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CLINICAL STUDY OF *BURKHOLDERIA CEPACIA* ISOLATED FROM BODY INFECTIONS

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Abstract

A total of four hundred and forty seven clinical samples were collected from patients of both genders and different ages, who were suffering from burns, wounds, otitis media, urine from patients complaining from urinary tract infections (UTI), sputum from patients with respiratory tract infections. Nineteen isolates of *B.cepacea* (4.3%) were isolated and identified according to routine diagnostic tests which its cultural and microscopically characteristics and biochemical tests, these isolates were 7, 5, 1, 4 and 2 from 93 burns, 77 wounds, 48 otitis, 175 UTI and 31sputum samples, respectively.

The antibiotics susceptibility test of these isolates were detected by disk diffusion method towards 20 antibiotics were checked, most of these isolates showed multidrug resistance (MDR) with high degree of resistance percentage for most antibiotics. The antibiotics were more impact including impinem, meropenem, sifitrixone, azthromycin and cefixime. The isolates had higher minimum inhibitory concentrations. All of these isolates contained capsule that plays an important role in resistance to phagocytosis Production of gelatinase, protease, β-lactamase, bacteriocin, haemolysin from all isolates, (73.7%) and (84.2%) of the isolates produced urease and lipase, respectively.

Key words : *B. cepacia*, urinary tract infections, respiratory tract infections, antibiotics resistance, pathogenicity factors.

Introduction

B.cepacia was belong to Pseudomonadaceae that clinically important and opportunistic pathogens, bacilli, straight, negative to gram stain, polarity of flagella, unable to form spores, lactose-fermentation, soil-based as well as humid environment, freshwater, plants, animals and hospitals. causing infections for males and females, old and young particularly respiratory infections, burns and disurea, not advanced age, children, Immunocopromised patients, diabetes and granulomatous, but it infect even the healthy people and young age by many infections such as urinary tract infections, prostate, burns, wounds, otitis media, its presence with toxins in blood, infections of the lungs, endocardidtis, cystitis, septic arthritis (McClean and Callaghan, 2009), it was producing alginate, fluidized gelatin, its colonies height circular with an internal edge of 1.0-1.5mm. It was resist for effect of disinfectant solutions and common antibiotics used in the hospitals and community, also it was isolated from disinfectants, mouth washes, dextrose and respiratory nebulizer. It was causes nosocomial infections as in intensive care units (ICU) and cardiology wards (Gautam *et al*., 2009). It causes in the events of health problems for hospital inpatients because its ability to transport between them by contaminated tools and solutions with it, *B. cepacia* was had virulence factors increased its pathogenicity and enable it from infection, its presence and invasion in host body, like toxins, siderophore complex, that use it in its vital functions and enzymes such as urease, protease, lipease, β-lactamas, gelatinase, licithenase and cell benefits different structures, such as the capsules, alginate, slime layer, fimbriae, pilli, its ability on multidrug resistant and production of haemolysin that distraction of blood cells, it attacks and destroys the entire epithelial cells of the host, leading to spread bacteria in that tissues (Sousa *et al*., 2010). Phospholipease was a product by these bacteria, that was important in cell wall lyses of host tissues and this lead to infection, it breaks and degradation the cell walls of the host cells and then the inflammation. The increase in virulence and severity of these bacteria pathogenecity was the possession of various strains in its multiple antibiotics and antiseptics

solutions resistance, especially in hospitals. For its chromosomal and plasmid DNA such as (R-plasmid), under its genetic genome, the effectiveness of the expression through its genetic genes of its virulence factors in which to suppress and overcome the lethal effect and inhibitory of effect antibiotics, as well as other genes in its genetic material obtained from other microorganisms by the jumping genes (transposones) and bacteriophages (Naqvi *et al*., 2011). Due to increase and randomly usage of antimicrobial such as antibiotics by patients and non-recourse to the owners of expertise and competence especially in the developing counteries, led to appearance of strains with a multiplicity of resistance to antibiotics and many researchers mentioned to this problem in their studies and this is a great problem in the medicine because difficulty in the controlling infections, and this result from in ability to choose the effect and efficient drug to kill bacteria, the existence of different means and mechanisms to resist the treatments, including chemicals such as disinfectants and antibiotics as a substitute for barriers responsible for the entry and exit of substances, changing the places of the impact of treatment through the addition or deletion to get what is new for the bacteria to skip treatments and escape from the influence killer and effective, to contain accurate systems pay treatments outside the bacterial cell to get rid of its impact, its portability and wide distraction of antibiotics such as beta lactamase and cephalosporinase that distraction beta lactam antibiotics containing the beta lactam ring and cephalosporin antibiotics, respectively (Zhou *et al*., 2007).

