**Egypt. Acad. J. Biolog. Sci., 11(1): 41-46 (2019)**

**Egyptian Academic Journal of Biological Sciences**
**G. Microbiology**

**ISSN: 2090-0872**
**www.eajbs.eg.net**

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

**Shehab A. Lafi[1]; Mahmood Al-Shamarry[2] and Mohamed S. Ahmed[3]**
1- HOD. Microbiology Dept. College of Medicine University of Anbar, IRAQ .
2- Clinical Lab. Ramadi Teaching Hospital
3- Deputy of Anbar Health Office.
E.Mail: **shehab_6555@ymail.com.**

**ARTICLE INFO**
Article History
Received: 1/5/2019
Accepted:22/7/2019

*Keywords*:
Traumatic wounds, Wound infections, Antibiogram
.

## ABSTRACT

**Background:** Traumatic wounds exposed to many microbial contaminan through contaminated tools causing these types of wounds . At the same tim treatment of wounds is difficult because of antimicrobial resistance to mar 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 pneumonia* 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 using Viteck2 system.

***Results*** *: Klebsiella pneumonia showed 100% sensitivity* to Imipenium , Meropenim , Eatrapenim 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 merabilis* (100% ) were sensitive to Levofloxacin and meropenem followed by 90% sensitivity to Imepenium 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 Imepenium , 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.

## 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 bumannii (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 bumannii* 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 baumanni*i . each isolate thawed and reactivated on blood culture medium at 37C° 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, Eatrapenim, and Levofloxacin while 75% of isolates were sensitive to Amikacin, Ciprofloxacin, and Nitrofuradantin. Eighty percent (80%) of isolates were resistant to Doxycycline, Cefotaxim, Ceftriaxone and Rifampicin (Fig-1).

