بسم الله الرحمن الرحيم

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Faculty of Medical laboratory Sciences

In *Vitro* Resistance of Commonly Prescribed Antimicrobial Agents Applied to Treat UTI in Shendi Locality

A dissertation Submitted in Partial Fulfillment for the Requirement of Degree of M.Sc. in Medical Laboratory Science (Medical Microbiology)

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الآية

بسم الله الرحمن الرحيم

﴿ وَعَنَتِ الْوُجُوهُ لِلْحَيِّ الْقَيُّومِ وَقَدْ خَابَ مَنْ حَمَلَ ظُلْماً ﴾

صدق الله العظيم

سورة طه الآية (١١١)

Dedication

To my … Loving Parents and my brothers

Who has always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve. your prayers have been answered

To my … Dear Husband

Who has been a constant source of support and encouragement all the way and made sure that I give it all it takes to finish that which I have started. I am truly thankful for having you in my life.

To my … All Friends

Who have supported me throughout the process. I will always appreciate all you have done

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Abstract

Introduction: One of the most serious issues in medicine was increasing resistance of *Bactria* to antimicrobial agents especially broad Spectrum antibiotics such as Cephalosporins. This fact is associated with higher mortality and morbidity rates, prolonged hospital stays and increased treatment related costs. Cephalosporins were the most prescribed treatment of infection causes by bacteria resistances to broad Spectrum of antibiotics.

Objective: This study aimed to detect distribution of more frequented prescribed antibiotics resistance in all pathogens Isolated from clinical Samples of UTI patient in Shendi locality.

Method: Cross-sectional and laboratory based study was carried out on 100 from UTI specimens, for 88(88%) of female,12(12%) of male in age group (20-40) 38(38%) found Shendi City 53(53%) and in Rural 47(47%). 111 types of pathogenic bacteria were isolated and identified using Gram stain, biochemical reactions and tested for their susceptibility to Cefixime, Ceftriaxone, Ciprofloxacin, Gentamicin and Norofloxcin a antibiotics was performed for all isolated bacteria from mid-stream urine samples.

Results: The present of 24(24%)of urine sample was mixed and 76(76%) from unmixed, gram positive 36(32.5%) and gram negative 75(67.5%), most isolated bacteria comprising of 19*(17.1%) p.vulgaris, 15(13.%) E.coli, 13(11.7%)S.aureus ,12(10.8%) S.epidermis ,11(9.9%)P.aregenosa ,7 (6.3%) Klebseilla pneumoniae,7(6.3%) Enterobacter species, 7(6.3%) S.saprofiticus,5(4.5%) M.morganii, 4(3.6%) P.mirabils, 4(3.6%) C.freundii, 4 (3.6%) S.fecalis and 3(2.7%) S.marcasin.* The antimicrobial susceptibility testing showed was sensitive to Cefixime 4(3.6%), Ceftrixone 42(37.8),Ciprofloxcin75(67.5%), Norofloxcin 74 (66.7%), Gentamycin, found resistance to Cefixime 107 (96.4%), Ceftriaxone

96.4(62.2%), Ciprofloxacin 36(32.4%), Norofloxcin 37(33.3%), Gentamicin 8(7.2%) .

Conclusion: in this study the most isolate bacteria was P.vularis and the lower isolate bacteria was S.marcasin. in antimicrobial susceptibility testing show the most antibiotic sensitive was Gentamycin, Ciprofloxcin, Norofloxcin, Ceftrixone and Cefixime. The most antibiotic resistance was Cefixime, Ceftrixone, Norofloxcin and Ciprofloxcin and Gentamycin to all isolate bacteria from urine sample.

ملخص البحث

المقدمة: تعتبر مقاومة الباكتيريا والمضادات الحيوية من اخطر المشاكل الطبية خاصة المضادات الحيوية واسعة الطيف كالسيفاروريسبورينات التي ترتبط بارتفاع معدلات المراضة والوفيات والإقامة الطويلة بالمستشفى مع زيادة تكاليف العلاج.

الأهداف: هدفت الدراسة لمعرفة البكتريا المسببة لالتهاب مجري المسالك البولية ومعرفه مدي انتشار مقاومة المضادات الحيوية الموصوفة بشكل اكبر لجميع مسببات الامراضي التهابات مجري المسالك البولية في منطقة شندي وما جاورها موزعة بحوالي ٥٣ عينة من المدينة بنسبة ٥٣% وما حول المدينة بحولي ٤٧ بنسبة ٤٧%.

الطريقة: تم إجراء دراسة مقطعية ومعملية علي ١٠٠ عينة من مرضي التهابات مجري المسالك البولية لعدد٨٨ من النساء بنسبة ٨٨% و١٢ عينة من الرجال بنسبة ١٢% في الفئة العمرية الموزعة كالآتي علي كلا الجنسين :(٢٠-٤٠) بنسبة ٣٨%، الفئة العمرية من ٤١-٦٠ بنسبة ٣٢% والفئة العمرية من ٦١-٨٠ بنسبة ٣٠%.، تم عزل ١١١ نوع من الباكتيريا المسبب لالتهابات مجري المسالك البولية وتحديدها باستخدام صبغة الجرام وإجراء التفاعلات الكيمائية الحيوية واختبار الحساسية للمضادات الحيوية لمركبات سيف كسيم، والسفترايكسون، وسيبرو فلو كساسين، النوروفلوكساسين، والجنتمايسين باستخدام وسط مولر هينتون.

