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Original Research Article

Bacteriological Analysis of Blood Cultures among the Sepsis Patients from a Tertiary Health Care Setup

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Abstract

Introduction: Bloodstream infections (BSIs) are a leading cause of morbidity and mortality in hospitalized patients. Coagulase negative staphylococcus (CoNS) is the leading cause for the contamination of blood cultures (BCC). With this a study was conducted to find the various pathogens isolated in the blood cultures those with BSIs.

Methods: It was a prospective research, conducted in the department of Microbiology, Rangaraya Medical College, Kakinada between March to May 2024. Individuals aged ≥18 years suspected with BSIs were included, those on antimicrobial treatment were not considered. Two blood samples were collected as per the guidelines and Brain heart infusion (BHI) biphasic media was used for culture. Blood culture, identification were carried as per the guidelines.

Results: Total 74 members were included and 22 (30%) blood cultures were positive. Klebsiella (8) was the leading isolate followed by Esch.coli (5), Staph. aureus (4) *Acinetobacter baumannii* (3) and CoNS (2). Maximum drug resistance (DR) was observed to ampicillin and there was no Vancomycin resistance.

Conclusions: In this study, 30% blood culture were positive. GNRs are the common isolates and Klebsiella was the common isolate. No significant DR was identified. Short duration is the limitation of this research.

Keywords: Blood Culture, Study, Patients, Research.

Introduction

Bloodstream infections (BSIs) are a leading cause of morbidity and mortality in hospitalized patients worldwide. [1] Obtaining a blood culture (BC) is the primary tool for determining whether patient had BSI or not and also requirement of antimicrobial therapy. But contamination of blood cultures (BCCs), is the leading issue while reporting the BCs as flora is common on the skin surface. [2]

It was reported a higher likelihood of BCC in critically ill patients, specifically those at triage levels 1 and 2 according to the modified Canadian Triage and Acuity Scale. [3] This increased risk is attributed to the urgency of care these patients require, which often limits the time available for proper blood sampling procedures. Consequently, the need for rapid intervention in these severe cases may compromise the accuracy of BCs. Differentiation of BCC is important aspect as the microbes enter through the skin. Coagulase negative staphylococcus (CoNS) is the leading cause for the BCC followed by the other agents namely, Micrococcus species, Propionibacterium species and so on. With this a study was conducted to find the various pathogens isolated in the BCs those with BSIs.

Materials and Methods

It was a prospective research, conducted in the department of Microbiology, Rangaraya Medical College, Kakinada. Study was conducted between March 2024 to May 2024. The study protocol was approved by the institutional ethical committee. An informed written consent was taken from all the participants. Individuals aged ≥18 years suspected with BSIs were included in the study. Individuals who did not submit the consent, those on antimicrobial treatment were not considered.

Initially the study was explained to the study members. All the doubts were cleared. It was also explained that there is no influence of the study on the health of the participants. Then physical examination was carried and the findings were recorded in the proforma. After this 2 blood samples

were collected under sterile precautions as per the university guidelines. Blood collection for culture typically involved aseptic techniques to minimize contamination. [5] Healthcare professionals disinfected the patient's skin, with sterile equipment, and collected the blood sample, often from a vein. [6] They ensured the sample was placed in culture bottles immediately to promote microbial growth if present. This procedure aimed to maintain sample integrity and prevent external contamination, crucial for accurate diagnosis and treatment. The collected samples were then promptly transported to the laboratory for analysis.

Brain heart infusion (BHI) biphasic media was used for culture, mixed thoroughly and bottle was tiled ones so that solid phase cultured with liquid media. After this, culture bottles were incubated at 37^0C for a week and sub culturing was continued for every 24 hrs. If growth was found on solid phase, culture was done on blood agar, MacConkey agar and after incubation the isolate was indented as per the Chandra et al. study. [7]

Statistical Analysis: The data was analyzed using SPSS version 20. The data was presented in mean and percentages.

Results

Total 74 members were included and 22 (30%) BCs were positive. Klebsiella (8) was the leading isolate followed by Esch.coli (5), Staph. aureus (4) *Acinetobacter baumannii* (3) and CoNS (2).The rest of the BCs (52) were sterile. Maximum drug resistance (DR) was observed to ampicillin and there was no Vancomycin resistance in this research.

Discussion

Sepsis imposes a significant global burden on healthcare systems. The gold standard for diagnosing sepsis is BC, which isolates the causative agents. However BSIs present a considerable challenge for clinicians due to the evolving resistance profiles of bacteria. [8] This changing resistance complicates treatment and increases the difficulty of managing infections effectively. Accurate diagnosis through BCs remains critical, but the growing antibiotic resistance among pathogens necessitates ongoing adaptation in clinical approaches and treatment protocols to combat sepsis effectively and improve patient outcomes. [9]

In this research 22 BCs were positive, positivity rate was 30%. Ina research by Pandey S et al. [10] 12.6: BCs were positive. In another Indian report, 26.8% BCs were positive. [11] However low BC positive results were also reported in the literature. [12]

In this study, out of the 22 isolates, gram negative rods (GNRs) were the leading. Similar findings were reported in the literature. The exact cause for the more GNRs is not known. Our findings differed slightly from those of Gohel K et al. (2014). Gram-positive bacteria accounted for 58.3% of cases, with a predominance of Staphylococcus aureus, while GNRs made up 40.2% of cases, predominantly Enterobacteriaceae. The etiologic agents vary due to geographical differences and epidemiological variations. Other contributing factors may include the nature of the patient population, the limited sample size, and the duration of the study. [14]

In this study significant DR was not detected. Clinicians must stay informed about the prevalence of common bacterial infections and the effectiveness of current treatments. This knowledge ensures that they prescribe the most effective antimicrobials, tailored to local susceptibility patterns and specific infection sites. Regular updates on resistance trends and local epidemiology are crucial for making informed treatment decisions, optimizing patient outcomes, and combating antibiotic resistance effectively. Continuous education and access to updated data are essential for maintaining high standards of care.

In this study, 30% BC were positive. GNRs are the common isolates and Klebsiella was the common isolate. No significant DR was identified. Short duration is the limitation of this research.

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