

Blood Stream Pathogens and their Antibiotic Profile in a Tertiary Care Hospital

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Abstract: *The aim of this study is to study the prevalence of type of organisms in the blood culture of clinically suspected septicaemia and their sensitivity pattern, in a tertiary care hospital. A total number of 480 blood samples were received to Microbiology department to screen various pathogens responsible for bloodstream infection.*

Keywords: Bacteriaemia, BSI, Blood Stream Pathogen, Antibiotic resistance

1. Introduction

Bloodstream infections (BSIs) are defined as the presence of viable infectious microorganisms in the bloodstream causing clinical illness. Illness associated with BSI ranges from self-limiting infection to life threatening sepsis that requires rapid and aggressive antimicrobial treatment. Bloodstream infection (BSI) is a significant cause of morbidity and mortality throughout the world. Bacteremia, sepsis, central venous catheter related blood stream infections are associated with high mortality and morbidity. They represent about 15% of all nosocomial infections and affect approximately 1% of all hospitalized patients.⁹

Numerous classes of antimicrobial agents have become less effective as a result of the emergence of antimicrobial resistance, often as a result of the selective pressure of antimicrobial usage.² These resistance trends and the clinical significance and changing spectrum of microbial pathogens argue strongly for a national program of antimicrobial resistance surveillance.

Prompt initiation of an effective antibiotic therapy is necessary in order to reduce mortality and to improve clinical outcome.

Among the bacterial causes of BSI, Staphylococcus aureus, coagulase negative Staphylococci, and Enterococcus faecalis are the commonest among Gram positive organisms; Escherichia coli, Klebsiella pneumonia, and Serratia spp are the commonest among Enterobacteriaceae; and Pseudomonas spp and Acinetobacter baumannii are the commonest amongst the non fermenter Gram negative

organisms. Among fungi, it is non albicans Candida spp followed by Candida.

2. Aims and Objectives:

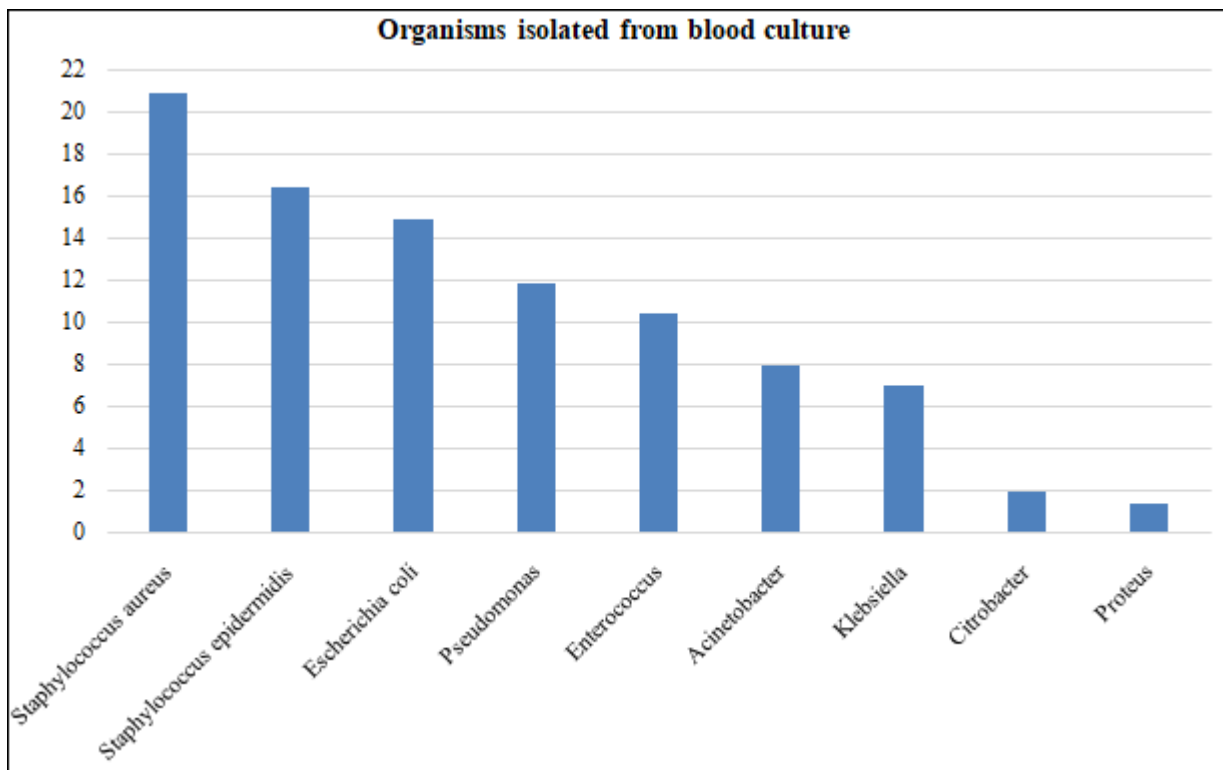
The aim of this study is to study the prevalence of type of organisms in the blood culture of clinically suspected septicaemia and their sensitivity pattern, in a tertiary care hospital.

