Microorganisms Isolated from the Patients in the Intensive Care Unit and Their Antibiotic Susceptibilities

Yoğun Bakım Ünitesinde Yatan Hastalardan İzole Edilen Mikroorganizmalar ve Antibiyotik Duyarlılıkları

Yoğun Bakımda Antibiyotik Duyarlılıkları / Antibiotic Susceptibilites in the ICU

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Özet

Amaç: Hastanemiz yoğun bakım ünitesinden Ocak 2010- Haziran 2011 döneminde gönderilen çeşitli klinik örneklerden izole edilen mikroorganizmaların ve antibiyotik duyarlılık oranlarının belirlenmesi amaçlanmıştır. Gereç ve Yöntem: Klinik örneklerden bakterilerin izolasyonu için standart mikrobiyolojik yöntemler kullanılmıştır. Antimikrobiyal duyarlılığı, CLSI (Clinical and Laboratory Standards Institute) önerileri doğrultusunda disk difüzyon yöntemi ile araştırılmıştır. Bulgular: Çeşitli klinik örneklerden gönderilen toplam 538 örneğin 236'sında mikroorganizma izole edilmiştir. Üreyen mikroorganizmalardan en sık görülenler sırasıyla Acinetobacter baumanii 49 (%21), Pseudomonas aeruginosa 49 (%21), Escherichia coli 47 (%20), Candida spp. 22 (%9), Enterococcus spp. 21 (%9) olarak saptanmıştır. En sık izole edilen bakterilerden Acinetobacter baumanii suşlarının oldukça dirençli olduğu, amikasin ve imipenem duyarlılıklarının %8 oranında olduğu saptanmıştır. Pseudomonas aeruginosa suşlarında siprofloksasin duyarlılığı %35 iken amikasin duyarlılığı %80 oranında bulunmuştur. E. coli'de en yüksek direnç oranı %87 ile ampisiline karşı iken en düşük direnç oranı %5 ile imipeneme karşıdır. Enterokoklarda vankomisin direnci görülmezken penisilin direnç oranı %86 olarak bulunmuştur. S. aureus'da penisilin direnç oranı %86 olup oksasilin direnç oranı %43 olarak bulunmuştur. Tartışma: Yoğun bakım üniteleri gibi nozokomiyal infeksiyon yönünden riskli birimler başta olmak üzere hastanede üreyen mikroorganizma çeşitliliğinin bilinmesi, antibiyotik direnç profillerinin bilinmesi, akılcı antibiyotik kullanımı ve infeksiyon kontrol önlemleri açısından önemlidir.

Anahtar Kelimeler

Yoğun bakım; Acinetobacter; Pseudomonas

Abstract

Aim: It was aimed to investigate the microorganisms and their antibiotic susceptibilities isolated from various clinical specimens sent from the intensive care unit of our hospital between January 2010 and June 2011.
Material and Method: Standard microbiological methods were assessed for the isolation of bacteria from clinical specimens. Antimicrobial susceptibilites were investigated according to the Clinical and Laboratory Standards Institute (CLSI) standards by disc diffusion method. Result: In 236 samples microorganisms were isolated through 538 various clinical specimens. The most common isolated microorganisms are Acinetobacter baumanii 49 (%21), Pseudomonas aeruginosa 49 (%21), Escherichia coli 47 (%20), Candida spp. 22 (%9) and Enterococcus spp. 21 (%9) respectively. One of the most common isolated bacteria Acinetobacter baumanii strains are extremely resistant and their suscepitibilty against amikacin and imipenem were both found to be %8. While in Pseudomonas aeruginosa strains were found to be %80 susceptibile to amikacin, susceptibility to ciprofloxacin was %35. The highest resistance in E.coli was 87% against ampicillin and the least resistance was against imipeneme as 5%. While no resistance against vancomycin in Enterococci, penicillin resistance was found to be 86%. Penicillin resistance in S. aureus was found 86% and oxacillin resistance was found 43%. Discussion: Knowledge of microorganism variety and the profile of antibiotic resistance in hospitals, especially in the ICU which is risky, against infectious disease is important in rational antibotic usage and infection control precautions.

Keywords

Intensive care; Acinetobacter; Pseudomonas

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Introduction

Nosocomial infections are the most common complications seen in the patients in the intensive care units (ICU). Although patients in the ICU consist %5-10 of total patients in the hospital, %25 of nosocomial infections are seen in the ICU [1,2]. Causative agents in nosocomial infections differ between centers. That's why most common agents and their antibiotic suscepitibilites should be known for the empirical antibiotic treatment. In this study it was aimed to investigate the microorganisms and their antibiotic susceptibilities isolated from various clinical specimens sent from the intensive care unit of our hospital between January 2010 and June 2011.

Material and Method

Clinical specimens sent from the ICU of our hospital between January 2010 and June 2011 were retrospectively inspected in this study. Standard microbiological methods were used to isolate bacteria from the clinical specimens. Antibiotic susceptibilities were done according to the Clinical Laboratory Standards (CLSI) criteria by the Kirby-Bauer disc diffusion method. Extended spectrum beta-lactamase (ESBL) activity was inspected by double disc synergy method and combined disc methods (ceftasidim/ceftasidim-clavulonic acid and cefotaxim/ cefotaxim-clavulonic acid discs). Methicillin resistance in Staphylococcus aureus were inspected by oxacillin (1mg) and cefoxitin (30 µg) discs. Antibiotic susceptibilities were evaluated according to the CLSI criteria and intermediate results were evaluated in the resistant cathegory.

