Antibiogram of *Klebsiella pneumonia*, *Acinetobacter bumannii* and *Proteus mirabilis* Isolated From Patients with Traumatic Wounds in Ramadi Teaching Hospital

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**ABSTRACT**

**Background:** Traumatic wounds exposed to many microbial contaminants through contaminated tools causing these types of wounds. At the same time, treatment of wounds is difficult because of antimicrobial resistance to marketed available antibiotics and transfer between bacterial generations.

**Aims of the study:** This study was done to show the bacterial profile and the antibiogram of *Proteus mirabilis*, *Acinetobacter bumannii* and *Klebsiella pneumoniae*, a preserved bacterial isolates from a previous study.

**Material and Methods:** Twenty-seven (27) deep frozen preserved bacterial isolates *Proteus mirabilis*, *Acinetobacter bumannii* and *Klebsiella pneumoniae* obtained from Department of Microbiology, College of Medicine, University of Anbar and were used to investigate the antibiogram profile. Frozen bacterial isolates were reactivated on blood culture medium at 37°C for overnight and re-identified to confirm bacterial type and antibiogram findings by using Vitek2 system.

**Results:** *Klebsiella pneumonia* showed 100% sensitivity to Imipenem, Meropenem, Etrapenim and Levofloxacin, while 75% of isolates were sensitive to Amikacin and Ciprofloxacin. Eighty percent (80%) of isolates were resistant to Cefotaxim, Ceftriaxone and Rifampicin. All isolates of *Proteus mirabilis* (100%) were sensitive to Levofloxacin and meropenem followed by 90% sensitivity to Imipenim and Amikacin. All isolates (100%) were resistant to Cefotaxim followed by 90% & 70%, resistance to Ceftriaxone, Refadin respectively. Seventy-five percent (75%) of *Acinetobacter bumannii* isolates were sensitive to Levofloxacin while 50% of isolates were sensitive to Ciprofloxacin and Amikacin followed by 25% sensitivity to Imipenim, Meropenem & Gentamycin. All isolates (100%) were resistant to Ceftriaxone, Augumentin, Ampiclox and Cefotaxim. So we recommend a continuous study of bacterial profile for wound infections both traumatic and surgical wounds because the profile of infection undergo difference through years.

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INTRODUCTION

Many types of aerobic and anaerobic bacteria were imposed in wound infections, both of Gram positive and Gram negative bacteria are blamed in this category among of them are MISA and MIRSA, Staphylococcus aureus (Brook et al., 1998; Kim et al, 2010; Goyal et al 2013), other types of Gram negative bacteria were also blamed like pseudomonas aeruginosa, Proteus spp., Klebsiella spp. and Acinetobacter baumannii (Lafi, 1997; Stevens et al., 2014 Lafi et al., 2018). Bacterial type depends on many factors like age of patient, site of the wound, patients gender and personal sanitation (Lafi, 1997, Bowler et al., 2001, Lafi 2018). It was found that infection in different sites of the body show change in microbial pattern, among them has wound infection (Altemeric 19973, Lafi et al., 2018). The response of bacterial isolates to antimicrobial agents is different regarding the type of isolate and type of antimicrobial agent and the site of wound (Eagye et al., 2009; Brooks et al., 2013).

Abuse of antibiotics in the community leads to an increase of resistance of bacteria to antibiotics due to arising of resistance factors like penicillinases of different spectrums (Bradford, 2001, Makena et al., 2016). So antibiogram of any bacteria undergo change with eras due to use of available antibiotics and surveillance of bacteria to antibiotics in vivo and in vitro (Altemeric 1973; Barchitta et al., 2012, lafi 2018). So a continuous need for bacterial wound profile and their antibiogram study are needed particularly with abuse of antibiotics in communities. This study was done to show the antibiogram of Proteus mirabilis, Klebsiella pneumonia and Acinetobacter baumannii isolated from traumatic wound swabs in a previous study (Lafi et al., 2018).

MATERIALS AND METHODS

Twenty-seven (27) Deep frozen preserved bacterial isolates from the previous study was done on bacterial profile of infected traumatic wounds. Out of (27) isolates, eleven (11) isolates were Proteus mirabilis, (10) Klebsiella pneumonia and (6) Acinetobacter baumannii. Each isolate thawed and reactivated on blood culture medium at 37°C for an overnigh. Each isolate was re-identified to confirm bacterial type using suitable bacteriological tests and detection of the antibiogram for each bacterial type was done using Viteck 2 System, USA. (Vandepitti et al 2003). Results were reported and data were analyzed using SSPS program version2 and discussed.