3. Materials and Methods

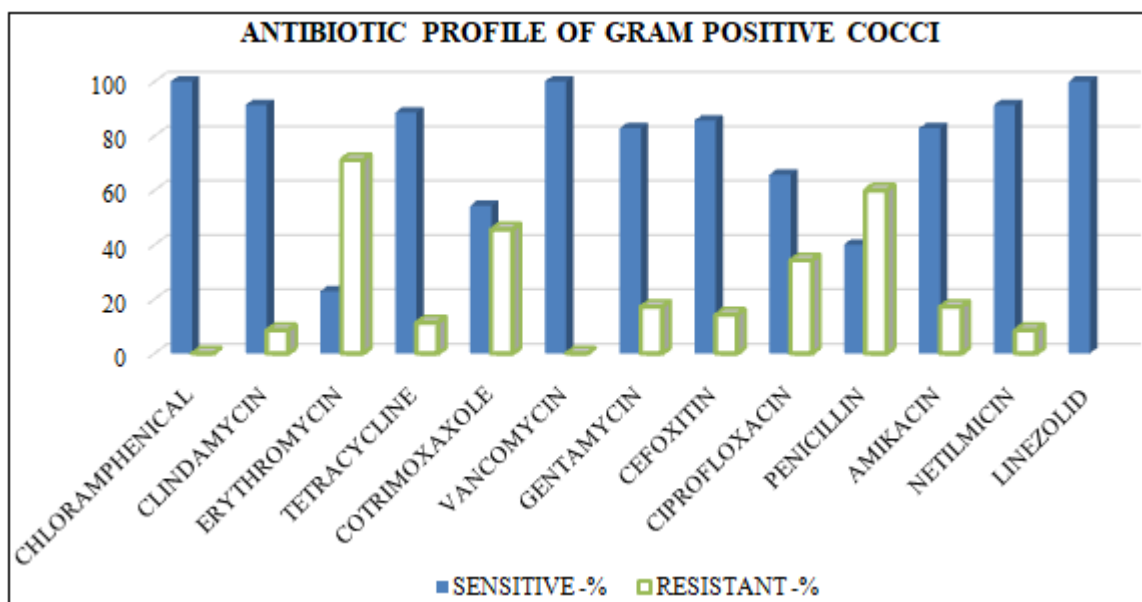
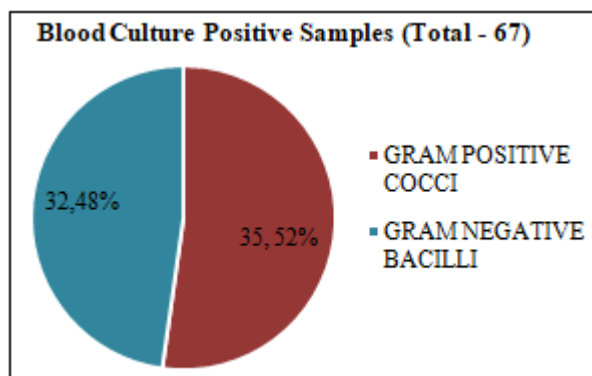
All blood samples sent from clinically suspected cases of Septicaemia to Department of Microbiology, Sree Mookambika Institute of Medical Sciences, Kulasekharam were included in which 480 samples were taken for study during the period January 2022-June 2022 (6 months). Blood samples were collected with aseptic technique and processed manually in Microbiology laboratory and isolates were identified by standard laboratory methods and then antibiotic susceptibility test was performed by using CLSI guidelines.