النتائج: أظهرت الدراسة أن العينات المختلطة عددهم ٢٤ بنسبه ٢٤% وان العينات غير المختلطة عددهم ٧٦بنسبه ٧٦%وان عدد الجرام بوسيتف ٣٦بنسبه ٣٢.٥%وان عدد الجرام نقتف ٧٥ بنسبه ٦٧.٥ % المتقلبة الشائعة عددها ١٩بنسبه ١٧.١% والاسكريشيا القولونية عددها ١٥ بنسبة ١٣.٥% والعنقودية الذهبية عددها ١٣بنسبه ١١,٧%والعنقودية البشرية عددها١٢ بنسبة ١٠.٨%والزائفة الزنجبارية عددها١١بنسبه ٩.٩%والكليبشيلا لرئوية عددها ٧ بنسبة 6.3% والبكتريا المعوية عددها ٧ بنسبه ٦.٣% والعنقودية المترممة عددها ٧ بنسبه ٦.٣% و البكتريا المورغانية عددها ٥ بنسبة ٤.٥% والمتقلبة الرائعة عددها ٤بنسبه ٣.٦% والبكتريا السترية عددها ٤ بنسبه٣.٦ % والمكورات المعوية عددها ٤ بنسبه ٣.٦% والسراتية الزابلة عددها ٣بنسبه ٢.٧%. أظهر اختبار الحساسية لمضادات الميكروبات أن الحساسية لي السفكسيم عدده ٤ بنسبه ٣.٦% والسفترايكسون عدده ٤٢ بنسبه ٣٧.٨% والسبروفلوكساسين عدده ٧٥بنسبه ٦٧.٧%والنوروفلوكساين عدده ٧٤بنسبة ٦٦.٧ و الجتامايسين عدده ١٠٣بنسبه ٩٢.٨% واظهر اختبار الحساسية انه مقاوم لي السفكسيم عدده ١٠٧ بنسبه ٩٦.٤%والسفترايكسون عدده ٦٩بنسبه ٦٢.٢% والسيبروفلوكساسين ٣٦بنسبه ٣٢%

والنوروفلوكساسين عدده ٣٧بنسبه ٣٣.٣%و الجتاماسين عدده ٨بنسبه ٧.٢%.

الخلاصة: خلصت الدراسة أن أكثر البكتريا المسببة لالتهاب البول هي المتقلبة الشائعة ووجدت أكثر نسبة للإصابة في النساء كما أظهرت نتيجة اختبار الحساسية للمضادات الحيوية أن الجنتامايسين اكثر حساسية للبكتريا المعزولة يليه السبروفلوكساين ثم النوروفلوكساسين ثم إلى سفترايكسون ثم واخيرا السفكسيم بينما شكل السفكزيم اكبر نسبة مقاومة لجميع البكتريا المعزولة يليه السفترايكسون ثم النوروفلوكساسين ثم السبروفلوكساين وأخيرا الجنتامايسين .

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Abbreviations

CLED	*Cysteine Lactose Electrolytes Deficient*
E.coli	*Escherichia coli*
e.g.	*For Example*
EDTA	*Ethylene Diamine Tetraacetic Acid*
ESBL	*Extended-Spectrum Beta-Lactamase*
H	*Flagella Antigen*
H_2S	*Hydrogen Sulphide*
ICU	*Intensive Care Unite*
Ig M	*Immunoglobulin M*
K	*Capsular Antigen*
K. pneumonia	*Klebsiella pneumonia*
KIA	*Kligler's iron agar*
LDC	*Lysine decarboxylase*
M. morganii	*Morganella morganii*
MR	*Methyl Red*
O	*Somatic Antigen*
ONPG	*Ortho-Nitrophenyl-B-Galactoside*
P value	*Probability Value*
P. aeruginosa	*Pseudomonas aeruginosa*
P. mirabilis	*Proteus mirabilis*
P. vulgaris	*Proteus vulgaris*
PBP	*Penicillin Binding Proteins*
Spp	*Species*
SPSS	*Statistical Package for The Social Sciences*
UTI	*Urinary tract infections*
P.Aerginosa	*Pseudomonas Aerginosa*
S.marcescen	*Serratia marcescen*
S.aureus	*Staphylococcus aureus*
S.saprofyvtius	*Staphylococcus saprofhytius*
E.faecalis	*Enterococcus faecalis*
C.freundii	*Citrobacter .freundii*

CHAPTER ONE

1. Introduction

1.1. Introduction

Urinary tract infections (UTI) are one of the most common bacteria l infections in humans both in the community and hospital setting. [1]Antibiotic resistance is increasingly challenging health care [2]. Irrational use of antibiotics is considered to contribute unnecessarily to increasing the rate of resistance in almost all cases there is a need to start treatment before the final microbiological results are available [3]. Area-specific monitoring studies aimed to gain knowledge about the type of pathogens responsible for UTI and their resistance patterns may help the clinician to choose the right empirical treatment.[4] Many different antimicrobial agents are available in Shendi [5], always on physician prescription, for the treatment of UTI. Co-trimoxazole, Trimethoprim, Ciprofloxacin, Norfloxacin, Nitrofurantoin[6], first and second-generation Cephalosporins and semi- synthetic Penicillins with or without inhibitors and Fosfomycin Trometamol are the most commonly used antibacterial drugs in the treatment of UTI outside of the hospital.[7]

Urinary tract infections (UTIs) were one of the most common bacterial infections that leadpatients to seek medical care, Approximately 10% will have UTI sometime during their lives of note UTIs are also the most common hospital acquired infection accounting for as may as 35%of nosocomial infection and UTIratio in female move than male(10:1)[8].

Many factors increase the susceptibility of patients to infection these include frequently during start treatment without prescribed antimicrobial agent lead to lower immunity .

And other factor the various in vasive procedure in during the long term use of in dwelling catheters [9].

The study was carried out between June 2021 and Dec 2021 in Shendi. All patients who had pyuria and significant bacteriuria obtained from a clean-catch midstream urine sample were included in the microbiological analysis from hospital, clinic and outpatients with completed questionnaires containing demographic, clinical and microbiological data.

1.2 Rationale

Most clinical doctors prescribe a special group of antibiotics to treat urinary tract infection (UTI)According to availability in the Shendi locality.

This study done to obtain data on susceptibility patterns of major pathogens from both community and hospital in Shendi Locality to antimicrobial agents currently used in the treatment of UTI to reduce resistant of bacteria to antibiotic and lower the cost of treatment.

