International Journal of Biomedical Engineering and Clinical Science
2018; 4(1): 15-20
http://www.sciencepublishinggroup.com/j/ijbecs
doi: 10.11648/j.ijbecs.20180401.13
ISSN: 2472-1298 (Print); ISSN: 2472-1301 (Online)

Detection of Most Pathogenic Bacteria in Renal Failure and Urinary Tract Infections Patients with Antibiotics Patterns

Jafar Jumaa Hassooni[1], Jabbar Jasim Kareem[2], Maysoon Mohammed Hassan[1], Abbas Naser Rashid[3]

[1]Department ob Basic Science, College of Dentistry, University of Wassit, Kut City, Iraq

[2]Department ob Tooth Industry, College of Dentistry, University of Wassit, Kut City, Iraq

[3]Laboratory Center, Health Center of Wassit, Kut City, Iraq

Email address:

physian16@gmail.com (J. J. Hassooni)

To cite this article:

Jafar Jumaa Hassooni, Jabbar Jasim Kareem, Maysoon Mohammed Hassan, Abbas Naser Rashid. Detection of Most Pathogenic Bacteria in Renal Failure and Urinary Tract Infections Patients with Antibiotics Patterns. *International Journal of Biomedical Engineering and Clinical Science*. Vol. 4, No. 1, 2018, pp. 15-20. doi: 10.11648/j.ijbecs.20180401.13

Received: October 6, 2017; **Accepted**: January 18, 2018; **Published**: February 11, 2018

Abstract: Urinary tract infection (UTIs) are some of the most common infections experienced by humans and most common cause of both community and nosoncomial infection for patients admitted to hospitals in worldwide. To shed light on this subject, present study was done to investigate relationship between bacterial infection and renal failure after treatment by follow up general urine examination, blood urea and serum creatinine. Two hundred and thirty samples has been taken from individuals their ages between (2 to 70) years old males and females these included one hundred and five urine samples from females and one hundred and twenty five urine samples from males. Samples has been tested by general urine examination by microscope and by chemical tested by (Strip urine-uorscan) by using number of chemical factors like (S. siliva celicielic acid, Benedict, Barium chloride Bacl, Ehrlich's, Foshus), also culture and antibiotics sensitivity test was done. Results of general urine examination appears two hundred and twenty two suffer from urinary tract infection percent 96.5% and 8 only with no urinary tract infection in 3.45% percent from urine samples. It has been taken two hundred and twenty two blood Samples from individuals who has urinary tract infection then detected (Blood urea, serum creatinine and urine sugar tests) to know relationship between bacterial infections and renal failure. Also in this study detected different types of bacteria pathogens in which isolated from patients with urinary tract infection with or without renal failure, Serotyping and antibiotics sensitivity test also done to known more suitable drug for each pathogens and antibiotic resistance.

Keywords: Urinary Tract Infections, Renal Failure, *Escherichia coli*

1. Introduction

Urinary tract infection are some of the most common infections experienced by humans, exceeded in frequency among ambulatory patients by respiratory and gastrointestinal infections indeed bacterial infections of the urinary tract are the most common cause of both community acquired and nosoncomial infection for patient admitted to hospitals in the united states the prognosis and management at UTLS however depend on the site of infection and any predis posing factors [1].

Urinary tract infection are serious health problem affecting millions of people each year million in the united state alone and it was the second most common type of infection more frequently in women than in men furthermore approximately 20% of women who recurrence [2].

Urinary tract infection are relatively easy to diagnose A clean cache urine specimen is used and urine determine the presence of a high level of white blood cells which may indicate a bacteria may then be cultured to determine the type of bacteria and susceptibility test par antibiotic should be used to treat the infection.

However urinary tract infections also account for up to 40% of nasocomail infections catheters these hospital-acquired infections tend to be more serious because the bacteria resistant to drug treatment and patients are often in poor general health [3].

Urinary tract infection account for more than 7 million

visits to physicians offices french epidemiologic study evaluated is annual incidence at 53000 diagnoses per million per year which represent to 1.05% to 2.10% of the activity of general practitioners in females was estimated to be 250000

The incidence of urinary tract infection is higher among females in who it commonly accurse in an anatomically normal urinary tract conversely in males and children [4].