Materials and Methods

Collection of samples

A total of 447 samples were collected from patients with urinary tract infections, otitis media, wounds, burns, sputum and blood of both genders and different ages and these samples were transferred to the microbiology laboratory for next experiments.

Bacterial isolates

B. cepacia isolates were isolated from the sick people by culturing of samples on the brain heart infusion agar, blood agar base and macConkey agar (Himedia) by streaking technique, the cultures were incubated at 37°C for 1-2 days and identified according to their morphological characteristics and biochemical tests (Macfaddin, 2000).

Antibiotics sensitivity test

The isolates were tested against 20 antibiotics disks (Bioanalyse,Turky) to detect its susceptibility to antibiotics and detect the minimum inhibitory concentrations in a macro-dilution method according to CLSI (2010).

Detection of siderophores

By the hardened M9 medium, to which I added 200µl of 2.2- Dipyridyl (Bartels *et al*., 2007).

Detection of haemolycin

By the blood agar base to detect the ability of bacteria to produce Haemolycin (Macfaddin, 2000).

Detection of protease

By the skim milk agar to detect the capability of bacteria to produce protease (Benson, 1998).

Detection of urease

To detect the ability of bacterial isolates to produce urease, therefore I used urea agar medium (Himedia, India) (Benson, 1998).

Lipease test

By agar lipease medium to detect the potential of bacteria for fat degradation (Chamberlain and Brueggmann, 1997).

Detection of gelatin liqufication

To investigate the potential of bacteria to produce the gelatinase, the bacterial isolates were cultured on a gelatin liquification media of 1.3g of nutrient broth and 4g of gelatin dissolved in 100ml of sterile distilled water (Krieg, 1984).

β - Lactamase test

By using the iodine method to detect the potential of bacterial isolates to produce β- lactamase (Collee *et al*., 1996).

Detection of capsule

In a film that suspends the isolates and places it on a sterile glass slide and without heating for installation and drying, pour 1% crystal violet solution and leave for 4 minutes. After that, 20% copper sulphate is poured and left to dry and then examined with a microscope. Isolated bacterial cells appeared in form a tiny spot of purple color dark is surrounded by a light-colored installation called the capsule (Forbes *et al*., 2007).

Results and Discussion

The results of primary cultures revealed that 368 (82.3%) of the 447 samples were positive, while 17.7% were no growth (table 1). May be due to the presence of other microorganisms that do not grow in simple media, but appropriate media and technologies that are useful for its growth development. The present results were shown below and in terms of phenotypic traits and

Table 1 : The distribution and percentages of *B. cepacia* isolates.

%	No. of *B. cepacia* isolates	Negative growth	Positive growth	No. of samples	Types of samples
7.5	7	11	82	93	Burns
6.5	5	16	61	77	Wounds
2.3	4	20	155	175	Urine
2.1	1	15	33	48	Otitis
6.5	2	9	22	31	Sputum
0	0	12	11	23	Blood
4.3	19	83	364	447	Total

biochemical tests (table 2), the isolates were distinguished by different colonies of the shape according to the medium which growth in it and source of infection. It appeared round, smooth and opaque, with an elevation on the blood agar base and a diameter of 1.0-1.5mm after 24 hours incubation period and it appeared in yellowish and brownish with frankly odor as it described by Bergan (1981). The results showed that *B. ecepacia* isolates were isolated from different cases, and the distribution numbers and percentages of it in table 1. The present results clarify that *B. ecepacia* isolation rate 4.3%, while 7.5% of it were from more cases of burns, (Omar *et al*., 2015) isolated it from burns cases (85.7%) while (Al-Saadii *et al*., 2016) refers to isolate it (15.4%) from sputum, larynx swab, and blood. Filho *et al.* (2002) showed that 11 isolates from these bacterial isolates were isolated from 257 clinical sputum samples (3.7%) of respiratory infections patients.