1.3 Objectives

1.3.1 General objective

To detect Invitro Resistance of Commonly Prescribed Antimicrobial Agents Applied to Treat Urinary Tract Infection in Shendi Locality.

1.3.2 Specific objectives

- To detect the most frequent causative agent of UTI in Shendi locality.
- To perform Invitro Antimicrobial Agents Cefixime, Ceftriaxone, Gentamycin, Ciprofloxacin, Norfloxacin.
- To correlate sensitivity and resistance of Cefixime ,Ceftriaxon, Gentamycin, Ciprofloxacin, Norfloxacin and compare with isolated bacteria.
- To correlate between age and isolated bacteria.
- To correlate between isolated bacteria and residence area.

CHAPTER TWO

2. Literature Review

2.1. Urinary tract infection (UTI):

within the renal tract, with a concentration greater than 10^5 organism/ml is regarded as significant bacteria, urinary tract infection remain a major clinical problem over 50 years after introduction of treatment many consultations in general practice are because of urinary infection, Infection of urinary tract may involve anywhere along urinary tract (bladder, kidney, Pelvis, Parenchyma, or. Urethra). (10)

2.2. Type of infection:

Infection is most often due to bacterial from patient's own bowel flora. Transfer to the urinary tract may be via the blood stream, the Lymphatics or by direct extension, but the most often via the ascending transurethral rout. (11)

2.2.1. Lower Urinary tract infection:

Involving of bladder and urethra, involving of urethra is called Urethritis, if the bladder is involved called Cystitis. (10)

The most typical symptoms are: Frequency of Micturition by day and night, Painful voiding (dysuria), Suprapubic tenderness and pain, Hematuria, Smelly urine. (11)

Urethritis:- Is the infection of Urethra, *Chlamydia trachomatis*, *Neisseria Gonorrhoeae* and *Trichomonasvaginalis* are common causes of Urethritis and are considered being Sexually transmitted.(12)

Cystitis :- It's the Infection of the bladder. Episodes of Cystitis greatly outnumber those that involve the kidney. (10)

2.2.2. Upper urinary tract infection:

When the infection extend to the kidney and pelvis (known as Pyelitis or Pyelonephritis), or to the Ureter the most typical symptoms are loin pain and

tenderness, with fever and systemic upset, also UTI may present with minimal or no symptoms or may associated with atypical symptoms such as abdominal pain and the typical presentation of lower urinary tract infection. (11)

Pyelonephritis refers to inflammation of the kidney Parenchyma and pelvis (upper end of the Ureter that is located inside the kidney) and is usually caused by bacterial infection of significance, 40% of patients with acute Pyelonephritis are bacteremia.(12)

2.3. Pathogenesis:

Anything that disrupts normal urine flow or complete emptying of bladder or facilitates access of organisms to the bladder will predispose an individual to infection. The shorter female Urethra is less effective deterrent to infection than male Urethra. Sexual intercourse facilitates the movement of organisms up the Urethra, particularly in females so the incidence of Urinary Tract Infections is higher among sexually active women than among celibate women.

Catheterization is major predisposing factor for UTIs; during insertion of the Catheter bacteria may be carried directly into the Bladder. Most urinary tract pathogens originate in the fecal flora but only aerobic and facultative species such as *Escherichia coli* possess the attributes required to colonize and infect The Urinary Tract. Virulence factor of causative organisms such as capsule which inhibiting Phagocytosis, Pili which enable adherence and bacteria production like heamolysins which cause kidney damage, and Urease production which cause Pyelonephritis. (13)

2.4. Causal organism:

The Gram-negative rods *Escherichia coli* is commonest cause of ascending UTIs about 60-90%; this is probably because they are often present in the colon and virulence factors which include: the possession of K antigens and specialized Fimbriae. (14)

Staphylococcus saprophyticus is related to Sexual active women. *Proteus mirabilis* and *Klebsiella* species are often multiply antibiotic-resistant. *Enterococcus faecalis, Pseudomonas aeruginosa* and *staphylococcus aureus* are cause infection especially after catheterization or instrumentation. Fastidious gram-positive bacteria (e.g. *lactobacilli, streptococci, corynebacteria*), which require incubation for 24–48 hour in the presence of CO2 for isolation, acute uncomplicated UTI is usually due to one type of organism and Chronic infection is often associated with more than one type of organism. (10)

Obligate anaerobes are very rarely involved, other species may be found e.g.: *Salmonella typhi, Staphylococcus aureus,* and *Mycobacterium tuberculosis.* (14)

2.4.1. Escherichia coli (E. coli:

E. coli is belong to the large group of gram negative rods referred to as *Enterobacteria,* they are cause primary and opportunistic infections in humans belong mainly to lactose fermenting, often referred to as Coliforms, they are aerobes and facultative anaerobes, non sporing and motile. (14)

E. coli is the cause of 60-90% of Urinary Tract Infection. Certain serotypes of *E .coli* are particularly common in Urinary Tract Infection (e.g. O2, O4, O6, O7, O18, O75); this is probably because they are often present in the Colon, rather than because of inherently high Pathogenicity for the Urinary Tract. Some strains are reputed to more invasive than other. Factor associated with virulence include: the possession of K (capsular) antigen, which inhibit Phagocytosis and bactericidal effect of normal human serum, the ability to adhere to Ur epithelium due to specialize Fimbriae .(10)

2.4.2. *Klebsiella species*:

Gram-negative and non motile usually capsulated rods cause UTIs in hospital patients. Antigenic analysis for Capsular polysaccharide reveals that more than 80 serotype are recognized. (14)

They grow well on Ordinary Media, with colonies which are often, but not always, large and mucoid.[10]

2.4.3. *Proteus species:*

Gram negative Pleomorphic motile rods, they grow on Selective Enteric Media.[14]

Proteus mirabilis is main *Proteus* species of medical importance. It causes Urinary Tract infection commonly in the elderly and young male often following catheterization or cystoscopy. It is often associated with urinary stones, probably because this organisms produce ammonia rendering the urine alkaline.[10]