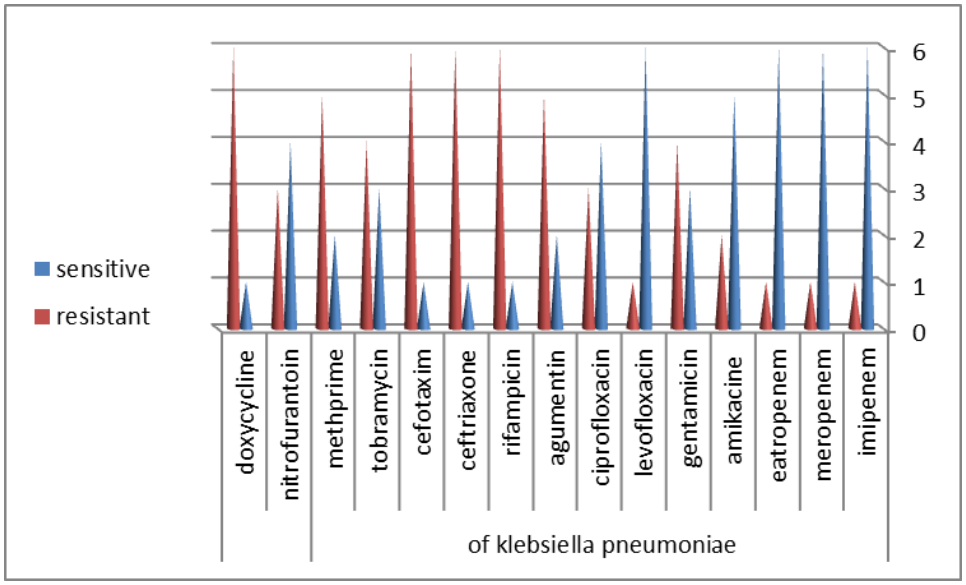


**Fig-1** Antibiogram of *Klebsiella pneumoniae*

**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).

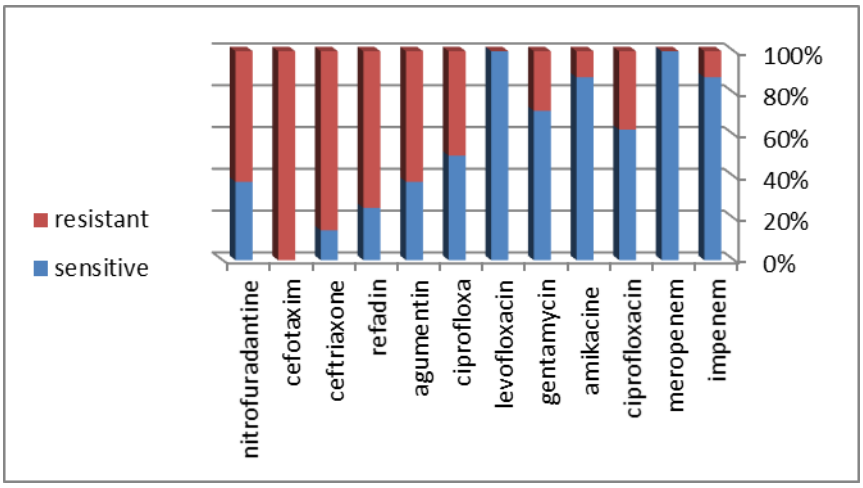


**Fig-2** Antibiogram of *Proteus merabilis*

**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).

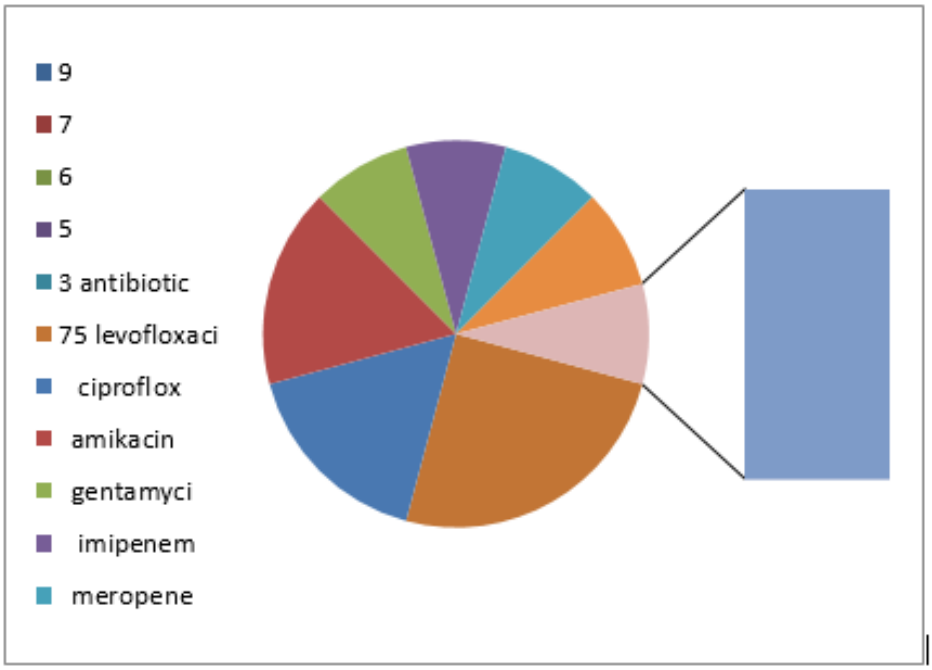


**Fig-3** Antibiogram of *Acinetobacter bumaneii*:

## 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 imepenium, 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 was 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 Antibiogram of *Acietobacter bumanii* , 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

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 her 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 of 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


Adoga AA., Bakari A., Afolabi OA., Kodiya AM ., Ahmed BM. (2011) : Bacterial isolates in chronic supparative otitis media : a changing pattern?. Niger. J. Med. Vol. 20 ( 1 ) : 96-98.

Al-Heety AS J. ( 2013 ) :Detection of genes encoding for Metallo-B-Lactamases produced by resistant Acinitobacter baumannii and pseudomonas SPP. Isolated from clinical specimens in Ramadi, A PhD.Thesis, College for Pure Science , Biology Department , Tikrit Uni. Iraq.

Altemeriec AW., Hummel PR., Hill OE., and Lewis S. ( 1973 ) : changing patterns of surgical infections .Ann. Surg.Vol.178 ( 436-445).

Barchitta M., Matranga D., Quattrocchi A. ( 2012 ): Prevalence of surgical site control programme . J. Antimicrob. Chemother.2012 Mar.67 ( 3 ): 749-55.

