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Studies on bacteriological and biochemical tests of urinary tract infections in some Iraqi patients undergoing hemodialysis due to renal failure and chronic kidney diseases

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Abstract:

Background: Quantification of proteinuria and urine creatinine concentration are important in kidney failure and chronic kidney diseases (C K D) assessment. In most kidney diseases, urine contains large amounts of protein and there are good correlations between the urine protein to creatinine ratios and the 24 hour urine. Some patients with renal failure and chronic kidney diseases suffered from bacterial infections.

Objective: The aims of this study are to investigate the protein; creatinine ratio in some Iraqi patients with kidney failure and chronic kidney diseases. Also, to detect the bacterial infections in CKD.

Methods : the relationship between protein and creatinine in urine samples was done in (70) patients (35 female and 35 male) with kidney failure and chronic kidney diseases, aged from (18 – 65) years, at a period from September 2016 –December 2017 at AL-Yarmuk Hospital Teaching / Baghdad. The urine volume and total protein measuring in 24 hr. samples were evaluated. The susceptibility of identified species of pathogenic bacteria to many antibiotics were tested.

Results: From the data, the elderly age between (39 - 65) had (50 %) kidney failure and chronic kidney disease. The urine total proteins in females were (56.8%) and in males (43.1%). On the other hands, the urine creatinine in females were (62.5%) but in males were (37.5%). The protein / creatinine ratios in females were (56.25%) and in males were (43.75%). The highest protein / creatinine ratio was detected in male with age (65) years old, and the total protein of this patient was (2.4 g/24 hr) and urine creatinine was (0.6 mg/kg/day), so the protein / creatinine ratio was 4g protein per19 creatinine. (61.42%) cases showed no growth upon culture, whereas (38.57%) cases were found to have significant bacterial growth in patients with KFD. The numbers of *E. coli* and CONS isolates in females were higher than in males, whereas *S. aureus* and *Klebsiella spp*. isolates in males were higher than in females with KDF.

Conclusions: The proteins / creatinine ratio on a 24 hr. urine samples give evidence to existence of significant proteinuria. It is a quick and accurate method to estimate proteinuria excretion and give an indication of renal failure and CKD in Iraqi patients.

Keywords: Urinary Tract Infection; Chronic Renal Failure; Antibiotic Sensitivity; pathogenic bacteria; Hemodialysis.

Introduction:

Renal function tests are important to: identify renal dysfunction; diagnose renal disease; revealing of disease progress and responding the patients to treatment. Plasma creatinine, urea and protein are used to estimate the renal functions [1].If protein excretion is >150 mg / 24 hr., So this will named proteinuria [2] .Proteinuria means the presence of proteins in urine like albumin and globulins [3] .

Kidney damage progression is marked by rises the concentrations of creatinine and urea and blood. Creatinine is produced from muscles and excreted outside the body through the kidneys. Whereas urea results from taking proteins via food like red meat and white meat, and are excreted with urine [4].The major causes of chronic kidney diseases and kidney failure are: glomerulonephritis; diabetic nephritis; hyper blood tension and autoimmune disease such as systemic lupus erythematosus [5] .

One reason of urinary tract infection risks is urinary catheterization; this lead to increase bacteriuria .In many cases, the antibiotics are not efficient to decrease the infections. But decreasing the infections has done by using aseptic techniques for insertion. *Escherichia coli* can cause about (80–85) % of urinary tract infections; followed by *Staphylococcus saprophuticus* being the cause in (5–10) %. *Klebsiella spp., Proteus spp., Pseudomonas spp.,* and *Enterobacter* may also cause UTIs In some cases, viral and fungal infections may be responsible for urinary tract infections [6].

Methods:

Patients under study:

The study was carried out over a period of (4) months, From September 2016 to December 2017 at artificial kidney Department / AL-Yarmuk teaching Hospital / Baghdad city.Seventy patients with kidney failure (KF)and chronic kidney disease (CKD) were chosen, (35 males and 35) females, their aged ranged from (18 – 65) years. The parameters measured were urine creatinine concentration, urine total protein, albumin in urine and protein / creatinine ratio . This cross-sectional study was designed also to study the uropathogenes in patients with (KF) and (CKD) (the same patients described above).

Collection of urine samples and subjects:

1- 24 hr urine sample:

Total urine collection time was 24 hours. In (70) patients had the assistance of the doctor and nursing staff for collection. Each container was marked with the patient's name, number of the container, and collection time. A protein / creatinine ratio and a urine albumin were done on a 24 hr urine sample.