2.4.4. *Pseudomonas aeruginosa*:

Gram–negative motile aerobic bacilli some strain is capsulated have very simple growth requirement and limited fermentation activity.[10]

Pseudomonas aeruginosa being resistant to infections are often difficult to eradicate due to *Pseudomonas aeruginosa* being resistant to many antimicrobials. Infection with *Pseudomonas aeruginosa* usually following Catheterization associated with Chronic Urinary Disease.[14]

2.4.5. *Serratia Marcescens*:

It has been reported to cause UTIs, and it is gram-negative rods, facultative anaerobe and it is resistant to cephalosporin.[14]

2.4.6. *Staphylococcus aureus*:

Gram-positive cocci are occurring in group. Non motile, non-capsulated and it is Catalase, DNase and Coagulase positive, and ferment Mannitol, it is rarely cause UTI.[14]

2.4.7. *Staphylococcus saprophyticu:*

Gram-positive Cocci of uniform size occurring in groups but also singly and pairs. They are non-motile and non-Capsulated. *S.saprophyticus* cause UTIs in Sexually active women. It was Coagulase and DNase negative and ferment

Mannitol. The organism causes are many as one quarter of symptomatic UTIs in women. The surface agglutinins of this pathogen appear to be a key determinant of the virulence promoting it colonizes urinary tract. [15]

2.4.8. *Enterococcus faecalis*:

It is gram-positive cocci, often found accompanying infection with Coliforms[14]

2-5. Other bacteria. Bacteria species are not primarily in urinary tract but may found in urine e.g. *Salmonella species*, *Mycobacterium tuberculosis*, *Neisseria Gonorrhoeae*, *Leptospira Innterrogans*, *Chlamydia* and *Mycoplasma species.*[14]

2-6 Definition of antibiotics:

It can be defined as any of a large group of Chemical substances, as Penicillin or Streptomycin, produced by various Microorganisms and Fungi, having the capacity in dilute solutions to inhibit the growth for to destroy bacteria and other Microorganisms, used chiefly in the treatment of infectious diseases[15]. In other words, it is a drug used to treat infections caused by bacteria and other Microorganisms[16].Originally, an antibiotic is a substance produced by one microorganism that selectively inhibits the growth of another. Synthetic Antibiotics, usually chemically related to natural antibiotics, have since been produced that accomplish comparable tasks.[17]

2.6.1 Antibacterial Activity:

damaging the osmotic barrier. Resistance to Colistin may occur via alteration of the lipid A binding site or by efflux pumps[18]. One possible mechanism for Colistin dependence may be a mutation of lipid A which results in a defective cell membrane and osmotic trauma in the absence of Colistin[19]. Inhibition of cell wall synthesis by binding to transpeptidases and inhibiting Peptidoglycan formation is another important mechanism of antibiotic[20]. These transpeptidase enzymes and some other bacterial protein[21], to which penicillins bind, are collectively called penicillin-binding proteins (PBP)[22]. The PBPs are different

for Gram-positive and Gram-negative[23]
bacteria and in anaerobic species. β-lactams are only efficacious against actively dividing bacteria, since that is when a new cell wall is being created.[24]

By interfering with protein synthesis taking place in the ribosome, several classes ofantimicrobials are able to stop cell division[25]. Certain antimicrobials bind to one or both subunits (30S, 50S) and cause misreading of the genetic code or formation of abnormal, nonfunctional protein complexes[26]. Aminoglycosides (Gentamicin, Tobramycin, Amikacin, Streptomycin) act primarily by binding to the 30S subunit. Tetracycline's are another biochemical class of antibiotic which also bind to the 30S ribosome[27] .

2-7 Mechanism of antimicrobial resistance:

Antibiotic resistance is the ability of a bacterium or other microorganism to survive and reproduce in the presence of antibiotic doses that is previously thought effective against them[26]. Different mechanisms are known to enhance the antimicrobial resistance. Microbes could be intrinsically resistant and may lack a target for the antibiotics [27].

Chlamydia do not have peptidoglycan and are not susceptible to the action of Penicillin's. The antibiotic target may be inaccessible. Membrane changes block antibiotic entrance and penetration into the cell [27]. Peptidoglycan in Gram-negative bacteria is inaccessible to penicillin's that cannot penetrate the Gram-negative outer membrane[28]. Efflux pumps can actively pump out antibiotics from cells. Gram-negative bacteria resist the activity of tetracyclines by this important mechanism [29].

The antibiotic target may be modified to prevent the action of the drug: Ribosomes become altered, mutated, and chemical-physical changes prevent antibiotic attachment to those ribosomes[30]. Bysynthesis of a new metabolic pathway bacteria can produce a new enzyme that is not inhibited by the

antimicrobial. Trimethoprim-Sulfamethoxazole resistance is due to bacteria that produce a new dihydro folatereducates not inhibited by Trimethoprim and a new dihydropteroate synthetase[31].

not susceptible to sulfonamides. Quinolone resistance is affected by point mutations in the DNA gyrase, which prevent binding of the drug to its target [21]. The antibiotic may be chemically modified or destroyed Enzymes degrade antibiotics, or inactivate them by reactions[32].