The current results in table 3 indicate that all isolates (100%) produced the important siderophores in the iron pull available in the center of the specialized media containing these bacteria and supply it because it was necessary in its vital activities, it is linked to the iron and pulls it from related substances such as transferrin and lactoferrin present in the body and this is identical to Suzanne *et al*. (2004), for the siderophore produced by *B.cepacia* an economically feasible alternative to the chemical fertilizers used to develop the agricultural aspect and its production through its work as biological fertilizers to reproduce the production and make it high-quality and quantitative as well as a vital control to control plant pests coming from pathogenic fungi.

In case of blood hemolysis, the result revealed that all isolates were β-hemolytic. The enzyme was investigated by culturing the isolates on the blood agar medium, the red blood cells were degradation in the medium in a clear zone shape around the bacterial isolates which produced haemolysin. Haemolysin was one of the important virulence factors in bacterial pathogens leading to different body infections. Which located inside the cells in a way that leads to its collapse, or interfere with the hemoglobin within its structure and then to prepare the bacteria for its needs in its vital activities, in addition to enabling it to attack and move it to most parts of the body and increase its numbers in a terrifying way, (100%) (table 3). Positive results were showed that the red phenol indicator change in the urea agar medium from yellow to pink color due to the ammonia formed after urea decomposition, as a result lead to alkaline a substrate that substitutes the color of the detector, urease were degradation urea and produced ammonia gas (NH_3) and (CO_2) gas and this lead to increase pH and precipitation multi charge ions found in urine and this cause stones formed in kidney, in addition to protecting bacteria from high and toxic concentrations of urea. The results of the present study were confirmed by the role of urease in virulence and pathogencity of *B. cepacia*, and some of these bacterial isolates produced protease (78.9%), the results were seen by a clear visible area around of the colonies in skim milk media 1% after incubation period at 48-72 days. The protein was dissolved in the center of skimmed milk and therefore a strong indicator of its ability to possess the enzyme, 15 isolates of the *B. cepacia* produced for it, these enzymes were of paramount importance in the sweep of bacteria to sites of inflammation, it destroy body tissues by degradation its proteins.

In addition to protecting the bacterial isolates from the immune system defenses and destruction antibodies (IgG and IgA) and decrease immune response, therefore this enzymes were consider important pathogenecity factors, which qualifies it to be a very bad agent for it (19) refers to that *B.cepacia* isolates isolated from respiratory infections and other infections possesses the external polysaccharide and viscous substances important in its virulence and resistance to antibiotics, while reduced or non-productive strains of viscous substances due to a mutation in the gene responsible for it, leading to non-pathogenicity. Table 3 showed the production of all bacterial isolates in capsules (100%), which consists of multiple mucosal external sugars, which it were the

Table 2 : Bacteriological and biochemical tests for *B. cepacia* identification.

B. cepacia	**Isolates** / **Testes**
G-ve	Gram Stain
+	MacConky agar Growth in
+/-	Growth in citrimide
Complete (β-hemolysis)	Blood agar Type haemolysis on
Yellow	(Oxidation-fermentation polymyxin-bacitacin lactose medium (OFPBL growth in)
Yellow	Stewart arginine glucose medium (SAG) growth in
-	45° Growth in
-	42° Growth in
-	4° Growth in
-	Starch test
+	Motility test
+	Catalaze test
+	test Oxidase
+/-	Lipase test
-	Arginine test
+	Glucose lyses
+	Gelatine lyses
+	Urea lyses test
+	test Esculine
-	Indole production test
+	Lysine decarboxilase test
+/-	Vox proskawer test
+/-	Methyl red test
+	Citrate utilization test
+/-	Nitrate reduction test
+/-	Kalctose oxidation
+/-	Lactose oxidation
+/-	Maltose oxidation
+/-	Manitol oxidation
+/-	Sucrose oxidation
+/-	Xiloze test