A) Detection of albumin in 24 hr urine sample:

Twenty five (25%) sulfosalicylic acid (SSA reagent) is used to detect protein (albumin) in each 24 hr urine sample [6] as following:

1- Into a clean glass test tube, (1 ml) of urine supernatant (after centrifugation, 3000 r. p. m for 5 min.) was poured.
2- Three drops of SSA reagent were added into the tube directly on top of the urine.
3- The tube was shaken gently and the turbidity was read immediately. By this method, albumin and globulin could detect with SSA reagent.

B) Detection of urine total protein:

Urine total protein kit (Fortress diagnostic limited, U. K.) was used to measure the amount of protein in urine sample. It consists of Urine protein reagent (Pyrogyllol red) . This reagent composed of:

a- Pyrogyllal red 0.06 mmol / L
b- Succinic acid 150 mmol / L
c- Sodium oxalate 0.84 mmol / L
d- Sodium benzoale 3.5 mmol / L

Standard (Protein):

The procedure was done as Table (1). Urine samples were centrifuged at (5000) r. p. m. for (5) minute and the supernatants were used to detect total protein.

Table (1): Manual procedure for urine total protein

	Blank	**Standard**	**Sample**
D D H_2O	**50 µl**	**____**	**___**
Standard (protein)	**____**	**50 µl**	**___**
Urine sample	**___**	**___**	**50 µl**
Reagent	**3 l**	**3 l**	**3 l**
	All tubes were mixed well and then incubated at 25 C º for 5 min.		
	The absorbance of each tube was measured at 600 nm		

DD H_2O: double deionized water

24 hr urine total protein determination:

24 hr urine volume was measured in milliliters and the specimen should be refrigerated during and after collection. The equations as following :

Protein concentration (g /L) = $\frac{absorbence\ of\ sample}{absorbence\ of standerd}$ × standard conc.

Protein (g / 24 h) = Urinary protein (g / L) × Tu / 1000

Where Tu = 24 hr urine volume in ml (Total urine volume in 24 hr)

1000 = It was used to convert ml / day to liter / day

The normal values at urine total protein in adults are:

0. 01 – 0. 14 g / L (0.028 – 0. 14 g / 24 hr)

C) Urine creatinine :

Urine creatinine kit (creatinine JAFFE , Business and technology park carriage two hill co . cork , Ireland) was used to measure the urine creatinine in Iraqi patients with kidney failure and chronic kidney diseases . It consists of many solutions [Table 2].

Table 2: Components of urine creatinine kit

Component	Ingredient	Conc in tests
Reagent 1	**Alkaline buffer**	**200 mmol /L**
Reagent 2	**Picric acid**	**25 mmol / L**
Standard (Calibrator)	**Creatinine**	**177 mmol / L**

The procedure was done as in table (3) .

Table 3: Manual for urine creatinine

	Sample	Standard	Blank
Reagent 1	**500 µl**	**500 µl**	**500 µl**
Urine sample	**50 µl**	**___**	**___**
Standard	**___**	**50 µl**	**___**
DD H_2O	**___**	**___**	**50 µl**
Reagent 2	**500 µl**	**500 µl**	**500 µl**
All tubes were mixed well and then incubated at 37 c° for 1 min			
O.D. was measured at 500 nm in 1 min and the next 2 min			

O. D: Optical density

To calculate the urine creatinine , these equations are must use :

a- Concentration of creatinine (mg / kg) =

$$\frac{sample\ O.D2 - sample O.D.1}{Calibrator\ O.D2 - Calibrator O.D.1} \times \text{Conc. of calibrator}$$

b- Conversion factor. Qty in µmol / L = 88.4 × Qty in mg / al

The normal values of urine creatinine in adults are :

Male:	$\frac{\mu mol/kg/day}{124-230}$	$\frac{mg/kg/day}{1.4-2.6}$
Female:	97 – 177	1.1 - 2

Urine creatinine test was based on the principle that at alkaline pH values, creatinine reacts with picric acid to produce a coloured compound, creatine alkaline picrate, which can be photometrically measured.

D) Urine protein / creatinine ratio calculation:

Standard calculation of protein / creatinine ratio was:

(Protein g / 24 hr) / (creatinine mg / kg / day)

The normal values of protein / creatinine ratio in adults is:

< 0. 2 g protein / g creatinine.