2-7-1Cefixime:

Previously designated FK027, FR17027 and CL284635, is an orally active cephalosporin with a broad spectrum of antibacterial activity in vitro[33]. It is particularly active against many *Enterobacteriaceae, Haemophilus influenza*[34]. *Streptococcus pyogenes*, *Streptococcus pneumoniae* and *Branhamella catarrhalis*, and is resistant to hydrolysis by many beta-lactamases[35]. Cefixime has little activity against *Staphylococcus aureus* and is inactive against *Pseudomonas aeruginosa*.[36]

Cefixime is distinguished by its 3-hour elimination half-life which permits twice daily[36], or in many instances once daily, administration. Comparative trials, though few, indicate that the clinical and bacteriological efficacy of Cefixime 200 to 400mg daily administered as a single dose or in 2 divided doses[36], is comparable with that of multiple daily doses of Co-trimoxazole (Trimethoprim + Sulphamethoxazole) or Amoxycillin in acute uncomplicated Urinary Tract Infection[29], with that of Amoxycillin, Amoxycillin/Clavulanic acid and Cefaclor in acute lower respiratory tract infections, and with that of Amoxycillin and Cefroxidine in adult patients with acute tonsillitis or pharyngitis[36]. Several comparative trials in children with acute Otitis media demonstrate the similar effectiveness of Cefixime 8 mg/kg daily (in 2 divided doses, or as a single daily dose[36], Cefaclor 20 to 40 mg/kg daily and Amoxycillin 40 mg/kg daily in 3

divided doses[37]. The most frequently reported adverse effects, diarrhoea and stool changes, are usually mild to moderate in severity, transient, and mostly occur in the first few days of treatment with Cefixime. Thus, Cefixime is an effective orally active Cephalosporin with a relatively long elimination half-life permitting a simplified treatment regimen[37], and to Amoxycillin or Co-Trimoxazole in acute uncomplicated urinary tract infections.

2-7-2Ceftrixone:

Ceftriaxone is used to treat a wide variety of bacterial infections. This medication belongs to a class of drugs known as cephalosporin antibiotics. It works by stopping the growth of bacteria. This drug is not recommended for use in newborns with high blood bilirubin levels and premature infants due to increased risk of side effects. Ask the doctor or pharmacist for details.[38]

How to use Ceftriaxone Vial: this medication is given by injection into a muscle or vein as directed by your doctor, usually once or twice daily. The dosage is based on your medical condition and response to treatment. Drink plenty of fluids while using this medication unless your doctor directs you otherwise.

If you are using this medication at home, learn all preparation and usage instructions from your health care professional. Avoid mixing Ceftriaxone with IV fluids that have calcium in them (such as Ringer's solution, Hartmann's solution, parenteral nutrition-TPN/PPN). Consult your pharmacist for details about the safe use of IV calcium products in infants, children, and adults (see Precautions section). Before using, check this product visually for particles or discoloration. If either is present, do not use the liquid. Learn how to store and discard medical supplies safely.[38]

2-7-3Ciprofloxcin:

This medication is used to treat a variety of bacterial infections. Ciprofloxacin belongs to a class of drugs called quinolone antibiotics. It works by stopping the growth of bacteria. This antibiotic treats only bacterial infections. It will not work for virus infections (such as common cold, flu). Using any antibiotic when it is not needed can cause it to not work for future infections.(38)

How to use Ciprofloxacin: read the Medication Guide and, if available, the Patient Information Leaflet provided by your pharmacist before you start taking Ciprofloxacin and each time you get a refill. If you have any questions, ask your doctor or pharmacist.

Take this medication by mouth with or without food as directed by your doctor, usually twice a day in the morning and evening.

The tablet may have a bitter taste if you split, chew, or crush it before taking it. The manufacturer recommends swallowing the tablet whole for this reason.

The dosage and length of treatment is based on your medical condition and response to treatment. Drink plenty of fluids while taking this medication unless your doctor tells you otherwise.(38)

2-7-4 Norofloxcin:

Norfloxacin is used to treat a variety of bacterial infections. This medication belongs to a class of drugs known as quinolone antibiotics. It works by stopping the growth of bacteria.This antibiotic treats only bacterial infections. It will not work for viral infections (such as common cold, flu). Using any antibiotic when it is not needed can cause it to not work for future infections.

How to use Norfloxacin :Tablet Read the Medication Guide provided by your pharmacist before you start taking Norfloxacin and each time you get a refill. If you have any questions, ask your doctor or pharmacist.

Take this medication by mouth as directed by your doctor, usually twice a day

(every 12 hours) with a full glass of water (8 ounces/240 milliliters). Do not have any food or dairy products (such as milk/yogurt) within 2 hours before or 1 hour after taking Norfloxacin. Drink plenty of fluids while taking this drug unless your doctor tells you otherwise. The dosage and length of treatment are based on your medical condition and response to treatment.[38]

2-7-5 Gentamycin:

This medication is used to prevent or treat a wide variety of bacterial infections. Gentamicin belongs to a class of drugs known as aminoglycoside antibiotics. It works by stopping the growth of bacteria.

How to use Gentamycin Sulfate Vial:

This medication is given by injection into a vein or muscle as directed by your doctor, usually every 8 hours. The dosage is based on your medical condition, weight, and response:- to treatment. Laboratory tests (such as kidney function, levels of drug in the blood) may be performed to help find the best dose for your condition.

If you are giving this medication to yourself at home, learn all preparation and usage instructions from your health care professional. Before using, check this product visually for particles or discoloration. If either is present, do not use the liquid. Learn how to store and discard medical supplies safely.[39]

2.8 Previous study:

- Study done by Guilermo *et al* Showed that , the greatest resistance increase in Ecoli to Ciprofloxacin and Ceftriaxone (2010)In United States.
- The other study by Wolters Kluwer, *et al* (2015) in Iran showAntimicrobial resistance pattern in Escherichia coli causing urinary tract infection among inpatients. We undertook this study to know the resistance pattern of E. coli causing UTI in patients admitted to a tertiary care hospital, and to know the treatment given and response of the patients.

- The other study done by Warsaw, *et al* with symptoms suggestive of UTI. The study was carried out between July 1998 and May 1999.In Poland only patient who had pyuria and significant bactriuria obtained from clean -catch mid stream urine sample were included in the microbiological analysis .

-The other study done by YevaRosana, *et al* (2019) in Indonesia who found that there was high resistance to Ampicillin and Ciprofloxcin.

-The last study done by George Abongomera, *et al* (2021) In Uganda show Spectrum of antibiotic resistance in UTI patient.

CHAPTER THRE

3. MATERIALS AND METHODS

3.1 Study design:

This was descriptive cross sectional hospital base study conduct to determine the prescribed Resistance Among Urinary Tract Infection in Shendi locality.