Abbreviations : +: Found character, - : absent character.

medium one of virulence factors of bacterial adhesion and repelling of cellular defense. All isolates possessed lipase, which is very important for destroying fat cell membranes containing fat, as an important component, and thus help it attack the tissues of the cells and increase infection. McClean and Callaghan (2009) refers to bacterial isolates were produced lipase, protease, exotoxin and viscous materials that help it in the adhesion and entry of tissue cells containing the receptors to these bacteria. The present results showed all the isolates of *B. cepacia* were able to produce beta lactamase distraction for antibiotics container beta-lactam ring, which the makings of resistance to such antibiotics. Gelatinase also produced by all these isolates (100%). Many studies have shown that there is a relationship between the possibility of the bacteria to produce metabolic enzymes and their ability to repel and resistance to some antibiotics, these enzymes share the ability of bacterial pathogenesis, the production of virulence factors such as enzymes, toxins, capsule, mucus materials, flagella and pilli were vary according to bacterial infection and the location of the infection of the bacteria, where the factors of pathogens, enzymes such β-lactamase, toxins, mucoid substances and its mechanisms of resistant for treatments such as to alter the site of the antimicrobial effect or entry barrier or efflux pump to increase its pathogenicity on the host (Vila *et al*., 2007. These studies found that the most isolates were multidrug resistance such as penicillins antibiotics and ratio 100%, 94.7%, 89.5% and 84.2% for ampicillin, amoxicillin, pipracillin and ticarcillin, respectively. β-lactamases were encoded by R-factor that destroy the effect of antibiotics, and may be alter changes in the structure of the bacterial walls due to genetic mutations, which affects negatively or positively on the proteins associated with penicillin, as well as mutations leading to low permeability of cell membranes and the effective pumping of the outside treatment to contact the site of the impact and prevent treatment from learn to its target and these case was made bacteria more resist to antibiotics, in addition to its ability to transfer resistant some antibiotics to other bacterial species such as *E. coli* (Chuang *et al*., 2011). The frequent use and presence of antimicrobial treatments such as antibiotics and disinfectant solutions in the environment of microorganisms, including bacteria is an selective pressure against microorganisms that were expected to increase its resistance to these treatments because of permanent exposure to it. The high resistance of these antimicrobial compared to other antibiotics against the bacteria and possibly excessive and random use without consulting the specialists, it may be because of the possibility of isolates to produce broken enzymes such as β-Lactam antibiotic-destroying beta-lactam antibiotics and render it ineffective (Nichols and Nick, 2017). The resistance of active antibiotics by the current bacterial isolates were 42.1%, 36.8%, 31.6% and 31.6% for both cefotaxim, azithromycin, cefixime and seftraixone,

Table 3 : Virulence factors of *B. cepacia* isolates.

Capsule	Siderophore	Haemolysis on blood agar	Protease	Urease	Phospholipase C	*B*- lactamase	Bacteriocin	*B. cepacia*
+	+	β	+	+	+	+	+	1
+	+	β	+	+	+	+	+	2
+	+	β	+	+	+	+	+	3
+	+	β	+	+	+	+	+	4
+	+	β	+	+	+	+	+	5
+	+	β	+	++	+	+	+	6
+	+	β	-	+	+	+	+	7
+	+	β	++	++	+	+	+	8
+	+	β	+	+	+	+	+	9
+	+	β	-	+	+	+	+	10
+	+	β	+	+	+	+	+	11
+	+	β	+	+++	+	+	+	12
+	+	β	-	+	+	+	+	13
+	+	β	+	+	+	+	+	14
+	+	β	-	+++	+	+	+	15
+	+	β	+	+	+	+	+	16
+	+	β	+	++	+	+	+	17
+	+	β	+	+	+	+	+	18
+	+	β	+	+	+	+	+	19

Abbreviations: +: ability to produce, -:inability to produce, + +:high ability to produce.

respectively.