2. Urine samples for culture :

A- A total of urine samples from 70 patients (35 males and 35 females) were collected for urine culture.

B-Macroscopic and microscopic examination:

Wet urine smear preparations were prepared from centrifuged urine samples at 3000 r.p.m. for 5 minute. Leukocytes (pus cells) and erythrocytes per high power filed (40X) were looked for. Urine samples containing ≥ 5 pus cells / high power field (H.P.F.) were considered as having significant bacteriuria . A rapid urine dipstick (Combur 10 test, Boehringer Manhim, Diagnostics and Biochemicals, East Sussex, United Kingdom) was also used to detect pyuria via leukocyte esterase activity [9].

C- Gram's staining:

Dry fixed smears of uncentrifuged urine were stained with Gram's stain and examined under oil immersion (100X). The presence of more than one bacteria in 20 field, this will give indication of bacteruria and it is give 10^5 CFU/ml urine after cuturing on selective culture media [10].

D-Urine culture:

A 0.01 ml of uncentrifuged urine was taken with sterile loop and inoculated on blood agar (Oxoid), MacConkey agar (Oxoid), CHROMagar™ *Candida* and CHROMagar™ Orientation (CHROMagar Paris,France) for isolation and differentiation of uropathogens. These plates were incubated aerobically at 37Ċ for 18-24 hour. All positive samples for one or both leukocytes, bacteruria and nitrite tests were inoculated on blood agar (aerobically conditions and in the presence of CO_2 %) and MacConkey agar [11].

E- Identification of bacterial isolates :

Bacterial colonies were identified on the basis of Gram's reaction, morphology, biochemical characteristics features. API-Staph and API 20E (bioMerieux, France) were used to identify *Staphylococcus spp*. and enterobacteraceae after culturing on selective and enriched culture media [9, 12, 13].

F-Antibacterial susceptibility:

Antibacterial susceptibility test was performed by the Kirby Bauer disc diffusion technique using antibiotic discs containing the following concentrations: Amikacin (AN, 30µg), chloramphenicol (C, 30 µg), Trimethoprim +Sulphamethazole (SXT, 25 µg), Ampicillin (Am, 10 µg). Nalidixic acid (NA, 30 µg) , Gentamycin (CN, 10 µg), Nitrofurantoin (F,300 µg), Cefotaxime (CTX, 30 µg) ,Amoxicillin (AMX,25 µg), Tetracyclin (TE, 10 µg), Oxacillin (OX, 10 µg), Vancomycin (VA, 10 µg), Co – Trimoxazole (CT,25 µg), Norfloxacin (NOR,10 µg) ,penicillin (G , 10 U) ,Ceftriaxone (CRO,30 µg) and Erythromycin (E , 10µg) .These antibiotics were chosen as they are the antibiotics of choice in the treatment of UTI. The diameters on inhibition zones were measured by milliliter and then compared with the standard diameters that installed in the standard scales [14, 15]. All antimicrobials used for the study were obtained from Oxoid Ltd. Bashingstore Hampaire, UK. A standard inoculum adjusted to 0.5 McFarland was swabbed on to Muller-Hinton agar (Oxoid Ltd. Bashingstore

Hampaire, UK); antibiotic discs were dispensed after drying the plate for (3–5) min and incubated at 37°C for 24 hours.

Results :

Table 4 showed that the elderly age between (39 – 65) years had 50% kidney failure and chronic kidney disease and these patients may be suffered from loaded filtrations of protein per year and for a long period. This lead to damage of kidney more than in younger age.

Table 4: Age of patients with renal failure and chronic.

Age (years)	Number	Percentage (%)
< 20	2	2.85
20–29	16	22.85
30-39	17	24.2
>39	35	50
Total	70	100

Table (5) showed that females with renal failure and chronic kidney diseases had urine total protein (56.8%) but in males were (43.1 %) and these results may be due to the fitness of female less than male.

Table 5: 24 hr urine total protein test in to patients with kidney failure and chronic kidney diseases

Sex	24 hr urine total protein		Probability	Total
	Positive (> 0.14 g/day)	Negative		
Female	29 (56.86 %)	6 (31.57 %)	0.016	35
Male	22 (43.13 %)	13 (68.42 %)		35
Total	51 (100 %)	19 (100%)		70

Positive case: > 0.14 g / 24 hr

Negative case: within normal range (Normal range: 0.028 – 0.14 g / 24 hr)

Table (6) show that females with kidney failure and chronic kidney diseases had urine creatinine (62.5 %) but males were (37.5 %).

