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Review Article



## Comparative study of identification of some uncommon bacterial species isolated from different clinical sample

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### Abstract

One of the tiniest microscopically species is bacteria, which has a detrimental impact on patients' life, and the current study has focused on the link between many diseases caused by damage caused by the presence of bacteria in the body's organs disturb immunity. There are some complete reports that fully reveal the relationship of bacteria to diseases such as intestinal poisoning, blood poisoning or other infections by determining the percentage of toxins produced by bacteria species or due to presence of those species responsible for causing diseases to humans in particular, particularly in persons who have been personally affected infected with bacteria. According to certain investigations, the number of samples within positive bacterial growth appeared on the media used reached a very high percentage, which included different types of bacteria such as *Morganella morganii*, which has the highest percentage of the uncommon isolates, and *Aerococcus urinae*, *Pseudomonas stutzeri*, *Micrococcus luteus* as for the remaining species, their appearance ranged at relatively lower rates in most of clinical samples acquired for this purpose of diagnosing the most common bacteria, which were represented by the following species from the bacterium *Kocuria kristinae*, *Ochrobactrum anthropi*, to three virulence factors Protease, Urease,  $\beta$ -lactamase, while the bacterial species *Sphingomonas paucimobilis*, *Gemella sanguinis*, *Aerococcus urinae*, *Pseudomonas stutzeri*, *Pseudomonas fluorescens*, that were insulated from different types of clinical specimens. Scientific criteria were adopted in this review, and 15 subjects were selected. And during the period 2014-2015, according to the subjects under study.

**Keywords** Uncommon, Bacteria,  $\beta$ -lactamase, *Ochrobactrum anthropic*, *Sphingomonas paucimobilis*.

### Introduction

Infections are known after they multiply inside the body of the host organism, which leads to a specific reaction in the body of the host, the pathological infections acquired by humans inside hospitals, are represented by different types, such as wound infection and infections of the device respiratory tract infection (UTI) (Godaly et al, 2015). Bacteria are one of the main causes of various infections, in which the bacterial infection varies among the common widespread bacteria, The most common is *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Proteus mirabilis* (Mahon et al., 2007; Issa et al., 2018). (Commons) such as the genus *Kocuria*, *Aeromonas* (Haghi-Ashteiiani et al.,

2007), *Micrococcus*, *Acinetobacter citrobacter*, which is characterized by containing various virulence factors through its production of urease enzyme, protease enzyme, also the capability to tolerate blood cells through the production of hemolysin enzyme (Tortora et al., 2004).

Antibiotics are defined as organic compounds produced by certain types of microorganisms, naturally or manufactured and they can kill or inhibit other microorganisms, through two important things include impeding structural integration, as it prevents construction of plasmatic membrane also cell wall, and the second is the metabolic structure, such as the construction of nucleic acids and the manufacture of different proteins, which play a role a key role in bacterial life (Balat &

Hill, 2003). Bacterial resistance to antibiotics is due to its production of beta-lactam enzymes and the production of virulence factors of toxins and enzymes. Urease, protease, and hemolysis are one of the most serious health concerns of the most dangerous epidemic phenomena in society it causes a widespread of bacteria, and their resistance to antibiotics is limited and blindly controlled.

### Data and methodology

The initial stage was to conduct an electronic search to collect a group of research related to different bacterial infections. Collected 15 articles on diseases related to bacterial infections, and these articles varied about diseases caused by bacteria, which ranged from presence in the blood and the cause of diseases specific to the urinary tract, addition to presence in the blood and the equipping of the diseased group understudy in the above-mentioned articles. . The samples included clinical samples as a preliminary comparison of the percentage of bacteria that occur according to the above-mentioned substances, then the percentage of different bacteria from clinical specimens was studied.

### Identification

Diverse species of bacteria were selected according to the articles that were referred to after the process of obtaining the colonies grown on appropriate culture media and capable of spreading to conduct further diagnostic tests. According to a note (Gayral et al., 1997). Which used the isolate diagnostic system (API 20 E) to confirm the isolates (Nader et al., 2017). Those articles indicated the existence number of bacteria that were isolated from a different number of clinical samples.

### Antibiotic allergy

In this article, we focus on the research that conducted a number of tests for the object to determine the sensitivity of isolates of bacterial species such as Pseudomonas to 13 antibiotics according to the disc diffusion technique (Bauer et al., 1966). Included in this study: amoxicillin; Ak: amikacin; cefotaxime; ceftriaxone; CAZ: Ceftazidime; ciprofloxacin; CN; KF: cephalothin; IMP: LEV: (5 Meropenem; NA; TE: tetracycline. The results were recorded according to (Helio et al., 2005).