Azithromycin from macrolides important broad spectrum antibiotics were effective on *B. cepacia* isolates, and acts by binding to the 50S ribosomal subunit of susceptible microorganisms and thus interfering with microbial protein synthesis, it was indicated in the treatment of upper and lower respiratory tract infection, community acquired pneumonia, otitis media, pharyngitis, tonsillitis, sinusitis (ear, nose and throat infection), genitourinary tract infections (including sexually transmitted diseases) urethritis, prostatitis, cervicitis, cervicovaginitis and salpingitis. The present result showed *B. cepacia* isolates caused urinary tract infection in these study were multidrug resistance and these results agreement to results referred to by Nimri *et al*. (2017).

The current results of sensitivity test for antibiotics (table 4), showed the presence of isolates not affected by most antibiotics and the reason because its presence in the hospital environment on a continuous basis to the selective pressure in the hospital environment, the misuse of treatments by patients, giving them treatments without the identification of microorganisms and antibiotics sensitivity test, there is a defect in the diagnosis of bacteria and antibiotics (Avgeri *et al*., 2009). The constant exposure of bacteria to treatments and disinfectants stimulates it to resist such these substances for sudden changes in its genetic genome, and this confirmed by many of the studies (Naqvi *et al*., 2011). The present results of the antibiotics sensitivity test to the isolates for rifampicin, amikacin and chloramphenicol were 31.5, 36.8 and 73.7% respectively, these antibiotics were described bactericidal agents for bacteria, (Omar *et al*., 2015) refers to that isolates resist to chloramphenicol by 62.9%. The resistant of *B. cepacia* to the specific aminooglycosides were due to its production of acetyltransferases, phosphotransferases, a lack or absent of permeability of the bacterial cell membrane (Opazo *et al*., 2012). Baxter *et al*. (1997) showed most isolates were resistant in percentage (100.9%, 71.9%, 75%, 40.6%) to aminoclycoside, impenem, ciprofloxacin and aztronam. These resistance to antibiotics possibly because chromosomal mutations that alter the sites of the antibiotics effect or inhibit its permeable and aggregation it in bacterial cell, thereby eliminating its negative effect.

Although, both gentamycin and amikacin were bactericidal against microorganisms, but in the present study was amikacin more effective *in vitro* against *B. cepacia* compared to gentamicin and these results same the results that came by Al-Saadii *et al*. (2016). The current results refers to the efficacy of meropenem and

Table 4 : *B. cepacia* isolates sensitivity to antibiotics.

Cifotaxim	Azithromycin	Amikacin	Ampicillin	Ciprofloxacin	Sifitrixon	Cefixime	Cefatazidim	Pipracillin	Gentamicin	Aztronam	Amoxicillin	Trimetheprim	Cloramphenicol	Ticarcillin	Lomfloxacin	Norfloxacin	Rifampicin	Impenem	Meropenem	Isolates
S	R	S	R	R	S	S	R	R	R	S	R	R	R	R	R	R	S	S	S	1
R	S	S	R	S	S	I	S	R	S	R	R	R	R	R	R	S	S	S	S	2
S	S	R	R	S	S	S	R	R	R	R	R	R	S	S	R	R	R	R	S	3
R	R	S	R	R	R	R	R	R	R	R	R	R	R	R	S	S	S	S	S	4
R	I	S	R	I	S	S	S	R	S	R	R	R	R	R	R	S	R	S	S	5
S	S	R	R	R	S	I	S	R	R	S	R	R	R	R	R	R	S	S	S	6
R	R	S	R	R	R	R	R	R	S	R	R	R	R	R	S	R	S	R	S	7
R	S	S	R	R	R	S	R	S	S	R	S	R	R	R	R	S	S	S	S	8
I	R	R	R	S	S	S	S	R	S	R	R	R	S	S	S	R	S	S	S	9
S	S	I	R	R	R	R	R	R	S	R	R	R	S	S	S	R	S	S	S	10
S	S	S	R	R	S	S	R	R	S	S	R	R	R	R	R	S	S	R	S	11
R	R	S	R	S	S	S	S	R	R	R	R	R	S	R	S	R	R	S	S	12
I	S	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	S	S	S	13
S	S	S	R	S	S	R	S	R	R	R	R	R	R	R	R	R	S	S	S	14
S	I	S	R	R	S	I	S	R	S	R	R	R	S	R	R	R	R	S	S	15
S	R	R	R	I	R	S	R	S	S	R	R	R	R	R	S	S	S	S	S	16
R	R	R	R	R	S	S	S	R	R	S	R	R	R	R	R	R	R	S	S	17
R	S	S	R	S	S	R	R	R	S	R	R	R	R	R	R	R	R	S	S	18
S	S	R	R	R	R	I	S	R	S	R	R	R	R	R	R	R	R	S	R	19

