



Research Article

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Frequency of isolated bacteria from positive blood cultures and their antibiotic susceptibility pattern in Afshar Hospital of Yazd

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Abstract

Septicemia or blood infection is one of the most serious infectious diseases that if not diagnosed quickly and treated properly, will lead to high complications and mortality. Also, the growing trend of antibiotic resistance and the importance of choosing the right initial antimicrobial treatment identify the need to determine the frequency bacteria isolated from positive blood cultures and study their antibiotic susceptibility pattern. This study investigated Frequency of isolated bacteria from positive blood culture and their antibiotic susceptibility pattern in Afshar Hospital of Yazd. This cross-sectional study was performed during 24 months. Positive blood culture samples of patients were examined and the results related to bacterial type, antibiotic susceptibility and resistance, and age and sex of patients were evaluated using SPSS. According to the results of antibiogram test, a gram-positive strain were most sensitive groups to rifampin and vancomycin and among gram-negative strains was most sensitivity to amikacin and gentamicin. It should be considered as key point that the sensitivity against an antibiotic is important and consumption rate is more significant for preventing the resistance to it.

Keywords: Blood infection, Blood culture, Antibiotic susceptibility.

INTRODUCTION

Bacteremia is very important and the mortality rate is still high and it is associated with serious complications for the patient ^[1,2]. Early initiation of appropriate antimicrobial therapy is critical in reducing mortality in patients with blood infection ^[3]. For the laboratory diagnosis of bacteremia, the most common method is the culture and isolation of bacteria, which is followed by the antibiotic sensitivity test of the isolated bacteria, which helps a lot in choosing the appropriate antimicrobial drug to treat the patient ^[4]. However, we cannot wait for the identification of the microorganism and its antibiogram, so antibiotics are prescribed empirically, and the initiation of appropriate experimental antibiotics increases the survival rate in septic shock patients ^[5-7]. Therefore, epidemiological studies on the type of bacteria that cause bacteremia and their antibiotic resistance play an important role ^[8]. These studies should be carried out continuously in every society because it has been shown that the type of bacteria isolated from blood culture and the level of antibiotic resistance change over time ^[9].

Thus, the current study was done to assay the frequency of isolated bacteria from positive blood cultures and their antibiotic susceptibility pattern in Afshar Hospital of Yazd.

MATERIALS AND METHODS

This cross-sectional study was conducted on the registered information of patients who referred to the laboratory of Afshar Hospital in Yazd from 2019 to 2020. The current study obtained the confirmation of ethics committee of Shahid Sadoughi University of Medical Sciences of Yazd. The collection of information was based on the available data in the database bank of Afshar Hospital Laboratory of Yazd. The method of obtaining the sample was simple census sampling. The positive blood culture cases were separated from the blood culture office of the laboratory and the necessary data were collected by preparing a checklist from it, but the positive suspected cases (other microorganisms) were not included in the study.

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The cultivation method was that 5 to 10 ml of the patient's blood was inoculated into a blood culture bottle, which was a two-phase environment, and placed at a temperature of 37 °C, and after 48 hours, re-cultivation from this bottle on blood agar culture, chocolate agar and EMB were given.

The disk diffusion method was used to evaluate the resistance. Commonly used drugs included ciprofloxacin, ceftazidime, cefazolin, imipenem, ceftriaxone, cefotaxime, gentamicin, cefepime, ampicillin, cotrimoxazole, amikacin, penicillin, doxycycline, meropenem, ceftazidime, vancomycin, clindamycin, erythromycin, rifampin and nitrofurantoin.

The limited number of positive blood culture samples and the limited time period were the limitations of the present study.

The data analysis was done by SPSS software (version 22).

RESULTS

The results of blood cultures showed that among 1109 blood cultures performed in Afshar Hospital, 99 blood cultures were positive. In positive blood cultures, the most common gram-negative and gram-positive bacteria were *Acinetobacter* and *Staphylococcus epidermidis*, respectively (Table 1).