### Result

Table 1. show the frequency of bacterial species in different clinical samples, according to the research collected for some governorates of Iraq, which extended. The prevalence of Citrobacter and Sphengomonas in urine was 44,4 %, while the frequency of Kocuria, Pseudomonas, and Enterobacter ludwigii reached about 1.11 % in the urine sample, while the frequency of the rest differed bacterial species for any different rates, both based on the type of sample that the bacteria were secluded, according to what was stated in the approved sources understudy, which included urine, blood, sputum samples, and others.

**Table 1. Number of uncommon bacteria isolates**

| Uncommon bacterial isolates    | No. of isolates | Sample isolates |
|--------------------------------|-----------------|-----------------|
| <i>Citrobacter spp</i>         | 4(44.4%)        | Urine           |
| <i>Citrobacter koseri</i>      | 4(44.4%)        | Urine           |
| <i>Acinobacter spp</i>         | 2(22,2%)        | sputum ,urine   |
| <i>Sphengomonas spp</i>        | 4(44,4%)        | Urin            |
| <i>Morganella morgani</i>      | 2(22,2%)        | urine           |
| <i>Enterobacter ludwigii</i>   | 1 (11,1%)       | Urin            |
| <i>Pseudomonas fluorescens</i> | 1(11,1%)        | sputum          |
| <i>Aeromonas salmonicida</i>   | 2(22,2%)        | Urin            |
| <i>Kocuria rosea</i>           | 1(11,1%)        | Blood,urin      |

In Table 1. the study showed a discrepancy in the percentages of bacteria appearance in different clinical samples, in which most of the studies relied on diagnosing bacteria using the Vitek 2 system, as it is in a study conducted in Switzerland by (Hendolin et al., 1997), the Vitek 2 system evaluated for speed, Strains diagnosis: Approximately 845 strains medically related to Gram-negative penis have been identified. Through which a database of bacteria isolated from clinical samples, including species rarely diagnosed in the clinical routine, has been identified inside the lab.

Urinary samples are also the most common in isolating pathogenic bacteria in the urinary system, which are often diagnosed as Gram-negative bacteria from a different clinical sample. Also, a study conducted in the USA by (Leskinen et al., 2002) was isolated. Anthropi, *S. paucimobilis*, *P. fluorescens/P. putida* and *Aeromonas spp P. stutzeri* in different clinical samples, which were collected from non-Gram-negative bacilli as a portion of the guarded antimicrobial resistance surveillance program (1997-2003).

Studies of the prevalence of otitis media have been conducted in Finland (Hendolin et al., 1997) and the United Kingdom (Kalcioğlu et al., 2002) A few clinical bacteria strains were isolated from middle ear abscesses in the United States (Faden & Dryja, 2000) and urine samples in Turkey (Gomez-hernando et al., 1999) and Spain (MacFaddin, 2000) and Brazil (CLSI, 2007) in Asian countries,

All isolates were grown on MacConkey plate based on the research approved in this investigation which belongs to as Gram-negative rods, in addition to the ability to ferment lactose. Oxidase and IMViC assay was the best-to-purpose method for differentiation of rare and Gram-negative bacterial species from common ones. In addition to bacterial growth on blood agar and N.A or one of them with no bacterial growth on MacConky agar, furthermore, bacteria have the potential to hemolyze.

This study was also based on comparing the virulence factors possessed by these types of bacteria isolated from clinical samples that included urine, sputum, and blood samples,

which included several virulence factors from 11 isolates of non-communicable bacteria isolated from different infections, including hemolytic factors and fermentation factors and enzymes through the production of the hemolysin enzyme, urea enzyme, loading proteins by except for hydrolysis proteins enzyme also its resistance to antibiotics by encoding the  $\beta$ -lactamase enzyme that works breaking the circle accountable for the activity of the antibiotic, which is beta-lactam circle in antibiotic, and the inhibition of bacteria, as shown in Table 2.

**Table 2. Virulence factors for uncommon bacterial isolates**

| Bacteria isolate               | $\beta$ -lactamase | Hemolysin | Protease |
|--------------------------------|--------------------|-----------|----------|
| <i>Morganella morganii</i>     | +                  | -         | -        |
| <i>Kocuria kristinae</i>       | +                  | -         | +        |
| <i>Alloiococcus Otitis</i>     | +                  | -         | -        |
| <i>Sphingomonas</i>            | +                  | +         | -        |
| <i>Ochrobactrum anthropi</i>   | +                  | -         | +        |
| <i>Pseudomonas Fluorescens</i> | +                  | +         | -        |
| <i>Aerococcus urinae</i>       | +                  | +         | -        |

The results showed that to reveal the most important types of virulence factors, the species possessed of bacteria, which included *Kocuria kristinae*, *Ochrobactrum anthropi*, two types of protease factors,  $\beta$ -lactamase, and the inability of these two isolates to produce hemolysin while the largest number of virulence factors, with an average of 2 isolates, was positive for only two virulence factors.