2. Materials and Methods

The following instruments were used throughout the study

Table 1. *Devices and materials.*

No.	Name of Instrument	Company (origin)
1.	Centrifuge	Elite-Medium
2.	Autoclave	Portable
3.	Balance	Metler (Switzerland)
4.	Distillator	Alab tech-(Korea)
5.	Electric Oven	Binder (Germany)
6.	Incubator Bacteriology	Binder (Germany)
7.	Sensitive electronic balance	Denver
8.	Shaker incubator	Binder (Germany)
9.	Microscope	Olympus (Japan)
10.	Spectrophotometer	Shimadzu (Japan)
11.	Water bath	Tefea- Hannover (Germany)
12.	Micropipettes (different size)	Gilson (france)
13.	Magnetic Stirrer	Japan
14.	Vortex mixer	Portable
15.	Refrigerator	Japan
16.	Inverted Microscope	Olympus (Japan)
17.	Freeze (-20C°)	Bender (Germany)
18.	Co2 incubator	Bender (Germany)
19.	Loope	(Japan)
20.	Forceps	(Japan)
21.	Burner	(Japan)

2.1. Chemical and Biological Materials

Table 2. *Chemicals and biological materials.*

No.	Name	Company (Origin)
1.	Acetone	BDH
2.	Absolute ethyl alcohol	BDH (England)
3.	Absolute methyl alcohol	BDH
4.	Agar	Mast (England)
5.	Ap2oE	BDH
6.	Benedict	BDH
7.	Barium chloride (Bacl)	BDH
8.	Ehrlich's	BDH
9.	5-Salfa Celiselic acid	BDH
10.	catlatse	BDH
11.	Oxidas	BDH
12.	Urea's	BDH
13.	Indol	BDH
14.	Voges Proskauer	BDH
15.	Normal Physiological salin	China
16.	Fushius	Fluka
17.	Sodium Chloride (Nacl)	Fluka
18.	Sodium hydroxide	BDH
19.	Urea	BDH
20.	Ioden	Fluka
21.	Iodine Crystals	Fluka
22.	Phenol Crystals	Fluka
23.	Methyl red	Fluka
24.	Concentration acetic acid (CH3CooH)	Fluka (Germany)
25.	Urine Strips	Japan

2.2. Stains

Table 3. *Stains.*

No.	Name of Stain	Company (Origin)
1.	Crystal Violet	Fluka
2.	Methylene blue	Fluka
3.	Safranine	Fluka
4.	Basic Fuchsine	Fluka
5.	Strong Grobol Fuchsine	Fluka

2.3. Serum and Kits

Table 4. *Serum and Kits.*

No.	name	Company
1.	Urea Kit	Biomerinx (France)
2.	Creatinine Kit	Biomerinx (France)

2.4. Antibiotics

Table 5. *Antibiotics Discs.*

No.	Name	Symbol	Ab Concentration Mg/disc	Company (Origin)
1.	Amoxicillin	Amx	2S	Oxiod (England)
2.	Ampicillin	Am	10	Oxoid
3.	Augmentin	Ac	30	Oxoid
4.	Cefixime	CFM	S	Oxoid
5.	Ceftriaxone	CRO	30	Oxoid
6.	Cephoxilin	CN	30	Oxoid
7.	Chloramphenicol	C	30	Oxoid
8.	Ciprofloxacin	CF	S	Oxoid
9.	Clindamycin	CM	2	Oxoid
10.	Cloxacillin	CX	S	Oxoid
11.	Doxycycline	DO	30	Oxoid
12.	Gentamycin	GM	10	Oxoid
13.	Lincomycin	L	1S	Oxoid
14.	Nalixic acid	NA	30	Oxoid
15.	Norfloxacin	NX	10	Oxoid
16.	Peincillin G	P	10i4	Oxoid
17.	Piperacllin	PC	100	Oxoid
18.	Rifampicin	RD	30	Oxoid
19.	Strepytomycin	S	10	Oxoid
20.	Tetracyclin	Te	30	Oxoid
21.	Trimetheprim	TR	2S	Oxoid
22.	Vancomycin	VA	30	Oxoid
23.	Amikacin	AK	10	Oxoid
24.	Tobramycin	Tb	30	Oxoid
25.	Cephalexin	CFA	10	Oxoid

2.5. Culture Media

Table 6. *Culture media.*

No.	Name of medium	Company (Origin)
1.	Macconkey	Himedia (India)
2.	Trypticase Soy broth	Himedia (India)
3.	Nutrient agar	Himedia (India)
4.	Blood agar	Himedia (India)
5.	Mueller Hinton agar	Himedia (India)

All culture media were prepared according to information of manufacturing company.