RESULTS

1-Antibiogram of Klebsiella pneumonia Isolates:

*Klebsiella pneumonia* showed 100% sensitivity to Imipenium, Meropenim, Etrapenim, and Levofloxacin while 75% of isolates were sensitive to Amikacin, Ciproflaxacin, and Nitrofuradantin. Eighty percent (80%) of isolates were resistant to Doxycycline, Cefotaxim, Ceftriaxone and Rifampicin (Fig-1).
2- **Antibiogram of Proteus merabilis:**

All isolates (100%) were sensitive to Levofloxacin and meropenem followed by 90% sensitivity to Imepenium and Amikacin, while 70% of them were sensitive to Gentamycin and 50% of them were sensitive to Ciprofloxacin. All isolates (100%) were resistant to Cefotaxim followed by 90%, 70%, and 60% resistance to Ceftriaxone, Refadin, and Nitrofuradantin respectively (Fig-2).

3- **Antibiogram of Acinetobacter bumannii:**

Seventy-five percent (75%) of isolates were sensitive to Levofloxacin while 50% of isolates were sensitive to Ciprofloxacin and Amikacin followed by 25% sensitivity to Imepenium, Meropenem & Gentamycin. All isolates (100%) were resistant to Ceftriaxone, Augmentin, Ampiclox, and Cefotaxim (Fig-3).
DISCUSSION

Wound infection is multifactorial, it caused by different types of bacteria which cause a reaction in patient, infection can be systemic and the patient becomes ill or local reaction only affecting the wound bed and surrounding tissue (Giacometti et al., 2000. Stevens et al., 2014). Regarding Levofloxacin, meropenem and imipenem, all tested bacterial isolates of the three studied bacterial types were showing high sensitivity rates (90-100%) this was due to the restricted use of these antibiotics due to their expensive price and used under medical supervision which limited its use and majority of patients could not afford to use it. Vice versa for the Cotrimoxazole and Agumentine and Ampiclox, All the studied bacterial types were showing high resistance (90-100 %) to these antimicrobial agents. This high drug resistance was attributed to the fact that these antibiotics were relatively cheap and readily available. These together with the policies that do not restrict antibiotics accessibility to patients, might have led to bacterial resistance (Kassam et al., 2017. Lafi et al., 2018).

The ratio of resistance to Cefotaxime, Ceftriaxone is surprising to all tested bacterial types (90%-100 %) this was nearly similar to the findings of (Sule A.et al., 2002, Kassam et al., 2017). This might be due to the fact that Cephalosporins were ineffective against most Gram-negative bacteria, this might be due to mutational emergence and spread of Extended Spectrum of Beta-lactamases ESBL-producing Gram-negative bacteria and the extensive use of theses antibiotics in both treatment and prophylaxis(10 Brooks et al., 2013). As well as the shift of bacterial behavior through time (Altemeric 19973. Adoga et al., 2011).

Regarding Antiibiogram of Acinetobacter buman, Seventy-five percent (75% ) of isolates were sensitive to Levofloxacin, this might be due to this antibiotic is expensive and difficult availability to majority of people, thus limitation of hazardous use of this treatment leading to keep effectivity in Anbar Community. Fifty 50% of isolates were sensitive to Ciprofloxacin and Amikacin, this was due to limited prescription of ciprofloxacin to certain bacterial infections. Furthermore Amikacin
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is highly restricted due to its adverse side effect (Ahmed 2009 ; Brooks 2013). All isolates (100%) were resistant to Ceftriaxone, Augmentin, Ampiclox, and Cefotaxim. This was due to the fact that this bacterium inherent resistance associated with impermeability or low permeability to antibiotics by reduced outer membrane porine content like Acinetobacter, also this bacterium possesses constitutive low-level expression of one or more active efflux system (Wong et al., 2017). As well as the arising of beta-lactamases to penicillins and cephalosporins in Gram-negative bacteria (Dio et al., 2017). In conclusion, bacterial isolates showed different profiles to antibiotics tested due to difference of theses bacterial isolates in its virulence and response (sensitivity and resistance) to antibiotics. So we recommend continuous study of bacterial profile for wound infections both traumatic and surgical wounds because the profile of infection undergo difference through years.

Prescription of antibiotics after performing antimicrobial sensitivity test for the patient to prevent abuse of antibiotics.

Community orientation toward medically controlled antimicrobial therapy and ceasing antibiotics sell without medical prescription. Continuous and periodic evaluation of microbiological pattern and antibiotic sensitivity of wound infections is necessary to decrease the potential risks of complications by early institution of appropriate systemic and topical antibiotic as well as Continuous microbial investigation for hospitals and medical caregiving centers following biosafety guidelines.

REFERENCES


Kassam A. N., Damian J. D., Kajeguka D., Nyombi B. and Kibiki SG. (2017): Spectrum and Antibiogram of Bacteria isolated from patients presenting with infected wounds in Tertiary Hospital, Northern Tanzania