*Morganella morganii*, *Alloiococcus Otitis* can induce  $\beta$ -lactamase production as shown in Table No. 2, was negative for Protease production and blood loading by hemolysin, while the other bacterial species *Sphingomonas paucimobilis*, *Gemella*, *Aerococcus urinae*, *Pseudomonas fluorescens*, which showed a positive result for the  $\beta$ -lactamase production and complete hemolysin-tolerant  $\beta$ -type beta hemolysin tests. , while it was negative for the virulence factor protease, as for *Kocuria rosea* has been shown to produce only one type of studied virulence factors with no  $\beta$ -lactamase positive, and no it showed no reaction towards protease, and it shown never tolerance when it was grown on blood agar because it did not contain He factor.

As for the resistance that these samples are shown linkage to the antigens that were used in the previous studies only, the results of the sensibility trial showed that both negative with positive isolates entirely of Ka stain is resistant to the antibiotics, ampicillin / cloxacillin, cephalothin, Oxacillicn, Metronidazole, Piperacillin, Ceftazidime, Aztreonam, Carbenicillin, Neomyci that the studied isolates showed a marked difference in sensitivity to antibiotics, where the bacterial isolates *Acinatobacter calcoaceticus*, *Enterobacter ludwigii*, *Citrobacter freundii*, *Aerobacter freundii*, and *Acinatobacter freundii* were shown to be highly resistant to the antibiotics. The genus *Kocuria* isolated with two types of

roles showed anti-levofloxacin, norfloxacin, ofloxacin, doxycycline, and a very broad spectrum of these antigens.

### Antibiotic sensitivity

Most bacterial isolates were observed, which included several types of research that included studying the sensitivity of bacteria to antibiotics, that were sequestered from several clinical samples, and using the Kirby- Bauer disc collection method. Table 3. shows that 100% of the bacterial isolates were resistant to amoxicillin, while 96 were % for cephalothin and nalidixic, 92% for tetracycline, 84% for ceftazidime and ceftriaxone, and 80% for cefotaxime, while the lowest resistance was for imipenem and meropenem (24%). The results as well appeared that the isolates are considered to be more resistant to multi-use drugs.

**Table 3. Some antibiotics resistance % of bacteria according to the CLSI 2007. (n=25%)**

| Type of antibiotic | No.(%) of Resistant | No. (%) of Intermediate | No. (%) of Sensitive |
|--------------------|---------------------|-------------------------|----------------------|
| Amikacin (AK)      | 9                   | 12                      | 13                   |
| Amoxicillin        | 100                 | 0                       | 0                    |
| Ceftazidime        | 84                  | 16                      | 0                    |
| Ceftriaxone (CIP)  | 12                  | 16                      | 0                    |
| Gentamicin         | 8                   | 36                      | 0                    |
| Meropenem          | 60                  | 4                       | 36                   |
|                    | 36                  | 12                      | 42                   |

### Discussion

Infection with the uncommon bacteria in clinical samples, and diagnosis are the urgent important matters that must be medically taken care of, as it is linked to the occurrence of many diseases of humans in various organs. Infection is a major cause of mortality and morbidity (Shi *et al.*, 1992). In the current study, it was established the species that were studied which isolated from previous studies, showing the diversity of bacteria that were isolated from different clinical samples, included samples of urine, blood and sputum, as these species have different and high virulence factors. This explains the presence of high resistance to most of the antibiotics that were tested on those studied species, and these results agree with (Hammami *et al.*, 2001; Adel & Sabiha, 2010; Deeba *et al.*, 2011). These bacteria appear to be naturally resistant to  $\beta$ -lactam, mainly due to the very low permeability of their cell wall.

### Conflict of Interest

The author hereby declares no conflict of interest.

### References

Adel, K. K., & Sabiha, S. S. (2010). Genetic site determination of antibiotic resistance genes in " *Pseudomonas aeruginosa*" by genetic

