بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Introduction

Acinetobacter species has emerged as an important nosocomial pathogen in outbreaks of hospital infection and is ranked second after *Pseudomonas aeruginosa* among nosocomial pathogens of aerobic non fermentive Gram-negative bacilli. Interest in this pathogen emerged about its capability of acquiring new mechanisms of resistance ***(Nazir and Asifa, 2019).***

Acinetobacter species, considered organisms of low virulence, have become one of the most difficult nosocomial pathogens to control and treat with an associated mortality of approximately 30%. ***(Royer et al., 2015)***

Acinetobacter baumannii is a nosocomial pathogen that causes a wide range of clinical illnesses in immunocompromised patients including bacteremia, pneumonia, meningitis, urinary tract, wound and skin infections. ***(Srinivasan et al., 2015)***

The emergence and spread of antimicrobial resistance continue to challenge our abilities to treat serious infections in both the nosocomial and the community setting .While new antimicrobial agents were designed to treat multi resistant pathogens that have been introduced in the past few years,

resistance has continued to emerge and spread, the emergence of antibiotic resistance in bacterial pathogens is an inevitable consequence of antibiotic use. Despite repeated warnings, negligent antibiotic use and poor infection control practice have led to the continuing development of extensive resistance problems worldwide. ***(Piotr et al., 2014)***

Antibiotic resistance of bacteria is commonly seen in daily medical practice, among the different types of drug resistance, most microbiologists would agree that multi- drug resistance (MDR) Gram negative bacteria pose the greatest threat to human health. Multidrug-resistant (MDR) bacterial infections, especially those caused by Gram-negative pathogens, have emerged as one of the world's greatest health threats. ***(Xu et al., 2014)***

Risk factors for MDR *A. baumannii* colonization and infection include prolonged length of hospital stay, exposure to the intensive care unit (ICU), mechanical ventilation, central venous catheterization, urinary catheterization, prior exposure to antimicrobials, greater severity of illness, surgery, and receipt of invasive procedures. ***(Zhou et al., 2014)***

The resistance of *Acinetobacter baumannii* to carbapenems can be mediated by one of the resistance mechanisms that are known to occur in bacteria, including enzymatic inactivation, active efflux of drugs and modification of target sites. The production of carbapenem-hydrolyzing ß-lactamases (carbapenemases) is the most common mechanism responsible for carbapenem resistance in *Acinetobacter baumannii*. ***(Codjoe & Donkor, 2018).***

Although *Acinetobacter* primarily is a colonizer in the hospital environment, occasionally it causes infection. *Acinetobacter* causes a variety of diseases, ranging from pneumonia to serious blood or wound infections and the symptoms vary depending on the disease. *Acinetobacter* may also "colonize" or live in a patient without causing infection or symptoms, especially in tracheostomy sites or open wounds. Although colonization rarely results in infection, colonization does precede infection. Colonization in one patient may result in infection in another patient. For these reasons, every attempt should be made to isolate patients who are colonized with in order to prevent other patients from becoming colonized or infected. Mortality and morbidity resulting from *Acinetobacter* infection relate to underlying illness rather than the inherent virulence of the

organism However *Acinetobacter* has a very high level of resistance to antimicrobials, and relatively few antibiotics are active against it, so to tackle this problem it is essential to observe, the new resistances the bacteria develops, in order to know what kind of antibiotic has to be used to treat patients. ***(Wong et al., 2017)***

Aim of the Work

- Detection of Resistant *Acinetobacter* by rapid test.

- prevention the spread of *Acinetobacter* infection.

Acinetobacter Species

Acinetobacter species are gram- negative bacteria that have become one of the most difficult pathogens to treat. The species *Acinetobacter baumannii*, largely unknown 30 years ago, has risen to prominence particularly because of its ability to cause infections in immunocompromised patients ***(Gomaa et al., 2014)***

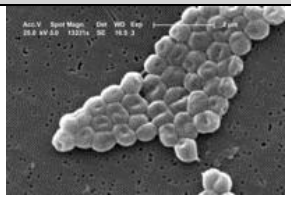
It is a gram negative non-motile encapsulated organism "unable to move. They are rod shaped during log phase, but coccobacillaryins, its name,in fact, derives from the Greek word akinetos, meaning stationary phase; Colonies are non pigmented and may be mucoid. It has a tendency to retain crystal violet and can therefore be incorrectly identified as gram positive ***(Davis et al .,2005)***

Acinetobacter causes a wide variety of illnesses in debilitated and hospitalized patients, especially in the intensive care units (ICUs). These bacteria survive for a long time in the hospital environment and thereby the opportunities for cross infection between patients are enhanced. ***(Sanjeev et al., 2018)***

Taxonomy

The genus *Acinetobacter*, as currently defined, comprises Gram-negative, strictly aerobic, nonfermenting, nonfastidious, nonmotile,catalase-positive, oxidase-negative bacteria. This genus has undergone significant taxonomic modifications over the last 30 years. ***(Singh et al., 2013)***

Table (1): Scientific classification of Acinetobacter

Acinetobacter	
 *Acinetobacter*	
Scientific classification	
kingdom:	*Bacteria*
phylum:	*Proteobacteria*
class:	*Gamma Proteobacteria*
order:	*Pseudomonadles*
Family:	*Moraxellaceae*
Genus:	***Acinetobacter***
Species	
A. baumannii *A. calcoaceticus* *A. lwoffii* *A. ursingii* *A. haemolyticus* *A. junii* *A. johnsonii* *A. radioresistens* *A. ursingii* *A. schindler*	

(Mugnier et al., 2008)

Laboratory Identification of *Acinetobacter*

Morphological identification:

Individual cell sizes are 0.9 to 1.6 mm in diameter and 1.5 to 2.5 mm in length. In the stationary phase, the organisms are usually coccoid. Cells frequently occur in pairs, resembling- *Neisseria* species, the organisms can be slightly gram positive, but this may be strain or species dependent.