Table 6: 24 hr urine creatinine test in patients with kidney failure and chronic kidney disease

Sex	24 hr urine creatinine		Probability	Total
	Positive	Negative		
Female	5 (62.5 %)	30 (48.38 %)	0.710	35
Male	3 (37.5 %)	32 (51.61 %)		35
Total	8 (100%)	62 (100%)		70

Positive case : men > 2,6 mg / kg / day , female > 2 mg / kg / day .

Negative case : within normal rang .

Protein / creatinine ratio for all patients were higher than the normal value they were (0.3 – 4) g protein / 1g creatinine and gave an indication that the kidney had damaged or failure. In three patients, the P/C ratios were within normal range because they had low urine protein and high urine creatinine that means the kidney were heals them. The highest protein / creatinine ratio was detected in male with age (65) years old. The total urine protein was (2.4 g / 24 hr) and urine creatinine was (0.6 mg / kg / day) ; so the p / c ratio was (4) and this mean that this patient is excreting 4 g protein / 1 g creatinine ,the urine albumin of this patient was (4 plus) [Table 7] . The highest P/C ratios were in females than in males; they were 27 (56.25%).

Table 7: 24 hr urine protein/creatinine test in patients with kidney failure and chronic kidney disease

Sex	24 hr urine protein / creatinine ratio		Probability	Total
	Positive	Negative		
Female	27 (56.25 %)	8 (36.36 %)	0.197	35
Male	21 (43.75 %)	14 (63.63 %)		35
Total	48(100%)	22 (1005)		70

Positive : > 0.2 g protein / 1 g creatinine

Negative : within normal range

Microscopic examination and Urine culture results

Microscopic examinations for leukocytes (pus cells) help to determine the pyuria and diagnose the type of urinary tract infection in 70 patients. Out of all these, 27 patients were positive to pyuria.

According to data presented in table 8, 43(43/70x1oo = 61.42%) cases showed no growth upon culture, whereas 27(27/70X100 = 38.57%) cases were found to have significant bacterial growth in patients with KFD. The numbers of *E. coli* and CONS isolates in females were higher than in males, whereas *S. aureus* and *Klebsiella spp*. isolates in males were higher than in females with KDF.

Table 8: Distribution of uropathogens in females and males in patients with KDF

Microorganisms	Male		Female		Total	Probability
	Number	Percentage	Number	Percentage	No. (%)	
E. coli	4	33.33	6	40	10(37.03)	1.0
S. aureus	3	25	3	20	6(22.22)	1.0
Klebsiella spp.	2	16.66	2	13.33	4(14.81)	1.0
CONS	1	8.33	2	13.33	3(11.11)	1.0
S. pyogenes	1	8.33	1	6.66	2(7.40)	1.0
Proteus spp.	1	8.33	1	6.66	2(7.40)	1.0
Total	12	100	15	100	27(100)	

A total of six species of bacteria were isolated in the significant growth. These species were *E. coli* 10 (37%), *S. aureus* 6 (22.22%), *Klebsiella spp*. 4(14.8%), CONS 3 (11.11%), *S. pyogenes* 2 (7.4%) and *Proteus spp*. 2(7.4%) [Table 9].

Table 9: Distribution of uropathogens among the positive UTI in patients with KFD

Distribution of uropathogens		
Microorganism	Number	Percentage (%)
E. coli	10	37
S. aureus	6	22.22
Klebsiella spp.	4	14.8
CONS	3	11.11
Streptococcus pyogenes	2	7.4
Proteus spp.	2	7.4
Total	27	100

Table 10 describes that Gram negative bacteria were the most common of uropathogens responsible for UTI with a 16 (59.25%) percentage in comparison to 11(40.74%) for Gram positive bacteria.

Table 10: Distribution of Gram-positive and Gram-negative Bacteria among Uropathogens.

Gram +ve		Gram -ve	
S. aureus	6 (54.54%)	*E. coli*	10 (62.5%)
CONS	*3 (*27.27%)	*Klebsiella spp.*	4 (25%)
Streptococcus pyogenes	2(18.18%)	*Proteus*	2 (12.5%)
Total	11 (100%)	Total	16 (100%)

Antibiotics which used against Gram negative pathogenic bacteria were showed (100%) sensitivity towards Amoxicillin and Gentamicin. The less effective of antibiotics for Gram negative bacteria were got to be Nitrofurantoin, Chloramphenicol and Cefotaxime (Table 11). While Amoxicillin, Vancomycin, Ciprofloxacin, and Gentamicin were most effective against Gram positive bacteria, whereas Erythromycin, Tetracycline and Nalidixic acid were found to be less effective.

