



Research Article

Microorganisms isolated from blood cultures in pediatrics clinic

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Received: 28 December, 2019

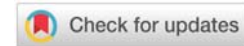
Accepted: 28 January, 2020

Published: 29 January, 2020

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Keywords: Blood culture; Pediatric patients; Microorganisms

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Abstract

Because of high mortality and morbidity, identification of microorganisms causing sepsis is important for the treatment of the patient. Blood culture is the most valuable test for diagnosis and treatment. The aim of this study was to evaluate microorganisms isolated from blood cultures retrospectively.

Blood cultures accepted to the Medical Microbiology Laboratory between 01.01.2017 and 31.12.2017 was included in this study. Cultures were made with the incubation in automated system (BacT/Alert 3D, BioMerieux, France). Samples were then passaged to 5% sheep blood agar and Eosin Methylene Blue (EMB) medium and incubated at 37°C for 24-48 hours. Cultured microorganisms were identified by conventional methods and MALDI-TOF MS/VITEC 2 system (BioMerieux, France).

Blood culture results of 1004 patients were analyzed retrospectively. 568(56.6%) were identified as Coagulase Negative Staphylococci (CNS), 125(12.5%) were *K.pneumoniae*, 50(5.0%) were *S. aureus*, 50(5.0%) *Candida* spp., 30(3%) were identified as *Acinetobacter* spp., followed by other microorganisms.

In this study, most common isolated microorganisms were CNS in blood cultures. Considering that most of these microorganisms were isolated in single blood culture, most of them were thought to be contaminant. Therefore, at least two sets of blood cultures should be obtained to be beneficial to accurate diagnosis. In addition, it should be kept in mind that they may cause sepsis of *K. pneumoniae*, *S. aureus*, *Candida* spp., and other microorganisms.

Introduction

Nowadays, hospitalization rates of patients are increasing in parallel with the improvements in care and treatment. Long-term hospitalizations for the treatment of chronic diseases, especially cancer, etc., increase the risk of infection in all patients, especially in immune-compromised patients and patients with poor general status. Nosocomial infections are more common due to the administration of broad-spectrum antibiotics to patients, life support through invasive procedures, and longer hospital stay [1,2].

Blood and circulatory system infections are the most important infections affecting morbidity and mortality. Increased invasive procedures to diagnosis and treatment,

increased cancer surgery and organ transplantation, and widespread use of immunosuppressive therapies are some of the risk factors for blood and circulatory system infections [3]. Blood culture is an important diagnostic method used to isolate microorganisms that cause bacteremia and is an important in terms of guiding the treatment [4,5].

Nosocomial infections agents, especially sepsis agents, vary from country to country, from hospital to hospital, depending on the country's development status, antibiotic use strategies, and general condition and characteristics of patients. Even in different hospital units, different microorganisms can cause infections. Determining the diversity of microorganisms growing in blood cultures and determining antibiotic susceptibilities are important to prevent effective infection



control measures, to establish empirical treatment protocols and initiate appropriate treatment [6].

Because of high mortality and morbidity, identification of microorganisms causing sepsis is important for the treatment of the patient. Blood culture is the most valuable test for diagnosis and treatment. The aim of this study was to evaluate microorganisms isolated from blood cultures retrospectively.

Materials and methods

Blood cultures accepted to the Medical Microbiology Laboratory that obtained from patients hospitalized in the pediatric clinic of Necmettin Erbakan University Meram Medical Faculty Hospital between 01.01.2016 and 31.12.2017 was included in this study. Blood culture results of 1004 patients were analyzed retrospectively.

After the children's skin was cleaned with baticon/alcohol, blood was taken with a sterile syringe. The optimal amount of blood in children was considered to be 1–5ml. With a practical approach, 1 ml of blood was taken for every age from children of 1 to 6 years old, and 5ml from older 6 years old.

Cultures were made with the incubation in automated system (BacT/Alert 3D, BioMerieux, France). Gram staining was made from the vials that gave positive signals during the incubation period and the result was given as preliminary information to the relevant clinic. Samples were then passaged to 5% sheep blood agar and eosin methylene blue (EMB) medium and incubated at 37°C for 24–48hours. Cultured microorganisms were identified by conventional methods and MALDI-TOF MS/VITEC 2 system (BioMerieux, France).

Results

Of the 1004 microorganisms isolated from blood cultures, 568(56.6%) were identified as coagulase negative staphylococci (CNS), 125 (12.5%) were *K.pneumoniae*, 50(5.0%) were *S. aureus*, 50(5.0%) *Candida* spp., 30(3%) were identified as *Acinetobacter* spp., followed by other microorganisms. The microorganisms isolated according to years shows in Table 1.