2.6. Prepared Media

Table 7. *Prepared media.*

No.	Name of Medium
1.	Hydrogen Sulphide production Medium
2.	Indole test medium (peptone water)
3.	Methyl redanf voges-proskauer test medium
4.	Urea agar (Christense medium)

3. Results

These study included (230) patients suffered from urinary tract infections with or without renal failure from Al-zahraa and Al-Karama teaching hospital in Wassit governorate in period from October 2009 to October 2010 in age between (2-70) years old in different gender, urine and blood samples was collected from them,

after culturing of all urine samples on different media the results showed that 194

(84.3%) gave positive result compared with 36 (15.7%) negative, the blood samples used for detecting creatinine, urea and also fasting blood sugar was done to them, the results who were detected recorded in Table 8 below:

Table 8. *Numbers and types of bacterial pathogens in which isolated from patient with urinary tract infections with or without renal failure.*

Age	Name of bacteria			Number of infection
	E. coli	Proteus	Klebsiella	
2-15 years	30 (83%)	2 (5.5%)	1 (2.7%)	36
16-40 years	36 (32.4%)	26 (23.4%)	20 (18%)	111
41-70 years	17 (20.4%)	30 (36.1%)	21 (25.3%)	83

Results of this study accepted with (Kolen, 1986) 89.5% and (Hamlemant, 1990) that show infection 87%, (Baka'ss, 1995) that show infection 80% and (Alataboy, 1999) that show infection 83%, also thes study show high percentage from the result (Haekal, 2001) that show the infection 70% and (Sadk Alaalak, 2003)that show infection 65% from 311 urine samples.

In addition to that this study show low percentage from the results of (Jabir Alhashimy, 2005) that show infection 91% from patients with or without renal failure gave positive results.

3.1. Blood Urea and Serum Creatinine

Blood urea and serum creatinine tests was done to 222 patients in which suffered from urinary tract infections, the results showed 94 (42.3%) patients with different age and sex suffered from renal failure.

Also showed that patient suffering from renal failure in age between (2-15) years old was 4 (4.2%) patients, (16-40) years old was 20 (21.2%) and (41-70) years old was 70 (74.4%) patients.

This result was accepted with following results Mohamad Alataby, 1993 in which obtained 40% renal failure from 200 blood samples, Mazin Alsalmmyu, 2005 that show 41% renal failure from 210 blood samples and Abd Alfetah Alraawy, 2008 that show 40% renal failure from 195 blood samples also these study show high percentage from Alataby, 2006 30% renal failure from 250 blood samples and Mar hamtim, 2007 that show 31% renal failure from 260 blood samples, also this results different from Albayty and Marhomtin, 2002 but this result of last two researcher builded on samples collected from patients with aged between (1-20) years old bit this study collection blood samples between (2-70) years old.

3.2. Biochemical Tests

The biochemical were used to confirm identification of different bacteria isolate these test include (catalase, oxidase, unease, Indole, methyl, voges-porskouer- siammon citrate, H2S) tests.

Results of this tests for *E. coli* bacteria positive for catalase, indole, methyl red and negative to oxidase, simmon citrate and vogas-postkawer test, also kelbsiella gave positive to catalase, siammon citrate, vogas- proskowres and negative to oxidase, indol and methyl red and also proteus gave the following result Table (9):

Table 9. *Biochemical tests for different bacteria isolated from culture of human urine.*

Name of bacteria isolate	Catalese	Oxidese	indole	urease	Methyl red	Voges proshouer	Simmon citrate	Hydrogen Sulfide production
E. coli	+	-	+	-	+	-	-	-
Klebsiella	+	-	-	-	-	+	+	-
Proteus	+	-	+	+	+	-	-	-

3.3. Sensitivity Test

The results of antibiotics sensitivity test to most common bacterial pathogens in which isolated in this study appeared in following table:

Table 10. *Antibiotics sensitivity test for common pathogens isolated from renal failure and urinary tract infection patients.*

Antibiotic name	*E. coli*		Klebsiella		Proteus	
	Senstivity%	Resistance%	Senstivity%	Resistance%	Senstivity%	Resistance%
ampicillin	91%	9	68%	32%	100%	0
Cefixime	91%	9	100%	0	93%	6.8%
Ceftriaxone	93%	7	100%	0	100%	0
Cephoxilin	97%	3	100%	0	63.7%	36.3%
Chloramphenicol	96%	4	78.7%	21.2%	91.3%	8.6%

Antibiotic name	*E. coli*		Klebsiella		Proteus	
	Senstivity%	Resistance%	Senstivity%	Resistance%	Senstivity%	Resistance%
Ciprofloxacin	91%	9	78.7%	21.2%	86.2%	13.7%
Clindamycin	91%	9	65.8%	34%	96.5%	3.4%
Cloxacillin	91%	9	97.8%	2.1%	100%	0
Doxycycline	92%	8	100%	0	89.6%	10.4%
Gentamycin	87%	13	100%	0	74.1%	25.8%
Lincomycin	88.8%	11.2	68%	31.9%	100%	0
Nalixic acid	82%	18	85.1%	1.4%	91.3%	8.6%
Norfloxacin	91%	9	91.4%	8.5%	94.8%	5.1%
Peincillin G	69%	31	95.7%	4.5%	98.2%	1.7%
Piperacllin	88%	12	100%	0	98.2%	1.7%
Rifampicin	22.2%	77.8	100%	0	100%	0
Strepytomycin	66.6%	33.4	100%	0	98.2%	1.7%
Tetracyclin	77.7%	32.3	89.3%	1.4%	81.1% .	18.9%
Trimetheprim	88.8%	11.2	87.2%	12.7%	100%	0
Vancomycin	91%	9	100%	0	100%	0
Amikacin	91%	9	87.2%	12.7%	84.4%	15.5%
Tobramycin	92%	8	100%	0	82.7%	17.2%
Cephalexin	98%	2	100%	0	100%	0
Amoxicillin	66.6%	33.4	76.5%	23.4%	55.1%	44.85%

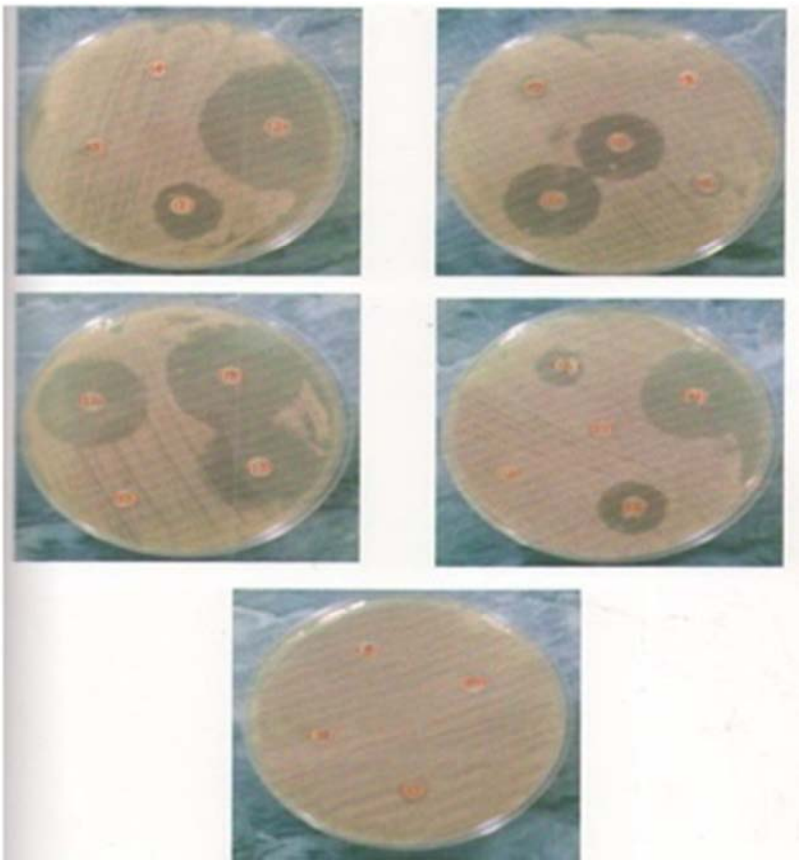

Figure 1. *Sensitivity test to patients with renal failure and or without urinary tract.*