3.2 Study area:

Data of this study were collected from Hospital, Clinc and Community population were suffering from urinary tract infection in Shendi, River Nile State, in Sudan.

3.3 Study period:

This study was done in period from June to December 2021

3.4 Study population:

Sample in this study were collected from urinary tract infections patients.

3.4.1 Inclusion criteria:

Patient not received treatment during this study with previous history of received that frequent treatment with present symptoms of urinary tract infection who agreed to fill the informed consent were included in the study.

3.4.2 Exclusion criteria:

People under received treatment. without symptoms of urinary tract infection, and those disagreed to participate or to fill informed consent were excluded.

3.5 Sample size:

The study was conducted 107 urine sample from infected patient with urinary tract infection have pyuria and bacteruria in Shendi locality.

3.6 Ethical consideration:

Written agreement was obtained from all participants, study objectives were explained, the method of sample collection, and maintaining the confidentiality of the laboratory resultAppendix1I.

3.7 Data collection:

A pretested structured questionnaire was used for collecting information on age, sex ,residence, previous history of treatment Appendix I.

3.8 Statistical analysis:

The table were constructed and calculated by statistical package for social sciences (SPSS VERSION 22)**.**

Method:

3.9 Collection of specimens:

About 100 mid-stream urine (MSU) specimens were collected from patients suffering from urinary tract infection especial patient that received large amount of prescribed drug according to frequency of UTI history, in sterile, dry, wide mouth, leak proof containers. These specimens were collected from. The specimens were immediately inoculated on Cystine Lactose Electrolyte Deficient (CLED).

3.10 Culturing of specimens:

The specimens were inoculated on plates of Cystine Lactose Electrolyte Deficient media (CLED), by method of streaking. Cultures were incubated at 35-37°C aerobically for overnight.

3.10.1Cystine Lactose Electrolyte-Deficient (CLED):

Used for culturing of urine sample; because it gives consistent results, can differentiate between lactose fermenting from non-lactose fermenting bacteria and allows the growth of both gram negative and gram positive pathogens (the indicator is Andrads) the Medium is electrolyte-deficient to prevent the swarming of *Proteus* species.[14]

3.10.2. Mueller-Hinton agar:

It consists of protease peptone, beef infusion solids, starch. 17 grams of the medium were suspended in 500ml of distilled water, then brought to boil to

dissolve completely, sterilized by autoclaving at 121for 15 minutes, then dispended into sterile Petri-dishes in portions of 15ml each. The poured plates were left to solidify at room temperature.[14]

3.11. Identification:

3.11.1 Colonial morphology:

The inoculated media were morphologically examined for size, color, and fermentation of lactose. (CLED) medium contain Andrads though the colonies appeared red in acid pH, and yellow in alkaline PH.

3.11.2. Gram stain:

A drop of normal saline was placed on slide. The suspected colonies were emulsified and smeared. The smears should be fixed by dry heat and then cover with crystal violet stain for 60 seconds. The stain rapidly washed by tap water and tipped the side. Stained smear then cover with lugos iodine for 60 seconds. Iodine immediately washed off and the smear was decolorized with ethanol for 5 seconds. Suffranin was added to the smear for 2 minutes. The red stain then washed off with tap water and smear preparation subsequently air dried and microscopically examined using high resolution objective power[14]

3.11.3 Identification of Gram positive cocci:

Catalase test:

The differentiation between *staphylococci* (which produce catalase) from *streptococci* (non catalase production) was made by catalase test. Catalase acts as catalyst in the break peroxide to oxygen and water. Using sterile wooden stick, suspected colonies were immersed in tube containing 2ml of 3% hydrogen peroxide.[14]

Positive result was indicated by production of air pubbling.

Negative result indicated by no change in tube.

DNase test:

Using sterile loop to inoculate the suspected colonies under a septic condition into DNA media, after overnight, aerobic incubation at 37◦c hydrochloric acid (1% HCL) was to the spots of an organism. Clear zone around the colonies mean positive result.(14)

Mannitol salt agar (MSA):

It is a useful media for identifying *staphylococci* species, which are able to grow on agar containing 70-100 g/l sodium chloride. Some species of staphylococci are able to ferment mannitol and other cannot ferment mannitol. The test done by inoculating the organism under test in MSA media which contain phenol red indicator, and then incubated the plate at 37c for 24 hours, and then change in color is observed.(14)

Coagulase test:

This test used to differentiate between *S.aureus* (positive) from other Staphylococci (negative) the test was performed by emulsifying portion of colonies from pure growth in a drop of undiluted plasma. Formation of clot

3.11.4. Identification of gram negative rods:

Indole test:

In this test the tested organism produce tryptophanase enzyme which break down tryptophan and produce indole, which react with kovac´s reagent and give pink ring. The tested organism was inoculated into peptone water and incubated at 37◦c for overnight, the kovacs reagent was added. If there is pink ring the result was indicated as positive.

If there is no pink ring in the surface the result was indicated as negative .(14)

Citrate utilization test:

In this test organism has ability to use citrate as only source of carbon. by straight loop apart of tested colonies was emulsified in kosser′s citrate media and

incubated at 37◦c for 24 hours.

A blue color with growth indicated as positive, no change in color indicated the negative result.[14]

Urease test:

In this test organism produce urease enzyme which breakdown urea and Produce ammonia, which make the pH of media alkaline, in the presence of phenol red indicator, the tested organism inoculated in Christensen's urea agar.

Positive: pink color.