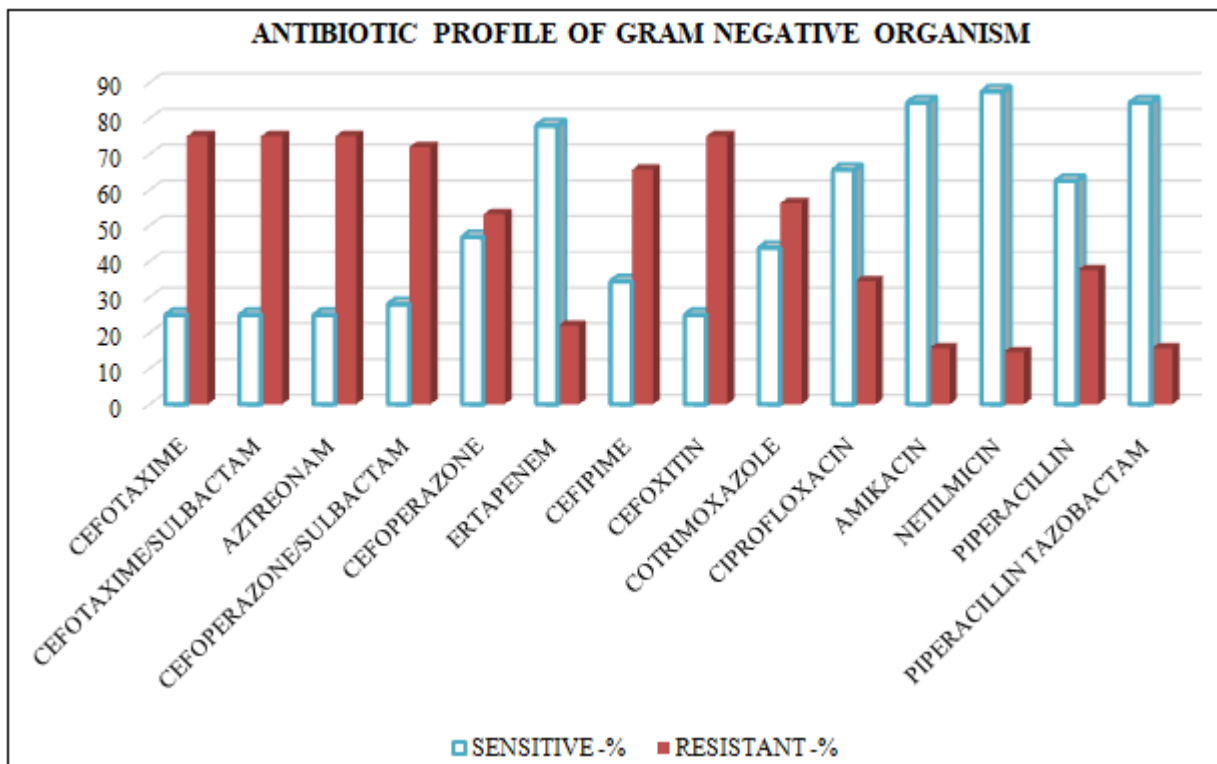
4. Results

Out of 480 samples, 67 samples were found to be positive for bacterial growth. 14 (20.9%) Staphylococcus aureus, 13 (16.4%) Staphylococcus epidermidis, 10 (14.9%) Escherichia coli, 8 (11.9%) Pseudomonas, 7 (10.4%) Enterococcus, 6 (8%) Acinetobacter, 5 (7%) klebsiella, 2 (2%) Citrobacter, 1 (1.4%) Proteus.