Bowler GP., Duerden IB., Armstrong GD.( 2001): Wound microbiology and associated approaches to wound management. Clinical Microbiolgy Reviews Apr. 2001 , p244-269.

Bradford PA.( 2001 ): Extended Spectrum Beta- Lactamases in the 21st Century : Characterization epidemiology and detection of this important resistance threat. Clinc. Microbiol.Vol.14 (4):933-951.

Brook I. ( 1998 ) : Aerobic and anaerobic microbiology of infection after trauma. Am.J. Emerg. Med. Vol.16: 585-591.

Brooks FG., Carroll CK., Butel SJ., MoresAS., Midzner AT. (2013): Jawetz Melnik and Adebrgs Medical Microbiology, 26th ed. P149-172. MacGrow Hill Pub. New York, USA.

Dio y, Bonomo RA, Hooper DC, Kaye KS, Johnson JR, Clancy CJ, Thaden JT, Stryjewski ME, Duni DV. Gram negative bacterial infections: research priorities accomplishments and future directions of the antibacterial resistance leadership group. Clin. Infect Dis 2017;46(sup-1):S30-S35.

Eagye K.L. ,Kim A.,Laochavaleeeson S. ( 2009 ): Surgical site infections does inadequate antibiotic therapy affect patient outcomes? . Surg. Infect. Larchmt 2009 Aug. 10( 4) : 323-31

Giacometti A., Cirioni O., Schimizzi MA., Del Prete SM., (2000): Epidemiology and microbiology of surgical wound infections J. of Clinical Microbiology, 38(2): 918-922.

Goyal N., Miller A., Tripathi M., Parvizi J. ( 2013 ): Methicillin resistant S. aureus ( MRSA ) : Colonization and preoperative screening Bone , Joint ,J. 2013 JAN; Vol. 95-B ( 1 ) :

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

Kim DH., Spencer M., Davidson SM., Li L., Shaw JW. ( 2010 ): institutional processing for detection and eradication of methicillin –resistant S. aureus in patients undergoing elective orthopedic surgery, Am. J. Bone Joint Surgery 2010 Aug.4; Vol. 92 ( 9 ) : 1820-1826.

Lafi S. Ahmed ( 1997 ): study on the bacterial wound infections , Al-Mustansiriya J. Science Vol.8 ( 2 ) : 29-35.

Lafi Shehab Ahmed ., Mahmood Alshamarry., Mohamed S. Ahmed & Waleed I .Ahmed ( 2018): Bacterial profile of Infected Traumatic Wound and the Antibiogram of predominant Bacterial Isolates Using Viteck Automated System in Ramadi Teaching Hospital, Iraq. Egypt. Acad. J. Biolog. Sci., 10(1): 69-76 (2018).

Makena A., Duzgun A., Brem J., Mac Donough MA. And Rydzik AM. (2016 ): comparison of Verona Integron –Borne Mettalo-B-Lactamas ( VIM ) Variants reveals difference in stability and inhibition profiles . Antimicrobial Agents Chemotherapy, Vol. 1 ( 4) : 283-288.

Stevens l.d., BisnoLA., Chambers FH., Dellinger PE., Goldstein cj ( 2014): Practice Guidelines for the diagnosis and management of skin and soft tissue infections : 2014 Update by the infectious Disease Society of America .IDSA Practice Guidelines for SSTIs. CD 2014:59 ( 15 July ).

Sule A., Thianni,L., Sule-Odu O.,Olusanya O.( 2002 ): Bacterial pathogens associated with infected wounds in Ogun State University Teaching Hospital, Sagamu, Nigeria . African J.Clin.Exp. Microbiology, 2002 ; 3: 13-16.

Vandepitte J ., Verhaegen J ., Engbaek K., Rohner P. (2003): basic laboratory procedures in clinical bacteriology , 2nd ed. WHO , Geneva.4-9.

Wong D,Nielsen TB, Bonomo RA, Pantapalangkoor P, Luna B, Spellberg B. (2017);Clinical and pathophysiological overview of *Acinetobacter* infections: century of challenges. *Clin Micro Rev* 30(1):409-447.