Table 11: antibiotics which used against Gram negative and positive pathogenic bacteria

Pathogenic bacteria		AN No. (%)	C No. (%)	SXT No. (%)	AM No. (%)	NA No. (%)	CN No. (%)	F No. (%)	CTX No. (%)	AMX No. (%)	TE No. (%)	OX No. (%)	VA No. (%)	CT No. (%)	NOR No. (%)	G No. (%)	CRO No. (%)	E No. (%)
E. coli	S	9 90	8 80	5 50	8 80	4 40	10 100	8 80	9 90	10 100	4 40	5 50	4 40	4 40	3 30	0 0	2 20	0 0
	R	1 10	2 20	5 50	2 20	6 60	0 0	2 20	1 10	0 0	6 60	5 50	6 60	6 60	7 70	10 100	8 80	10 100
Staph. aureus	S	2 33.3	1 16.7	5 83.3	5 83.3	0 0	1 16.7	2 33.3	3 50	5 83.3	1 16.7	2 33.3	4 66.7	2 33.3	1 16.7	1 16.7	4 66.7	0 0
	R	4 66.7	5 83.3	1 16.7	1 16.7	6 100	5 83.3	4 66.7	3 50	1 16.7	5 83.3	4 66.7	2 33.3	4 66.7	5 83.3	5 83.3	2 33.3	6 100
Klebsiella	S	3 75	3 75	2 50	3 75	1 25	4 100	3 75	3 75	0 0	3 75	2 50	1 25	1 25	1 25	1 25	1 25	0 0
	R	1 25	1 25	2 50	1 25	3 75	0 0	1 25	1 25	4 100	1 25	2 50	3 75	3 75	3 75	3 75	3 75	4 100
CONS	S	1 33.3	1 33.3	1 33.3	2 66.7	0 0	2 66.7	0 0	1 33.3	1 33.3	1 33.3	1 33.3	0 0	0 0	0 0	2 66.7	0 0	0 0
	R	2 66.7	2 66.7	2 66.7	1 33.3	3 100	1 33.3	3 100	2 66.7	2 66.7	2 66.7	2 66.7	3 100	3 100	3 100	1 33.3	3 100	3 100
Strep. pyogenes	S	1 50	0 0	1 50	2 100	0 0	2 100	1 50	2 100	2 100	0 0	1 50	1 50	0 0	0 0	1 50	0 0	0 0
	R	1 50	2 100	1 50	0 0	2 100	0 0	1 50	0 0	0 0	2 100	1 50	1 50	2 100	2 100	1 50	2 100	2 100
Proteus spp.	S	2 100	2 100	2 100	1 50	0 0	2 100	2 100	2 100	2 100	2 100	0 0	1 50	1 50	1 50	0 0	0 0	0 0
	R	0 0	0 0	0 0	1 50	2 100	0 0	0 0	0 0	0 0	0 0	2 100	1 50	1 50	1 50	2 100	2 100	2 100
Total		27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27

Discussion:

On the basis of many previous studies, urinary protein production in Iraqi patients with renal failure and chronic kidney diseases was studied. 24 hr urinary protein excretion rate has been used to detect the severity of renal diseases and this depending on the volume and timing of urine sample collection which are necessary to estimate of total urinary protein excretion.

Urine protein / creatinine ratios were detected in patients with glomerular nephritis and renal failure. The ratios were ≥ 2000 mg / g in 24 hr urine [7]. In other studies, the researchers found that the average of daily protein excretion were (40 – 80) mg .However, excretion > 150 mg / 24 hr is abnormal and may be concidered the earliest marker of renal diseases. On the other hand, proteinuria less than 1 g / 24 hr with a normal centrifuged urine deposits and normal renal function indicates sever glomerular pathology. Levels of proteinuria greater than (3-50 g / 24 hr are present in patients with nephritic syndrome [8].