Abbreviations : R: Resistance, S:Sensitive, I : moderate resistance.

Table 5 : Percentage to resist and mediate the sensitivity and sensitivity of bacteria.

Resistance isolates	Intermediate sensitive isolates	Sensitive isolates	Symbol	Antibiotics
36.8(7)	5.7(1)	57.9(11)	AK	Amikacin
100(19)	0.0(0)	0.0(0)	AM	Ampicillin
1.42(18)	10.5(2)	47.4(9)	CTX	Cifotaxim
42.1(8)	0.0(0)	57.9(11)	GM	Gentamicin
9.57(11)	10.5(2)	36.8(7)	CIP	Ciprofloxacin
6.31(6)	10.5(2)	68.4(13)	SXT	Sifitrixon
68.4(13)	0.0(0)	6.31(6)	NOR	Norfloxacin
31.5(6)	0.0(0)	68.4(13)	RIF	Rifampicin
10.5(2)	0.0(0)	89.5(17)	IPM	Impenem
5.2(1)	0.0(0)	94.7 (18)	MEM	Meropenem
78.9(15)	0.0(0)	0.21(4)	ATM	Aztronam
89.5(17)	0.0(0)	10.5(2)	PRL	Pipracillin
94.7 (18)	0.0(0)	5.3(1)	AMX	Amoxicillin
89.5(17)	0.0(0)	10.5(2)	TIC	Ticarcillin
68.4(13)	0.0(0)	6.31(6)	LOM	Lomfloxacin
52.6(10)	0.0(0)	47.4(9)	CAZ	Ciftazidim
36.8(7)	10.5(2)	52.7(10)	AZM	Azithromycin
31.5(6)	21.1(4)	47.4(9)	CFM	Cefixime

Table 6 : The minimum inhibitory concentrations of antibiotics used as human therapy against *B. cepacia*.

MICs (µg/ml) for *B. cepacia*	% of resistant *B. cepacia*	Antibiotics
128 <- 8	9 .57	Ciprofloxacin
64 - 1	5.31	Rifampicin
64 - 0.5	31.6	Cefetriaxone
128 <- 4	42.1	Cefotaxime
128<- 16	52.6	Ceftazidime
16 - 0.5	5.2	Meropenem
128- 0.5	42.1	Gentamicin
128<- 64	100	Ampicillin
128<- 64	100	Trimethprim

impenem to killed *B. cepacia* isolates while (Omar *et al*., 2015) refers to 88.5% of isolates were sensitive to meropenem, but its resistant to ciprofloxacin and trimethiprim were (100%) and its resistant to tetracycline, chloramphenicol, pipracilin and ciftazidim were 94.2%, 74.3%, 62.9% and 40%, respectively. The study showed that 52.6% of the isolates resist to ceftazidime antibiotics, while 47.4% of the isolates were sensitive to it,