In the gram stain morphology of isolate that belong to the genus *Acinetobacter* are often appearing as diplo-cocci (Fig.1).

The organisms can form a pellicle on the surface of fluid media. They grow well on complex media, including blood agar, nutrient agar, and MacConkey agar. Colonies are colorless to beige, domed, and smooth to mucoid. . Colonies on MacConkey agar can become pink. Many strains can use a wide variety of carbon sources for growth. Selective enrichment can be obtained in mineral media with acetate as the carbon source and ammonium salt as the nitrogen source with shaking incubation at 30°C. ***(Mario et al., 2011)***

Growth temp:

Growth temperature varies, but most species grow between 20 and 35°C. Clinically important species grow between 20 and 35°C.

Genus level identification:

For genus level identification of *Acinetobacter* isolates, the following characters can be used: gram-negative coccobacilli, oxidase negative, aerobic (nonfermenting), and nonmotile. Phenotypic identification of *Acinetobacter* species in the clinical microbiology laboratory by commercial identification systems is problematic. ***(Mario et al., 2011)(fig 1)***

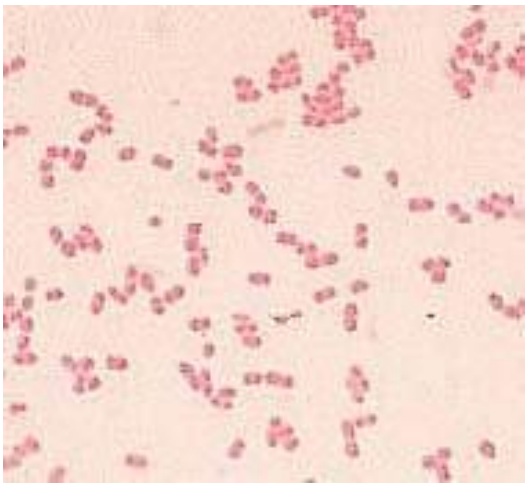


Figure (1): The Gram-stain morphology of isolate that belong to the genus *Acinetobacter*. They are Gram-negative coccobacillary cells often appearing as diplo-cocci ***(Niumsup et al., 2009).***

Species Identification:

Acinetobacter spp. has become a leading cause of nosocomial infection in recent years. Phenotypic similarities between the species in the genus have made it difficult to

identify those clearly using routine diagnostic methods. Consequently, more relevant species have been grouped together as *Acinetobacter calcoaceticus–Acinetobacter baumannii* complex *(A. baumannii, A. calcoaceticus, Acinetobacter geno species 3* and *A. genospecies 13TU*). However, there are other species that may also have clinical significance. ***(Álvarez Buylla et al., 2012)***

Real-time PCR (Polymeras chain reaction) is used to monitor bacterial growth in the presence of antibiotics is effective for rapidly identifying antibiotic resistance in *Acinetobacter*. ***(Reyes et al., 2013).***

Epidemiology of Clinical *Acinetobacter*

Acinetobacter baumannii has emerged as an important nosocomial pathogen, and nosocomial infection with this organism has been associated with increased patient morbidity, mortality, and health care costs **.**

A. baumannii has been isolated from various environmental locations. Indeed, it has been recovered from soil contaminated with petroleum hydrocarbons in countries presenting different climatic conditions, like India and France ***(Eveillard et al., 2013)***

A. baumannii widely distributed in soil and water, grows at various temperatures and pH environments and uses a vast variety of substrates for its growth; it normally inhabits human skin, mucous membranes, and soil. *A. calcoaceticus* is found in water and soil and on vegetables; Acinetobacter genomic species 3 is found in water and soil, on vegetables, and on human skin; *A. johnsonii* is found in water and soil, on human skin, and in human feces; *A. lwoffii* and *A. radioresistens* are found on human skin; and *Acinetobacter* genomic species 11 is found in water and soil, on vegetables, and in the human intestinal tract also It has been isolated from the human body lice of homeless people in France. *Acinetobacter* can form part of the bacterial flora of the skin; particularly in moist regions such as the axillae, groin, and toe webs, and up to 43% of healthy adults can have colonization of skin and mucous membranes, with higher rates among hospital personal and patients. ***(Manchanda et al., 2010)***

Acinetobacter is a hydrophilic organism and preferentially colonizes in aquatic environments. *Acinetobacter* spp. has been documented to survive in hospital environments. The reservoirs of this pathogen are poorly understood**.** ***(Montefour et al., 2008)***

The organism can survive for long periods on both dry and moist surfaces. Survival is probably helped by the ability of *Acinetobacter* spp to grow at a range of different temperatures and pH values. *Acinetobacter* spp has commonly been isolated from the hospital environment and hospitalized patients, as sources of colonization or infection with multidrug-resistant *Acinetobacter* species in a hospital environment may be from these sites. ***(Manchanda et al., 2010)***

- Hands of the hospital staff
- Respiratory therapy equipment
- Food (including hospital food)
- Tap water
- Infusion pumps
- Mattresses, pillows, bed curtains and blankets in vicinity of infected patients
- Soap dispensers
- Fomites like bed rails, stainless steel trolleys, door handles, telephone handles, tabletops
- Hospital sink traps
- Hospital floor (fig 2)