Ninety nine of urine protein is a mixture of plasma proteins. Little amount of plasma protein passes the glomerular capillary membranes in healthy individuals. Trace concentrations of albumin and beta globulins may be filtered in kidney, but most of them are reabsorbed by the proximal tubule cells [16]. Urinary protein excretion averages in healthy adults about (40 mg / 24 hr; 0.04 g / 24 hr) and it reaches 0.15 g / 24 hr as upper limited of normal. In another study, a urinary protein excretion rate > 3500 mg / 24 hr; 3.5 g / 24 hr) gives an indicator of kidney diseases presence, and this will cause edema. Protein concentrations in urine relate to how much protein is filtered in kidney and the amount of water excreted in urine that varies with hydration status. The volume and total protein concentration can measure in 24 hr urine samples [17].

Urine protein concentrations decreased in patients who drink a lot of water. So, 24 hr urine volume will be increased; whereas the urine protein concentration decreased in patients who drink very little fluid and water, and 24 hr urine volume will decrease [9].

Creatinine can filter inside the glomerulus and is not extensively reabsorbed or secreted. So, its concentration become as the same method which described in proteinuria paragraph .Males usually excrete (19 – 26) mg of creatinine / kg of body weight each 24 hr, whereas females excrete (14 to 21) mg / kg of body weight each 24 hr. The range of normal urine volume in adults is from 1 to 1.5 L / 24 hr [10]. Creatinine and protein excretions varies among peoples according to age, sex and body size ,but still give good accuracy and correlation with urinary protein .The P / C ratios are wide daily varied in the urinary protein excretion rate and this depending on changes in physical activity ;protein intake and the type of foods[11,12,13,14].All positive cases with urine total protein had albumin in their urine ,the range of albumin were (2 plus – 3 plus) detected with (25 %) Sulfosalycilic acid solution [15] .

Our results of amikacin resistant were compatible with Seifu *et al*. [18] results .They found that 77.8% of the isolates were *E. coli* and 97.2% of them had susceptibility to amikacin. Most frequently pathogens that cause UTI were *Escherichia coli*, they were 39.3%, followed by *Staphylococcus spp*., 20.2%, *Klebsiella spp*., 8.4%. Gentamicin was the most effective antibiotics pathogenic bacteria, followed by chloramphenicol. Whereas,Amoxicillin was not effective on the pathogens. Guneysel *et al.* [19] also found that the most pathogenic bacteria were *Escherichia coli*. It was (54%) which isolated from 251 patients suffered from UTIs. They were resistance to trimethoprim/sulfamethoxazole and the rate was (34%). Kabugo *et al*. [20] were isolated *E. coli*, followed by *Staphylococcus aureus*. *E. coli* isolates were sensitivite to Ampicillin and Nitrofurantoin, they were (78.6%) and (64.3%) respectively, whereas *Staphylococcus aureus* sensitivity to ciprofloxacin, Nitrofurantoin and gentamycin were (100%) and (66.7%) respectively.

In China, Ma *et al* [21] found that Coagulase-negative staphylococci (CoNS) considered important bacteria that cause nosocomial infections. It was highly resistance (>70%) for Penicillin G and Erythromycin ; while the moderate resistance were (30 - 70)% for Tetracycline, ciprofloxacin, Trimethoprim/Sulfamethoxazole and Chloramphenicol; and the low resistance (<30%) was for Gentamicin.

Our results are compatible with Falah *et al*. results [22] ,they were revealed that from 40 patients with hemodialysis (27 males and 13 females) with chronic renal failure, their urine had 15(37%) positive culture for pathogenic bacteria; 6, 5, 1, 1, 1 patients had been infected with *E. coli*, *Klebsiella*, α-hemolytic Streptococci, coagulase negative Staphylococci, and *Proteus spp*. respectively. 9 (64%) out of 14 patients had a positive urine culture results. Also, our results are the same results which obtain from Richa *et al*. [23], they found that 33(84.6%) of Gam-negative bacteria were isolated from 39 patients suffered from 13(33.3%) *E. coli*, 7(17.9%) *Proteus spp*., 3(7.7%) *Klebsiella* and *Pseudomonas aeruginosa*, 2(5.1%) *Proteus mirabilis*. While 6(15.4%) *Staphylococcus saprophyticus* which is only the one type of Gram positive bacteria isolated from patients. All Gram-negative bacteria were found to be effective towards Gentamicin whereas *Staphylococcus saprophyticus* had high sensitivity to Oxacillin.

The results of our study demonstrate that pyuria was a good marker for significant bacteriuria in these patients. Cultural techniques are needed for susceptibility testing of bacterial isolates to guide antimicrobial therapy. The antimicrobial susceptibility tests in this study revealed that Amikacin, Gentamicin, Ceftazidime, Cefoxitin, and Imipenem act well on isolated bacteria.

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