ceftazidime belongs to the third-generation antagonists of the broad-acting cefalosporins. The resistance of *B. cepacia* isolates of rifampicin inhibitor to the RNA synthesis was clear, stopping the RNA polymerase enzyme from transcription (Zhou *et al*., 2007). The current results showed that the sensitivity of isolates to rifampicin were 31.5%. The resistance of some isolates to this antibiotics may be due to the chromosomal mutations of the genetic material, specifically in the genes that encode the RNA polymerase subunit, causing the antibiotic binding to be inhibited, and change in receptors of antibiotics. May be bacterial resistance to antibiotics was caused by the transfer of resistance genes on the chromosome, plasmids, or genetic elements that jump from resistant to sensitive isolates, as well as mutations to the genetic material and encoded to its resist (Naqvi *et al*., 2011). The present study on the minimum inhibitory concentrations of the studied isolates were higher in value, reaching more than 128µg/ml for cefotaxim, ceftazidim and ampicillin, whereas for ciprofloxacin 128 µg/ml (table 6). The most efficient meropenem was 16 µg/ml, (Omar *et al*., 2015) refers to resistant for meropenem by *B. cepacia* was 11.5% and minimum inhibitory concentration was 16 µg/ml while resist to ceftazedim was 40% and minimum inhibitory concentration was 32 µg/ml. Most of these antibiotics resistance may be due to the incorrect and widespread use of these antibiotics as treatments for patients with different infections.

While some the isolates were sensitive to the same concentrations for their development in their disease and not to be exposed to antibiotics in advance or because of the mutations affecting negatively on it, which gives the antibiotic effective in its destruction.

Conclusion

B. cepacia isolates associated with body infections showed resistance to many antibiotics but it were highly susceptible to meropenem and imipenem. All bacterial isolates in this study have the ability to possess more than one pathogenecity factors such as capsule, siderophore, hemolysin, extracellular protease, lipase, bacteriocin, β-lactamase and stones formation factor called urease and variability of bacterial isolates pathogenicity according to site of infection, therefore burns and urinary tract infections isolates were more isolates virulence.

References

Al-Saadii, A. G. M., A. F. Abbas and T. A. Dasheesh (2016). Identification of Gram Negative Bacilli from Patients AL-Diwaniya City and Detection of The Virulence Factors. *Int. J. Adva. Rese*., **4(3)** : 855-861.

Avgeri, S., D. Matthaiou, G. Dimopoulos, A. Grammatikos and M. Falagas (2009). Therapeutic options for *Burkholderia cepacia* infection beyond co trimoxazole: a systematic review clinical evidence. *Int. J. Antimicrob. Agents*, **33** : 394–404.

Baxter, I. A., P. A. Lambert and Simpson (1997). Isolation from clinical sources of *Burkholderia cepacia* possessing characteristics of *Burkholderia gladioli. J. Antimicrob. Chemother*, **39** : 169–175.

Bartels, E. D., J. E. Nielsen, M. L. Lindgaard and L. M. Hulten (2007). Endothelial lipase is highly expressed in macrophages in advanced human atherosclerotic lesions Atherosclerosis. *J. Appl. Microbiol*., **12** : 65-73.

Benson, H. J. (1998). *Microbiological applications laboratory manual in general microbiology*. **7**th ed. The McGraw-Hill Co.:431 (1998).

Bergan, T. (1981). Human and Animal-Pathogenic Members of the Genus *Pseudomonas*, In the prokaryotes. A Hand-Book on Habitats, Isolation and Identification of bacteria (Vol **I**). Springer-Verlage. Newyork.

Clinical and L aboratory Standars Institute (CLSI) (2010). Performance standars for antimicrobial susceptibility testing, **20** ed. approved standars, M 100-S20 and M100-S19, U.S.A.

Chamberlain, N. R. and S. A. Brueggmann (1997). Characterization and expression of fatty acids modifying enzymes produce by *Staphylococcus epidermidis*. *J. Med. Microb*., **46** : 693-697.

Chuang, Y. C., M. F. Lee and H. C. Lee (2011). Bacteremia due to extended spectrum-β-lactamase-producing *Aeromonas* spp. At a medical center in southern Taiwan. *Antimicrob. Agents Chemother*, **55** : 5813-5818.

Collee, J. G., A. G. Fraser, B. P. Marmion and A. Simmons (1996). *Mackie and mecartney. Practical microbiology*. 14thed. Churchill Livingstone. USA : 413-424.