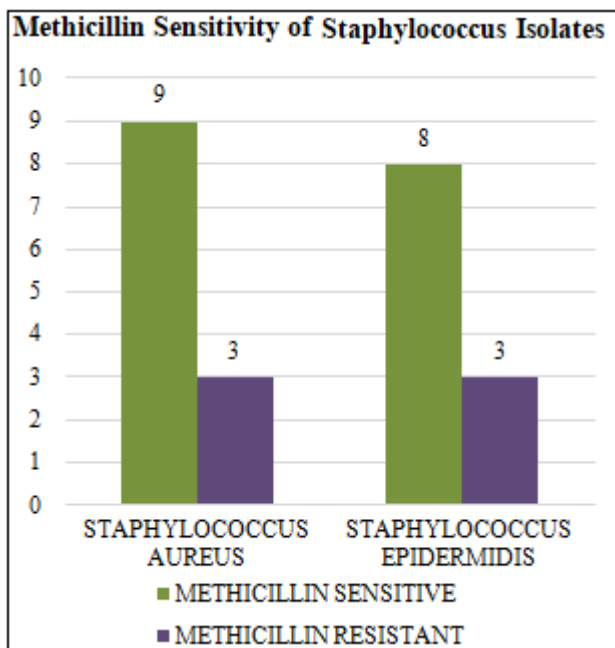
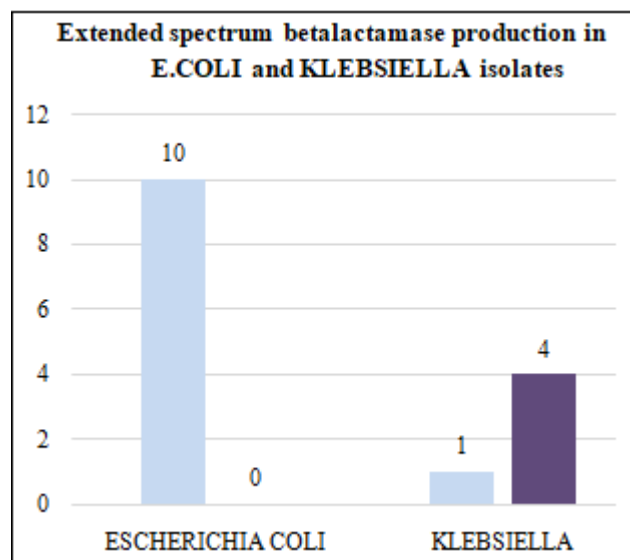


In total, 52% of the organisms isolated were gram-positive and 48% organisms were gram negative bacilli.





Both gram positive and gram negative isolates shows a good percentage of sensitivity towards amikacin and netilmicin. Gram positive isolates are sensitive to vancomycin (100%), linezolid (100%), chloramphenicol (100%), clindamycin (91.4%), netilmicin (91.4%), tetracycline (88.6%), cefoxitin (85.7%), amikacin (82.8%), gentamycin (82.8%). Gram negative isolates are sensitive netilmicin (87.5%), amikacin (84.4%), piperacillin-tazobactam (84.4%), ertapenem (78%), ciprofloxacin (65.6%), piperacillin (62.5%).



5. Discussion

In our study, the blood culture positivity rate in clinically suspected Septicaemia cases was 14%, which was similar to the studies by Manjula Mehta et al. (9.4%),⁵ and in contrast to other studies by Venkatesh et al. which showed positivity of 27.16%.⁶ Such differences in prevalence of BSI could be due to the different methodology used in blood culture system, the study design, geographical location, nature of patient population, epidemiological difference of the etiological agents and differences in the infection control policies.

In our study, Gram-positive and Gram – negative bacteria constituted 52% and 48% respectively. This finding was similar to a study by Mitta et al., which shows predominance of gram positive organisms (53%); and not in accordance with the studies by Radha Rani et al.⁷ and Narayan prasad et

al.¹ where Gram-negative bacilli were more than the Gram-positive organisms. The predominant Gram-positive isolate was *Staphylococcus aureus* (20.9%), followed by coagulase-negative *Staphylococci* (16.4%) and *Enterococcus* species (10.4%). The gram negative organisms are 14.9% of *E. coli*, 11.9% *Pseudomonas*, 8% *Acinetobacter* and 7% *Klebsiella*. In several studies, CoNS followed by *S. aureus* comprised the most prevalent bacteria isolated from BSI.⁵

The prevalence of ESBL producers among *Escherichia coli* species was 100% in the present study which is higher than a study from Delhi published in 2010 where 41.7% of *Escherichia coli* isolates were ESBL producers.⁷ Hospitalization in the previous 3 months and co morbidity could be the risk factors associated with infections by the ESBL-producing Gram-negative bacteria.⁷ A study from Mumbai revealed that *Pseudomonas* species was the most common (30.37%) gram negative isolate with *Escherichia coli* and *Klebsiella* species accounting 16.06% and 10.61% respectively.⁸

6. Conclusion

Alarming rates of antimicrobial resistance among blood culture isolates is a serious issue. Prompt and accurate diagnosis and rational antimicrobial therapy are extremely needed. Increase in antibiotic resistance for BSI causing pathogens has necessitated continuous monitoring of the susceptibility of organisms towards antibiotics to prevent and spread of drug resistance. Guidelines for antibiotic therapy can be helpful for clinicians to select more appropriate antibiotics for effective treatment and prevent the development of drug resistance.

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