Negative: no change in color .[14]

Kligler iron agar (KIA):

A tested organism inculcated by sterile straight loop by stepping on the butt then blocked the pore and streaked the slop of the media and incubated at 37◦c for 24 hour. Glucose fermentation indicated by yellow butt, yellow slop indicated the lactose fermentation, gas produce in the end of the tube and H2S produce blacking in the media.[14]

Motility test:

Motility is the ability of an organism to move by itself by means of propeller-like flagella unique to bacteria or by special fibrils that produce a gliding form of motility. Motile bacteria move using flagella, thread like locomotor appendages extending outward from the plasma membrane and cell wall either single flagellum or multiple flagella. Motility has long been recognized as an important taxonomic tool and biological characteristic of microorganisms. The presence of flagella occurs primarily in bacilli but there are a few flagellated cocci, thus motility is a very important means of identification in the family *Enterobacteriaceae.* From the early days in the field of microbiology, the ability of bacteria to move has been used as a means of differentiation and classification of organisms[22].

Susceptibility techniques:

The susceptibility techniques testing was done by disc diffusion technique

Disc diffusion technique:

Disc diffusion techniques were used by most laboratories to test routinely for antimicrobial susceptibility. A disc of blotting paper was impregnated with a known volume and appropriate concentration of an antimicrobial, and this was placed on a plate of susceptibility testing agar uniformly inoculated with the test organism. The antimicrobial diffuses from the disc into the medium and the growth of the test organism is inhibited at a distance from the disc that was related (among other factors) to the susceptibility of the organism. Strains susceptible to the antimicrobial were inhibited at a distance from the disc whereas resistant strains have smaller zones of inhibition or grow up to edge of the disc. For clinical and surveillance purposes and to promote reproducibility and comparability of results between laboratories, WHO recommends the modified Kirby-Bauer disc diffusion technique[14].

3.12 Method of susceptibility:

1. Preparation of Agar: The media was prepared and sterilized as instructed by the manufacture.

2.Preparation of inoculation and turbidity standard McFarland :two to three colonies of the test organism was emulsified in a small volume of the sterile saline the 0.5 McFarland was prepared by adding 0.5ml of 1.75%(w/v) barium chloride solution to 99.5ml of 1%(v/v) sulphuric acid . the turbidity standard was liquated into test tube identical to those used to prepare the inoculums suspension[38].McFarland standard tube was sealed with wax and some other means to prevent evaporation[20] . Before any use shake well .Then suspension compared with McFarland standard to adjust the turbidity.

3.Seeding of the inoculums: Sterile cotton swab was impregnated inside the

suspension of test organism, excess was removed by passing it in the tube. it was then applied to the center of sensitivity agar plate. The inoculums were spread evenly across the plate. The inoculums then allowed to drying for a few minutes. Then antimicrobial disc were placed on the plate using sterile plate forceps the plate were incubated aerobically at 73°C for overnight. Then inhibition zone were read and compared with standard .

Reaction of the test organism were read and reported for each Antibiotic as sensitive or resistant.

Antimicicrobial disc:

Commercial discs 6mm in diameters were used:

Cefiximie (30), Ceftriaxone(30), Ciprofloxacin(5), Norofloxcin (10) and Gentamycin (30).

CHAPTER FOUR

4. RESULTS

A total of 107 samples of urine were collected from infected UTI patient 100samples were found growth ,7samples were found no growth . most of study population was female 88(88%) while male 12 (12%) as showed in **Table (4-1)**. Regarding the age, 38(38%) was in age group (20-40),32(32%) in age group(41-60) , and 30(30%)in age group(61-80) as mentioned in **Figure (4-2)** , about 53 (53%) of study population from Shendi city and 47(47%) from rural area as showed in **Figure (4-3).**The **Figure (4-4)** show the distribution of study population according to previous history of treatment. According to mixed infection study presented 24(24%) from mixed infection and 76(76%) from unmixed as showed in **Figure (4-5).** In regard to gram stain , 111 were isolated (100%) about 82(73.8%) was gram negative and 29(26.1%) was gram positive as listed in **Table (4-6)** The predominate abundant organism of gram negative was E.coli 22(26.8%), *proteus vulgaris* 19 (23.1%), *Pseudomonans* 11(13.4%), *K.Pneumone*7(8.5%)**,** *Morgenella morganii* 5(6%), *Citrobacter*4(4.3%), *P.mirabilis* 4(4.3%)and*Sirratiamarcacin*3(3.6%)**.** all this percent out of 75for gram negative bacteria show **Table (4-7)**and the most frequency of gram positive bacteria was *s. aureus13*(44.8%), *S.saprophyticus* 7 (26.1%), S.epidermis 5(13.8%),*S.fecalis*4(13.7%)all this percent out of 36 for gram positive bacteria show **Table (4-8)**. in this study present suceptpility pattern against Cefixime was sensitive 4(3.6%)and the most resistance was Cefiximie107 (96.4%) show **Table (4-9)**, Suceptpility pattern against Ceftrixone was sensitive 42(37%),was resistance 69(62.2%) show **Table (4-10)**, present Ciprofloxcin was sensitive 75(67.5%) and resistance36(32.4%) show **Table (4-11)** found Norofloxcin was sensitive 74(66.7),was resistance 37 ((33.3%)show **Table (4-12),** Gentamycin was the most sensitive 103 (92.8%)and resistance

8(7.2%) show **Table (4-13) Table (4-14) Show relation between age and isolated bacteria. Table (4-15) Show relation between residence area and isolated bacteria. Table (4-16)** show relation between sensitively of prescribed antibiotics and Isolated Bacteria from UTI Patients the prescribed antibiotics such as Cefixime، Ceftrixone،Ciprofloxacin، Norofloxcin, Gentamicin.