Filho, L. S., F. W. Lucina, C. N. O. Bento, E. Gytin, A. F. Tatenon, J. E. Levi, J. C. Rodrigues and S. R. T. S. Ramosi (2002). Use of Selective For *Burkholderia cepacia* Isolation Respiratory Sample From Cystic Fibrosis Patients. *Rev. Inst. Med. trop. S. Paulo*. **44 (4)** : 203-208.

Forbes, B. A., F. S. Daniel and S. W. Alice (2007). *Bailey and Scott's Diagnostic microbiology*. **12**th ed., Mosby Elsevier company, USA (2007).

Gautam, V., P. Ray, G. D. Puri, K. Sharma, P. Vandamme and S. K. Madhup (2009). Investigation of *Burkholderia cepacia* complex in septicaemic patients in a Tertiary Care Hospital. *J. Ind. Nepal. Med. Coll*., **11(4)** : 222–224.

Krieg, N. R. (1984). Enrichment and Isolation: In manual of methods for general bacteriology. *J. Gene. Microbiol*., **54** : 143-153.

Macfaddin, J. F. (2000). *Biochemical tests for identification of*

medical bacteria. **3**rd ed. The Williams and Wilkins co. Baltimore. USA. (2000).

McClean, S. N. and M. Callaghan (2009). *Burkholderia cepacia* complex : epithelial cell-pathogen confrontations and potential for therapeutic intervention. *J. Med. Micro*., **58** : 1-12.

Nichols, D. P. and J. A. Nick (2017). Impact of azithromycin on the clinical and antimicrobial effectiveness of tobramycin in the treatment of cystic fibrosis. *J.* **16 (3)** : 358-366.

Nimri, L., M. Sulaiman and O. B. Hani (2017). Community-acquired urinary tract infections caused by *Burkholderia cepacia* complex in patients with no underlying risk factor. *J. Microb*., **4** : 1-4.

Naqvi, Z., Q. Aziz and S. Kharal (2011). Burn patients effectiveness of β-lactam antimicrobial drugs against gram negative bacteria. *J. Prof Med.*, **18(2)** : 300–305.

Omar, N., A. R. Hala, H. Okasha and N. Nabil (2015). Microbiological assessment of *Burkholderia cepacia* complex (Bcc) isolates in Alexandria Main University Hospital. *Alexandria J. Medicine*, **51** : 41-46.

Opazo, A., A. Sonnevend, B. Lopes, A. Hamouda and A. Ghazawi (2012). Plazmid encoded PER-7-lactamase responsible for ceftazidime resistance in *Acinetobacter baumannii* isolated in the United Arab Emirates. *J. Antimicrob. Chemother*, **67** : 1619-1622.

Sousa, A., G. Ramos and O. H. Leita (2010). *Burkholderia cepacia*complex: emerging multi host pathogens equipped with a wide range virulence factors and determinants. *Int. J. Microbiol.*, 1–9.

Suzanne, E. D., A. D. Kirby, G. Lajoie and D. E. Heinrichs (2004). Role of siderophore biosynthesis in virulence of *Staphylococcus aureus*: identification and Characterization of genes involved in production of a siderophore. *J. Infect. Immun*., **72(1)** : 429-437.

Vila, J. Marti, S. Sanchez-Cespedes and J. Porins (2007). Efflux pumps and multidrug resistance in Acinetobacter baumannii. *J. Antimicrob. Chemother*, **59** : 1210-1215.

Zhou, J., Y. Chen, S. Tabibi, L. Alba, E. Garber and L. Saiman (2007). Antimicrobial susceptibility and synergy studies of *Burkholderia cepacia* complex isolated from patients with cystic fibrosis. *J. Antimicrob. Age. Chemother*, **51** : 1085–1088.

Zlosnik, J. E. A. and D. P. Speert (2010). The Role of Mucoidy Complex: A Systematic: Proteomic and Transcriptomic Analysis. *J. Infe. Dis.*, **202(5)** : 770–781.