Table 1: Types of bacteria isolated from positive blood culture samples

Bacteria	Frequency	Percent (%)
<i>Staphylococcus epidermidis</i>	29	29.0
<i>Staphylococcus aureus</i>	12	12.0
<i>Acinetobacter</i>	12	12.0
<i>Klebsiella</i>	10	10.0
<i>Streptococcus Alpha-hemolytic</i>	8	8.1
<i>Enterococcus</i>	7	7.1
<i>E. coli</i>	7	7.1
<i>Pseudomonas</i>	5	5.1
<i>Enterobacter</i>	3	3.0
<i>Citrobacter</i>	2	2.0
<i>Group D Salmonella</i>	1	1.0
<i>Staphylococcus saprophyticus</i>	1	1.0
<i>Group D Streptococcus</i>	1	1.0
<i>Group A Streptococcus</i>	1	1.0
Total	99	100.0

Of the 99 positive blood cultures, 46 cases were related to men and 53 cases associated with women.

In infants and the elderly, the most abundant organism was *Staphylococcus epidermidis* (Table 2).

According to the results of the antibiogram test, the highest sensitivity of gram-positive strains was to rifampin (34 cases, 63%) and vancomycin (29 cases, 63%) and the highest resistance to penicillin (45 cases, 83.3%) and erythromycin (37 cases, 66.1%) and among gram-negative strains, there was most sensitivity to amikacin (28 cases, 71.8%) and gentamicin (25 cases, 65.8%) and the most resistance to cefotaxime (29 cases, 82.9%) and nitrofurantoin (16 cases, 76.2%).

In general, among all bacteria isolated from positive blood cultures, the most resistance was related to penicillin (83.3%), cefazolin (82.1%) and cefotaxime (76.3%) and the most sensitivity was related to amikacin (74.4%) and gentamicin (63.9%).

Table 2: Frequency of positive blood cultures bacteria according to age range

Common Bacteria	Gram-positive	Gram-negative	Total	Age (year)
<i>Staphylococcus epidermidis</i> (40%) <i>Klebsiella</i> (12%) <i>Pseudomonas</i> (12%)	18 (18%)	14 (14%)	32 (32%)	Below 2
<i>Enterobacter</i> (60%)	2 (2%)	3 (3%)	5 (5.1%)	2-15
<i>Staphylococcus epidermidis</i> (20%) <i>Enterococcus</i> (20%) <i>E. coli</i> (20%)	7 (7.1%)	3 (3%)	10 (10%)	15-50
<i>Staphylococcus epidermidis</i> (25%) <i>Staphylococcus aureus</i> (17%) <i>Acinetobacter</i> (15%)	32 (32%)	20 (20%)	52 (52%)	Above 50

DISCUSSION

In the current study, the most common gram-negative and gram-positive bacteria were *Acinetobacter* and *Staphylococcus epidermidis*, respectively. In infants and the elderly, the most abundant organism was *Staphylococcus epidermidis*. The highest sensitivity of gram-positive bacteria was to rifampin, and the highest resistance to penicillin. Also, among gram-negative strains, there was most sensitivity to amikacin and the most resistance to cefotaxime.

In a study conducted at Towhid Hospital in Sanandaj on 180 positive blood cultures, the highest frequency was related to *Staphylococcus epidermidis* [10].

In another study in Tehran, the most abundant Gram-negative and Gram-positive bacteria were *Pseudomonas* and coagulase-negative *Staphylococcus*, respectively [11].

In a study at Imam Khomeini Hospital of Urmia, the most common gram-positive and gram-negative bacteria were coagulase-negative *staphylococcus* and *Escherichia coli*, respectively [12].

CONCLUSION

Considering the pattern of antibiotic susceptibility in common organisms in the study area, reporting it to physicians can be considered in experimental treatments in order to reduce the phenomenon of antibiotic resistance and consequently the high cost of treatment for patients and medical centers.

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Conflicts of interest

None declared.

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