Antibiotic Susceptibilities of Acinetobacter Baumanii Strains Isolated from Clinical Samples

Klinik Örneklerden İzole Edilen Acinetobacter Baumanii Suşlarında Antibiyotik Duyarlılığı

Acinetobacter'de Antibiyotik Duyarlılığı/ Antibiotic Susceptibility of Acinetobacter

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Özet

Amaç: Bu çalışmada Tavşanlı Devlet Hastanesi Mikrobiyoloji Laboratuvarı'na gönderilen çeşitli klinik örneklerden izole edilen Acinetobacter baumanii suşlarının antibiyotik duyarlılıklarının retrospektif olarak incelenmesi amaçlandı. Gereç ve Yöntem: Kültürlerin tümü etken ve antibiyotik duyarlılıkları açısından irdelenmiştir. Bakterilerin tanımlanmasında çeşitli biyokimyasal testler ve BBL Crystal E/NF (Beckton Dickinson, ABD) sistemi kullanılmıştır. Antibiyotik duyarlılığı Mueller-Hinton Agarda disk diffüzyon yöntemi ile CLSI kriterleri doğrultusunda değerlendirilmiştir. Bulgular: Acinetobacter baumanii olarak izole ve identifiye edilen suş sayısı 74 idi. Suşların çoğunluğu trakeal aspirat örneklerinden izole edildi (%46). Suşların çoğunluğu nozokomiyal infeksiyonlardan izole edildi(% 93). Suşların antibiyotik direnci yüksek bulundu. En duyarlı antibiyotik ise gentamisindi (%30). Sonuç: Direnç gelişimini önlemek için antibiyotikler uygun doz ve sürede dikkatlice kullanılmalı, ampirik tedavi, her merkez için kendi direnç oranlarına göre belirlenmeli, ve antibiyogram sonucuna göre düzenlenmelidir. Artan direnç oranları Acinetobacter suşlarına karşı yeni alternatif antibiyotik kullanımına neden olmaktadır.

Anahtar Kelimeler

Acinetobacter Baumanii; Direnç; Nozokomiyal Enfeksiyon

Abstract

Aim: In this study it was aimed to investigate the antibiotic susceptibilities of Acinetobacter baumanii strains isolated from various clinical samples sent to Tavsanli State Hospital Microbiology Laboratory retrospectively. Material and Method: All of the cultures were examined for the agent and antibiotic susceptibilities. For the identification of bacteria, various chemical tests and BBL Crystal E/NF (Beckton Dickinson, ABD) system was used. Antibiotic susceptibilities were investigated according to CLSI criteria on Mueller Hinton agar by disc diffusion method. Results: There were 74 strains isolated and identified as Acinetobacter baumanii. Most of the strains were isolated from tracheal aspirate specimens (46 %) Most of the strains were isolated from nosocomial infections. Antibiotic resistance was high among strains. The most susceptible antibiotic was gentamicin (30%). Discussion: To prevent the development of resistance, antibiotics should be used carefully in appropriate doses and time, empirical antibiotherapy should be determined for each centre according to resistance rates of the centre and should be regulated according to the antibiogram results. Increasing resistance rates in Acinetobacter strains leads to the usage of new alternative antibiotics.

Keywords

Acinetobacter Baumanii; Resistance; Nosocomial Infection

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Introduction

Acinetobacter species, which are found in soil and animals can cause nosocomial infections, which are seen more frequent than community acquired infections in hospitals [1]. Its great capacity to survive in low-moist environment and its ability to develop resistance to antimicrobial agents afford Acinetobacter baumanii the possibility of spreading in hospitals. The risk of colonization and subsequent infection are associated with factors such as the presence of underlying severe illnesses, long term hospitalization, stays in spesific hospital wards, selective antimicrobial pressure and invasive interventions such as the use of mechanical ventilation or catheters [2-4].

Acinetobacter infections are usually seen in intensive care units (ICU). Acinetobacter species are colonized over mechanical instruments, colonized on health care workers and patients, selected by antibiotic usage and becomes the reason of nosocomial infections [5]. Acinetobacter species are the reason of bacterial colonization, bacteremia, pneumoniae, urinary tract infections, wound infections [6]. In this study it was aimed to investigate the antibiotic susceptibilities and extended spectrum beta lactamase production of Acinetobacter baumanii strains isolated from miscellaneous clinical samples sent to Tavsanli State Hospital Microbiology Laboratory retrospectively.

Material and Method

In this study microbiogical samples sent to Tavsanli State Hospital Microbiology Laboratory between January 2010 and December 2011 were evaluated. All of the cultures were examined for the agent and antibiotic susceptibilities. For the identification of bacteria, various chemical tests and BBL Crystal E/NF (Beckton Dickinson, ABD) system was used. Antibiotic susceptibilities were investigated according to CLSI criteria on Mueller Hinton agar by disc diffusion method. Ampicillin, cefazolin, cefuroxime, ceftriaxone, ceftazidime, imipenem, piperacillin/tazobactam, sulbactam/cefoperazone, sulbactam/ampicillin, trimethoprim/sulfamethoxazole, amikacin, gentamicin and ciprofloxacin was investigated for antibiotic susceptibility [7].