3.4. Follow up After Treatment

3.4.1. General Urine Examination (GUE)

After treatment the patients follow up by this test and also by sensitivity test using 25 antibiotic (Table 10) in which show:

It's the percentage of recovered 77.4 %, and 22.5% patients non recovered from urinary tract infections with or without renal failure.

Table 11. *Numbers and percentages of patients which was suffered from UTIs and diabetic and also recovered patients.*

Total number of patients	Suffered from UTI and diabetic	Recovered from UTIs after treatment
230	71 (31.9%)	172 (77.4%)

3.4.2. Blood Urea and Serum Creatinine

After treated of patient retest of blood urea and serum creatinine by take blood samples from the patients, the results of this testes showed the percentage of recovered patients from renal failure 45 (47.8%) from 94, ratio of treated renal failure at aged between (2-15) years old 100%, aged, between (16-40)years old 71.8% and 33.3%. in age group between 41 to 70 years old. This results was agreed with (kovien, 2003), in which show 38% of renal failure was recovered after treatment, (Kadear Alwan, 2005) 50% renal failure also agreed with result of Haider Abid Alkalik, 2007 (35%), and (Kalid ali, 2004) that show 30%. But it high from results obtained by Walees Amer, 2004 in which 25%.

Also noted that all patients suffered from renal failure had urinary tract infections but very low numbers had firstly urinary tract infections them infected with renal failure for this case appeared that renal failure enhanced ability to grow different bacteria them can lead to infected with urinary tract infections.

4. Conclusion

According to our study and results achieved we can conclude the following:

1. The result of this study shows found most 3 types of bacteria in which caused of urinary tract infection (*E. Coli*, Klebsiella and proteus).
2. The result of this study shows its high number at patient that age between (41-70) years old suffering from renal failure.
3. The result at this study shows it high number at patient that have suffering from renal failure that have suffering from urinary tract infection.
4. The result of this study shows it's the percent of covered to patient that have suffering from renal failure and urinary tract infection low from percent of covered to patient that had suffering from urinary tract infection only.
5. The results of this study shows it's all types of bacteria caused urinary tract infection sensitive to many antibiotic
6. The results of this study shows it's all type at bacteria caused urinary tract infection resistance to some antibiotics.
7. The result of this study shows its high number of individual that live in village and poor that had urinary tract infections more than percent the individual that live in center city and rich man.
8. The result of this study showed that *E. Coli* bacteria found in large number in age between 2-15 years old.
9. The results of this study showed high number of patient that suffering from diabetic metallic and urinary tract infections.

References

[1] Abbott, S. L., O'Connor, J., Robin, T. *et at.* (2003) "Biochemical Properties of a newly described Escherichia species, Eschcrichia albertii." Journal of Clinical Microbiology 41: 4852-4854.

[2] Agace, W., Hedges, S., Andersson, U. *et at.*. (1993) "Selective cytokine production by epithelial cells following exposure to Escherichia coll." Infection and Immunity 6\\ 602-609.

[3] Al Mamun, A. A. M., Tominaga, A. and Enomoto, M. (1996) "Detection and characterization of the flagellar master operon in the four Shigella subgroups." Journal of Bacteriology 178: 3722-3726.

[4] Ashkenazi, S., Levy, I., Kazaronovski, V. and Samara, Z. (2016) "Growing antimicrobial resistance of Shigella isolates." The Journal of Antimicrobial Chemotherapy 51: 427-429.

[5] Azad, M. A., Islam, M. and Butler, T. (1986) "Colonic perforation in Shigella dysenteries 1 infection." The Pediatric Infectious Disease Journal 1: 103-104.

[6] Kolen, F. (1986) "Uropathogenic Escherichia coli." In Escherichia colt: Virulence Mechanisms of a Versatile Pathogen. M. S. Donnenberg (ed.). London Academic Press, 239-268.