Result

From the 538 samples sent form the ICU, 236 microorganisms were isolated. Most common isolated microorganisms are Acinetobacter baumanii 49 (%21), Pseudomonas aeruginosa 49 (%21), E. coli 47 (%20), Candida spp. 22 (%9), Enterococcus spp. 21 (%9) respectively. Distribution of the microorganisms isolated according to the samples is shown in Table 1. Of the most common isolated bacteria, Acinetobacter baumanii strains were found to be extremely resistant to antibiotics, which showed %92 resistance against amikacin and imipenem. Most effective antibiotic against P. aeruginosa was found to be amikacin (%80). 21 E. coli strains (%45) showed ESBL activity. E. coli strains showed %87 resistance against ampicillin and %5 resistance against imipenem, which is the most effective antibiotic against E. coli. There was not vancomycin resistance in Enterococcus and Staphylococcus aureus strains. Penicillin resistance was %86 in Enterococci. Resistance against penicillin was %86 and, methicillin was %43 in S. aureus strains. Detailed antibiotic susceptibilities are shown in Table 2.

Table 1. Distribution of samples isolated from clinical specimens

Clinical specimen	N	%
Urine	102	43
Tracheal aspirate	73	31
Wound	24	10
Catheter	21	9
Others	16	7
Total	236	100

Discussion

Nosocomial infections are important problems in ICU. When a patient is treated for one week in the ICU is usually colonised with the bacteria from the unit [3]. That's why active surveillance and determination of common microorganisms and their antibiotic susceptibilities are important for decision of empirical antibiotic treatment. Gram negative bacteria are usually dominant in the ICUs as they were found %78 in our unit. In a study conducted in 1417 ICUs in 17 countries showed that the Gram negative and positive bacteria are almost equal in frequency and the most common Gram negative bacteria are Gram negative enteric bacteria and P. aeruginosa [4].

Lockhart et al., [5] showed that the most common bacteria isolated from 74394 Gram negative bacteria are P. aeruginosa (%22.2), E. coli (%18.8) and Klebsiella pneumoniae (%14.2) respectively. In the MYSTIC study 6243 Gram negative bacteria were evaluated and the most common bacteria were found as P. aeruginosa (%22.5), E. coli (%19.8) and Klebsiella pneumoniae (%10.4) respectively [6]. Also in our country multi centre studies show the predominance of Gram negative bacteria. Gur et al., [7] showed that the first three rank was composed of P. aeruginosa (%30), Klebsiella spp. (%25) and E. coli (%18) respectively and Leblebicioglu et al., [8] showed Psedomonas spp. (%28.2), E. coli (%19.2), Klebsiella (%19.1) and Bayram et al., [9] showed P. aeruginosa(%20.3) and Candida spp. (%15) and S. aureus (%12.9). Esen et al., [10] showed that the most common microorganisms isolated from the intensive care unit are P.aeruginosa (%20.8), S. aureus (%18.2), Acinetobacter spp. (%18.2) and Klebsiella spp. (%16.1). All these finding show that the most common bacteria in the intensive care unit is P. aeruginosa which is concordant with our results (%21). Acinetobacter baumanii is an important causative agent in our intensive care unit, which is sometimes seen in the first three ranks in other studies, but endemic in our hospital (%21). Although E. coli is usually the 2nd common bacteria, we found it third (%20), but it is close to the second rank.

Most common infections in the inten ive care units are pneumonia and urinary tract infections which is concordant with our study [2,4].

Microorganisms isolated from the ICU are usually resistant to antibiotics. These bacteria lead to infections that extend hospitalisation and increase the cost for the treatment and mortality. For the treatment of infections in the ICU culture antibiogram tests should be done to choose the right antibiotic. The most effective antibiotics against Gram negative bacteria were found as amikacin and imipenem in our study. But the susceptibility of P. aeruginosa strains against imipenem was low among extensive usage for the treatment of nosocomial infections in our hospital. In different studies from our country show that the most effective antibiotic against Gram negative bacteria are carbapenems. Leblebicioglu et al., [8] showed in a multi-centre study that the susceptibilites against antibiotics are; imipenem (%68), cefoperazone/sulbactam (%61), ciprofloxacin (%59) and cefepime(%57).

ESBL activity is an important problem for the treatment of Gram negative enteric bacteria. In our country ESBL activity

was found between %12-51 in ICUs of different hospitals [8,11-13]. In our study ESBL activity in E. coli was found to be %45 which is concordant to the data in our country.

Antibiotic resistance among Gram negative bacteria were found to be similar to other studies from our country. It is known that antibiotic treatment increases the resistance. Cephalosporin treatment is a risk factor for ESBL activity, prolonged treatment in ICU and hospital, presence of urinary catheter are risk factors for the development of resistance [14].

Conclusion

Knowledge of microorganism variety and the profile of antibiotic resistance in hospitals, especially in the ICU which is risky, against infectious disease is important in rational antibotic usage and infection control precautions.

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