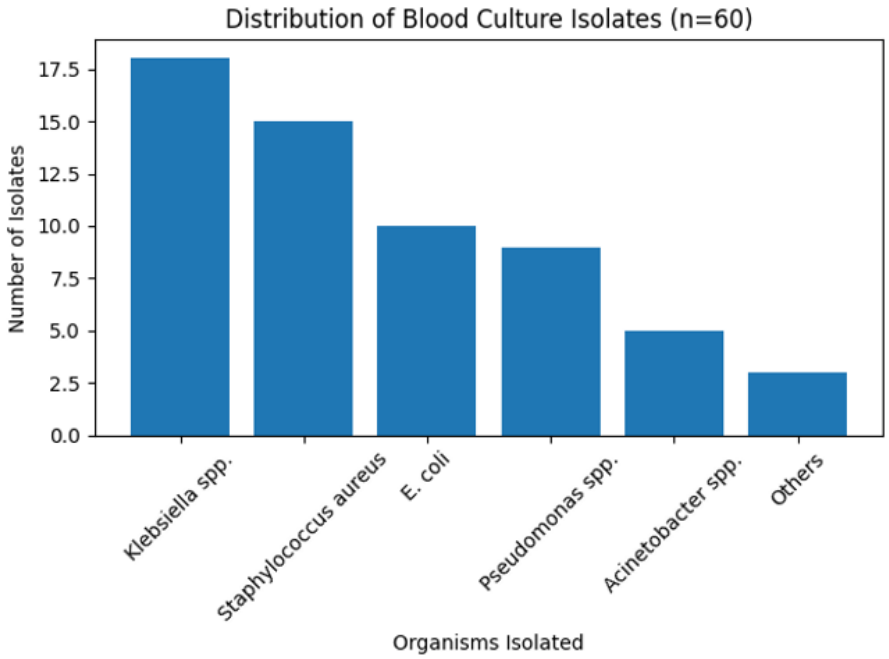

Figure 1: Distribution of blood culture isolates (n=60)

3: Gram Stain Distribution

Organism Group	Frequency	Percentage (%)
Gram-negative	42	70%
Gram-positive	18	30%

1. Antimicrobial Susceptibility Pattern

Table 4: Gram-negative Isolates

Antibiotic	Sensitive (%)	Resistant (%)
Ceftriaxone	35%	65%
Amikacin	60%	40%
Piperacillin-Tazobactam	68%	32%
Imipenem	85%	15%

Table 5: Gram-positive Isolates

Antibiotic	Sensitive (%)	Resistant (%)
Penicillin	30%	70%
Cefazolin	55%	45%
Vancomycin	100%	0%
Linezolid	100%	0%

2. Statistical Association

Resistance to third-generation cephalosporins was found to be statistically significantly correlated with Gram-negative organisms (p=0.02). Gram-positive isolates showed no discernible resistance to vancomycin (p=0.001 for retained sensitivity).

Discussion

Comparable to other tertiary care studies, this one showed a 42.8% culture positivity rate. Klebsiella spp. were the most frequently isolated gram-negative microbes, accounting for 70% of the total. This result is consistent with current patterns that indicate a rise in Gram-negative septicemia in children [5].

Gram-negative isolates' high resistance to third-generation cephalosporins raises concerns and may indicate the formation of extended-spectrum beta-lactamases (ESBLs). Carbapenems, on the other hand, continued to be highly effective, which made them appropriate for serious infections. The most common Gram-positive bacteria was Staphylococcus aureus [2], [6]. While penicillin resistance is still high, universal sensitivity to vancomycin and linezolid is comforting [7].

The results emphasize how crucial local antibiograms are for directing empirical treatment and halting the spread of antibiotic resistance. Retrospective design and single-center data are among the limitations [8].

Conclusion

Klebsiella spp. are the most often isolated gram-negative bacteria, which are the main cause of septicemia in suspected pediatric cases. A major worry is the rise in resistance to widely used antibiotics like cephalosporins. To enhance clinical results and lessen resistance trends, routine monitoring of antimicrobial susceptibility patterns and the execution of antibiotic stewardship initiatives are crucial.

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