Table 1: The microorganisms isolated according to years.

| Isolated microorganisms | 2016 year n-% | 2017 year n-% | 2018 year n-% | Total n-% |
|---------------------------|------------------|------------------|------------------|--------------|
| CNS* | 120-49.8% | 262-58.4% | 186-59.2% | 50-56.6% |
| <i>K.pneumoniae</i> | 43-17.9% | 49-10.9% | 33-10.5% | 125-12.5% |
| <i>S. aureus</i> | 9-21.7% | 33-7. % | 8-2.5% | 50-5% |
| <i>Candida</i> spp. | 24-10% | 17-3.8% | 9-2.9% | 50-5% |
| <i>Acinetobacter</i> spp. | 3-1.3% | 15-3.4% | 12-3.8% | 30-3% |
| <i>E. coli</i> | 8-3.3% | 12- 2.7% | 8-2.5% | 28-2.8% |
| <i>Enterococcus</i> spp. | 8-3.3% | 10-2.2% | 9-2.9% | 27-2.7% |
| <i>P. aeruginosa</i> | 7-2.9% | 11-2.5% | 7-2.2% | 25-2.5% |
| <i>E. cloacae</i> | 6-2.5% | 6-1.3% | 4-1.3% | 16-1.6% |
| Others | 13-5.4% | 34-7.6% | 38-12.1% | 85-2.5% |
| Total | 241 | 449 | 314 | 1004 |

* Coagulase negative staphylococci.

Discussion

Bloodstream infections are the most frequent infections in pediatric patients and one of the most serious and potentially life-threatening infectious diseases. Early diagnosis and therapy are essential for the prevention of morbidity and mortality [7].

In the majority of cases, antimicrobial therapy must be admitted empirically in these patients generally. The accuracy in predicting the pathogen and antimicrobial resistance patterns is crucial for successful therapy [8]. For this reason, it is necessary to know the microorganisms that grow in the hospital. Growing microorganisms vary according to hospitals.

In a study, which researched nosocomial bloodstream infections of pediatric patients in Brazilian, it is reported that the most common isolated pathogens were coagulase-negative staphylococci (CoNS) (21.3%), *Klebsiella* spp. (15.7%), *Staphylococcus aureus* (10.6%), and *Acinetobacter* spp. (9.2%) [9]. It is reported that *S. aureus* to be the most common cause of nosocomial bloodstream infections, followed by *Klebsiella pneumoniae* and coagulase-negative staphylococci, respectively in a study [10].

In Gaziantep Children's Hospital, CNS was most frequently isolated in blood cultures, followed by *Salmonella* spp, *S. aureus*, *Klebsiella* and streptococci species, respectively [11]. In another study, *E.coli*, *Klebsiella* and CNS were the most frequently isolated microorganisms [12]. It is reported by Birol, et al., [13], that the most common isolates included 1000(35.6%) coagulase-negative staphylococci, 782(27.8%) *S. aureus* and 303(10.8%) *Escherichia coli* [13].

Tao, et al., [14], reported that *A. baumannii* was the most common microorganism identified, followed by *P. aeruginosa* (17.2%), *K. pneumoniae* (11.9%), and *S. aureus* (11.9%) in patients with device-associated healthcare-associated infections, *S. aureus* was the most common organism in patients with central line-associated bloodstream infection. Ben Jaballah, et al., [15], reported that *S. aureus* to be the most common cause of nosocomial bloodstream infections, followed by *Klebsiella pneumoniae* and CNS, respectively in a study from a Tunisia.

As seen in the studies, isolated microorganisms vary according to regions. CNS was reported as highest isolated microorganism some studies [9,11,13]. In this study, the most frequently isolated microorganisms were CNS, but isolation ratio was very high. It can be associated with contamination. Other isolated microorganisms were *K. pneumoniae*, *S. aureus*, *Candida* spp., *Acinetobacter* spp., respectively, similar to other studies.

Blood culture is one of the most important tests used in the diagnosis of sepsis. In our laboratory, most commonly, CNS was isolated in blood cultures. Considering that most of these microorganisms were isolated in single blood culture, most of them were thought to be contaminant. Therefore, at least two sets of blood cultures should obtained to be beneficial to accurate diagnosis. In addition, It should be kept in mind may



be cause to sepsis of *K. pneumoniae*, *S. aureus*, *Candida spp.*, and other microorganisms.

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