Results

There were 74 strains isolated and identified as Acinetobacter baumanii. Most of the strains were isolated from tracheal aspirate specimens (%46) (Table 1). Only five of the isolates were from community acquired infections (%7), 69 strains were from nosocomial infections. 64 strains were isolated from the samples sent from the intensive care unit. Antibiotic resistance was high among strains (Table 2). The most susceptible antibiotic was gentamicin (%30).

Table 1. Distribution of samples isolated from clinical specimens (n: number of specimens)

Clinical specimen	n	%
Tracheal aspirate	34	46
Urine	32	43
Wound	5	7
Catheter	3	4
Total	74	100

Table 2. Susceptibility rates of Acinetobacter baumanii strains according to the origin of the strains (n: number of isolates, SAM: sulbactam/ampicillin, SCF: sulbactam/cefoperazone, SXT: trimethoprim/sulfamethoxazole, TZP: piperacillin/tazobactam).

Antibiotic	Community acquired (n=5) %	Nosocomial (n=69) %	Total (n=74) %
Ampicillin	0	0	0
Cefazolin	0	0	0
Cefuroxime	0	0	0
Ceftriaxone	0	0	0
Ceftazidime	20	1	3
Imipenem	40	12	14
TZP	40	0	3
SCF	80	14	19
SAM	40	7	9
SXT	60	13	16
Amikacin	20	6	7
Gentamicin	80	26	30
Ciprofloxacin	20	2	3

Discussion

Acinetobacter strains are one of the most common bacteria isolated from nosocomial infections [8]. In recent years, the species has emerged as particularly important in nosocomial infections in ICUs probably related to the increasingly invasive diagnostic procedures used and the increasingly greater quantity of broad-spectrum antimicrobials used. Development of resistance against antimicrobials is a major problem in treatment of Acinetobacter infections. Although their virulence is low they rapidly acquire resistance [9].

In Spain between 1991 and 1996, 1532 Acinetobacter strains were investigated for antimicrobial resistance. Resistance rates increased in time; imipenem resistance increased to % 80 from %1, ciprofloxacine increased to %90 from %54, amikacin increased to % 84 from %21, ampicillin/sulbactam increased to % 84 from % 66 [10]. Dobrewski et al. [11], investigated 18 multi drug resistant Acinetobacter strains isolated from surgical intensive care unit. % 89 of the strains were resistant against, piperacillin, ceftasidime, gentamicin, ciprofloxacin.

Yurtsever et al. [12], investigated 120 Acinetobacter strains in 2007. % 50 of the isolates were from ICUs. Susceptibility rates were; %10 against ceftasidime, % 18 against ciprofloxacin, % 66 against ampicillin/sulbactam, % 14 against trimethoprim/sulfamethoxazole, % 63 against amikacin, % 65 against imipenem, %87 against sulbactam/cefoperazone.

Balci et al. [13], investigated 79 Acinetobacter strains isolated between 2005 and 2007. They found that the % 63 of the samples were sent from ICUs and most of the isolates were from respiratory tract samples (%43). Susceptibility rates were; %1 against ceftasidime, % 18 against ciprofloxacin, % 19 against ampicillin/sulbactam, % 22 against trimethoprim/sulfamethoxazole, % 34 against amikacin and % 51 against imipenem.

Ozdemir et al. [8], investigated 215 Acinetobacter baumanii strains for antimicrobial susceptibility in 2008. %78 of the bacteria were isolated from the sapmples from ICUs. % 42 of the samples were respiratory specimens. Susceptibilities against ceftasidime was %11, ciprofloxacin was %14, gentamicin was % 18, imipenem was % 40 and sulbactam/cefoperazone was % 60. Susceptibility against tigecycline was % 99 and colistin

was % 100. Tigecycline and colistin were investigated in the last nine Acinetobacter isolates in our laboratory. All of them were found susceptible against colistin, and all of them were resistant against tigecycline.

Mansur et al [14] isolated 147 Acinetobacter strains in 2008 in a tertiary care hospital. %32 of the samples were from ICU's. Most frequent samples were tracheal aspirate (%29) and blood (%26). Tigecycline was found the most effective antibiotic, against which the strains were %100 susceptible. Colistin susceptibility was found to be %91. Susceptibilities against imipenem, amikacin, gentamicin, ceftasidime and ciprofloxacin were; % 38, % 14, % 21, %9 and %11 respectively.

Kurtoglu et al. [6], inspected the resistance rates between 2008 and 2010 in Acinetobacter strains. They found that the resistance rates were inreasing in trimethoprim/sulfamethoxazole, imipenem, piperacillin/tazobactam and sulbactam/cefoperazone by time.

Colistin and tigecycline are new alternatives in the treatment of Acinetobacter strains. Gales et al. [15] investigated polymyxine resistance in 2621 strains. They found the resistance against polymyxine % 2,1. But the side effects of colistin restricts the use of the drug. Tigecycline which is a minocycline derivative is another effective choice against Acinetobacter strains. Tigecycline susceptibility is usually over %90 in acinetobacter strains [16,17].

To avoid resistance, antibiotics should be used carefully in appropriate doses and time, empirical antibiotherapy should be determined for each centre according to resistance rates of the centre and should be regulated according to the antibiogram results. Increasing resistance rates in Acinetobacter strains leads to the usage of new alternative antibiotics.

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