- transformation. *British Journal of Pharmacology and Toxicology*, 1(2), 85-89.
- Balat, A., & Hill, L. (2003). Genitourinary abnormalities in children with urinary tract infection. *J. Med. Sci.* 29, 59-63.
- CLSI: Clinical and Laboratory Standards Institute. (2007). Performance Standards for antimicrobial susceptibility testing, seventeenth informational supplement, CLSI document M100-S17, Wayna, PA, USA.
- Deeba, B., Manzoor, A., Bashir, A., Gulnaz, B., Danish, Z., Shabir, A., & Abubaker, S. (2011). Detection of metallo- $\beta$ -lactamase (MBL) producing *Pseudomonas aeruginosa* at a tertiary care hospital in Kashmir. *Afr J Microbiol Res.*, 5: 164-172.
- Faden, H., & Dryja, D. (2000). Recovery of a unique bacterial organism in human middle ear fluid and its possible role in chronic otitis media. *J. Clin. Microbiol.*, 27:2488-2491.
- Gayral, J. P., Robinson, R., & Sandstedt, D. (1997). A new integrated system for microbiological testing: the Vitek II system, abstr. P254. *Clin. Microbiol. Infect.*, 3(Suppl. 2):53.
- Godaly, G., Ines, A., Catharina, S. (2015). Innate immunity and genetic determinants of urinary tract infection susceptibility. *J. Wal. K. Health.* 28 (1).
- Gomez-Hernando, C., Toro, C., Gutierrez, M., Enriquez, A., & Baquero, M. (1999). Isolation of *Alloioococcus otitidis* from the external ear in children. *Eur. J. Clin. Microbiol. Infect. Dis.*, 18:69-70.
- Haghi-Ashteyani, M., Sadeghifard, N., Abedini, M., Soroush, S., & Taheri-Kalani, M. (2007). Etiology and antibacterial resistance of bacterial urinary tract infections in children's medical center, Tehran, Iran., *Acta Medica Iranica.*, 45(2), 153-157.
- Hammami, S., Boutiba-Ben Boubaker, I., Ghazzi, R., Saidani, M., Amine, S., & Ben Redjeb, S. (2001). Nosocomial outbreak of imipenem-resistant *Pseudomonas aeruginosa* producing VIM-2 metallo- $\beta$ -lactamase in a kidney transplantation unit. *Diagn Mol Pathol.* , 6:106.
- Helio, S., Sadera b., Ronald, N., & Jonesa, C. (2005). Review; Antimicrobial susceptibility of uncommonly isolated non-enteric Gram negative bacilli. *International Journal of Antimicrobial Agents*, 25, 95-109.
- Hendolin, P. H., Markkanen, A., Ylikoski, J., and Wahlfors, J. J. (1997). Use of multiplex PCR for simultaneous detection of four bacterial species in middle ear effusions. *J. Clin. Microbiol.*, 35:2854-2858.
- Issa, M. A. S., Ghaima, K. K., Saleh, M. B., & Nader., M. I. (2018). Antibiogram study and prevalence of *pslA* gene among biofilm *Pseudomonas aeruginosa* producers isolated from some clinical specimens in Thi\_Qar province. *Pak. J. Biotechnol.*, 15 (3) 681-688.
- Kalcioglu, M. T., Oncel, S., Durmaz, R., Otlu, B., Miman, M. C., & Ozturan, O. (2002). Bacterial etiology of otitis media with effusion; focusing on the high positivity of *Alloioococcus otitidis*. *New Microbiol.*, 25:31-35.
- Leskinen, K., Hendolin, P., Virolainen-Julkunen, A., Ylikoski, J., & Jero, J. (2002). The clinical role of *Alloioococcus otitidis* in otitis media with effusion. *Int J Pediatr Otorhinolaryngol.* 66:41-8.
- MacFaddin, J. (2000). Biochemical tests for identification of medical bacteria. *Lippincott Williams & Wilkins. Philadelphia, USA.*
- Mahon, C. R., Lehman, D. C., & Manuselis, G. (2007). "Textbook of Diagnostic Microbiology". 3rd ed. U.S.A.
- Nader, M. I., Kareem, A. A. A., Rasheed, M. N., & Issa, M. A. S. (2017). Biofilm Formation and Detection of *pslA* Gene in Multidrug Resistant *Pseudomonas aeruginosa* Isolated from Thi-Qar, Iraq. *Iraqi Journal of Biotechnology*, 16, (4), 89-103.
- Sih, T., Schwartz, B., Bosley, G., & Facklam, R. (1992). Chronic otitis media effusion caused by *Alloioococcus otitis*: clinical and laboratory features, abstr. 671, p. 222. In Program and abstracts of the 32nd Interscience Conference on Antimicrobial Agents and Chemotherapy. *American Society for Microbiology, Washington, D.C.*
- Tortora, G. J., Funke, B. R., & Case, C. L. (2004). "Microbiology an Infection". 8th ed.; Pearson Benjamin Cummings, San Francisco, Boston, New York, San Francisco.
- Yousefi, S., Nahaei, M., Farajnia, S., Ghojzadeh, M., Akhi, M., Sharifi, Y., Milani, M. and Ghotaslou, R. (2010). Class 1 integron and Imipenem Resistance in Clinical Isolates of *Pseudomonas aeruginosa*: Prevalence and Antibiotic Susceptibility. *Iran J Microbiol.*, 2 :115-121. [www.iraqws.com/iraq/site/moh.gov.iq](http://www.iraqws.com/iraq/site/moh.gov.iq) (2012). Event of eyes patients.

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