[7] Hamlemant, B. (1990) "A sensitive and specific DNA probe to identify enter aggregative Escherichia coli, a recently discovered diarrhea pathogen." The Journal of Infectious Diseases 161: 1249-1251.

[8] Baka'ss, M. (1995) "Characterization of an RTX toxin from enter hemorrhagic Escherichia coli 0157:H7." Infection and Immunity 64:167-175.

[9] Alataboy, M. L. (1996) "Mortality due to shigellosis: community and hospital data." Reviews of Infectious Diseases 13 (Suppl. 4): S219-S224.

[10] Haekal, M. L. (2001) "Rethinking options for the treatment of shigellosis." The Journal of Antimicrobial Chemotherapy 30: 243-247.

[11] Sadk Alaalak. (2003) "Identification of Ics A, a plasmid locus of Shebelle Flexner that governs bacterial intra- an intercellular spread through interaction with F-acting." Proceeding of the National Academy of Sciences of the United States of America 86: 3867-3871.

[12] Jabir Alhashimy. (2005) 'The Afa/Dr adhesins of diffusely adhering Escherichia coli stimulate interleukin-8 secretion, activate mutagen-activated protein kinesis, and promote polymorph nuclear Tran epithelial migration in T84 polarized epithelial cells." Infection and Immunity 71: 1068-1074.

[13] Mohamad Alataby, (1993) "Reliability of CHROMagar O157 for the detection of entero hemorrhagic Escherichia coli (EHEC) 0157 but not EHEC belonging to other serigraphs." Journal of Applied Microbiology 85: 425-428.

[14] Mazin Alsalmmyu. (2005) "Rapid laboratory identification and characterization of verify tot oxygenize (shiga toxin producing) Escherichia coli (VTEC/STEC)." Journal of Applied Microbiology 95:205-217.

[15] Alfetah Alraawy. (2008) "The different hemolysins of Escherichia call." Medical Microbiology and Immunology 180: 167-182. Beutin, L. (1999) "Escherichia coli as a pathogen in dogs and cats." Veterinary Research: 285-298.

[16] Alataby. (2006) "Close association of era toxin (Shiga-like toxin) production with enter hemolytic production in strains of Escherichia coli." Journal of Clinical Microbiology 27: 2559-2564.

[17] Mar hamtim. (2007) "An evaluation of current shigellosis treatment." Expert Opinion on Pharmacotherapy 4: 1315-1320.

[18] Albayty and Marhomtin (2002). "Molecular characterization of a fibril adhesion, Fl 845, mediating diffuse adherence of diarrhea-associated Escherichia coli to HEp-2 cells." Journal of Bacteriology 171:4281289.

[19] Abd Alfetah Alraawy. (2008). "Epidemiology of verocyto-toxigenic Escherichia coli (VTEC) in ruminants." In Veracity oxygenic E. coli. G. Duffy, P. Garvey and D. A. McDowell (ed. s). Trumbull, CT: Food & Nutrition Press, 113-148.

[20] kovien. (2003) "Enter pathogenic Escherichia coli." in Escherichia coli: Virulence Mechanisms of Versatile Pathogen. M. S. Dannenberg (ed.). London: Academic Press, 81-118.

[21] Kadear Alwan. (2005). Plunkett, G., Bloch, C. A. et al. (1997) "The complete genome sequence of Escherichia coli K12." Science 277: 1453-1474.

[22] Haider Abid Alkalik. (2007)."The tripartite type III secreton of Shigella flexneri inserts IpaB and IpaC into host membranes."The Journal of Cell Biology 147: 683-693.

[23] Kalid ali, (2004). "Binding of the Shebelle protein IpaA to vinculum induces F-acting de polymerization." The EMBO Journal 18: 5853-5862.

[24] Brenner, D. J., Fanning, G. R., Johnson, K. E. *et at.*. (1969) "Polynucleotide sequence relationships among members of Nitrobacteria cease." Journal of Bacteriology 98: 637-650.

[25] Walees Amer. (2004), R., Acar, G. *et at.*. (2003) "Identification and characterization of a new variant of Shiga toxin 1 in Escherichia coli ON'f:H19 of bovine origin." Journal of Clinical Microbiology 41: 2106-2112.