Table (4-1): Ddistribution of study population according to sex:

Gender	Frequency	Percent
Male	12	12%
Female	88	88%
Total	100	100%

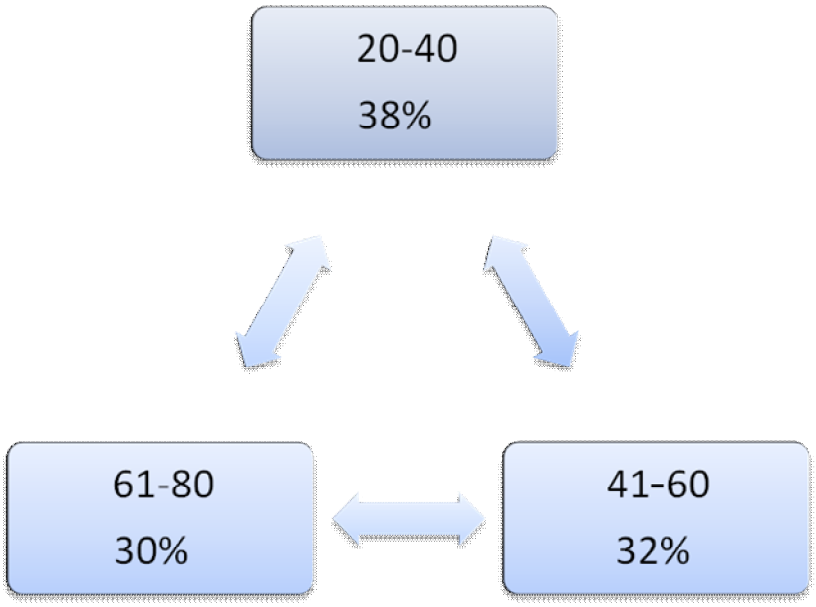

Figure (4-1):Distribution Of Study infected Population According To Age

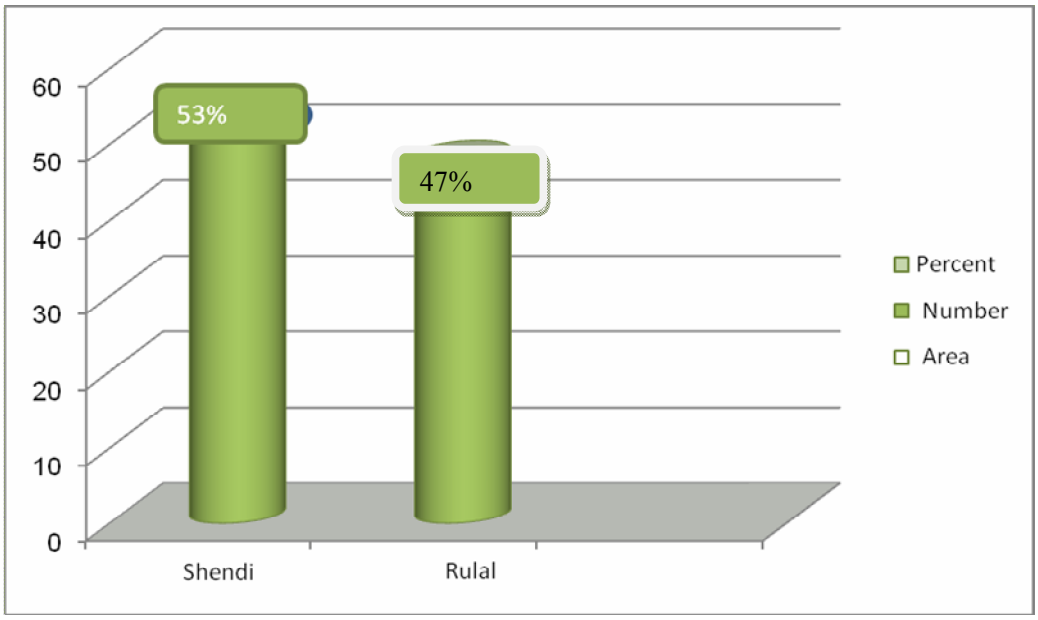

Figure (4-2)Distribution of Study Population According to Residence Area

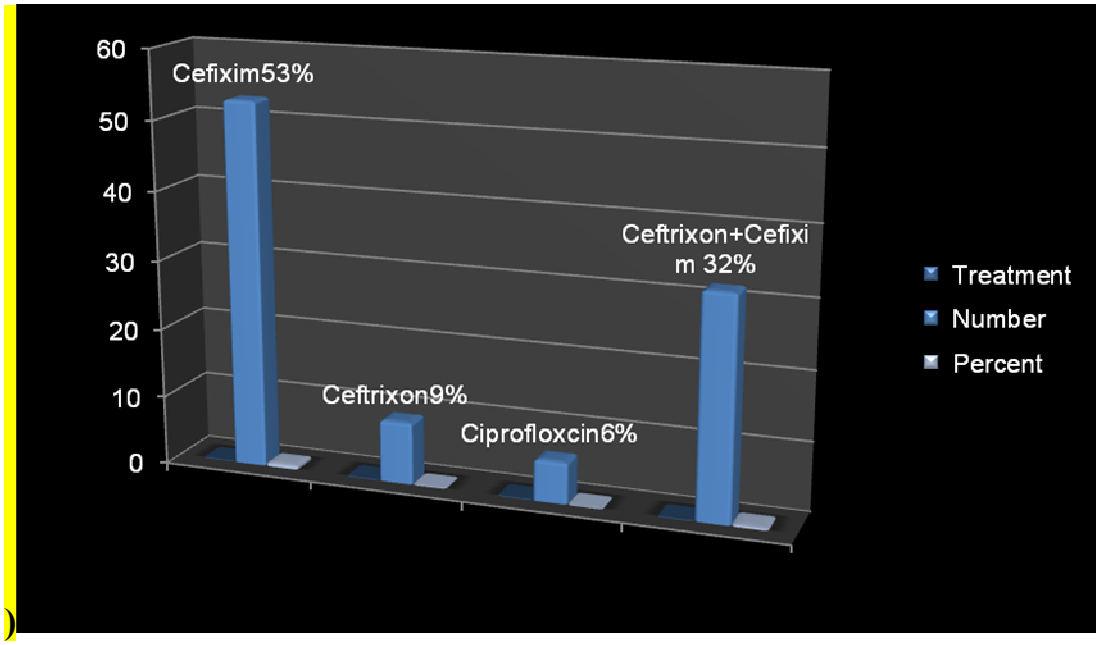

Figure (4-3): Distribution of Study Population According to pervious History Of Treatment

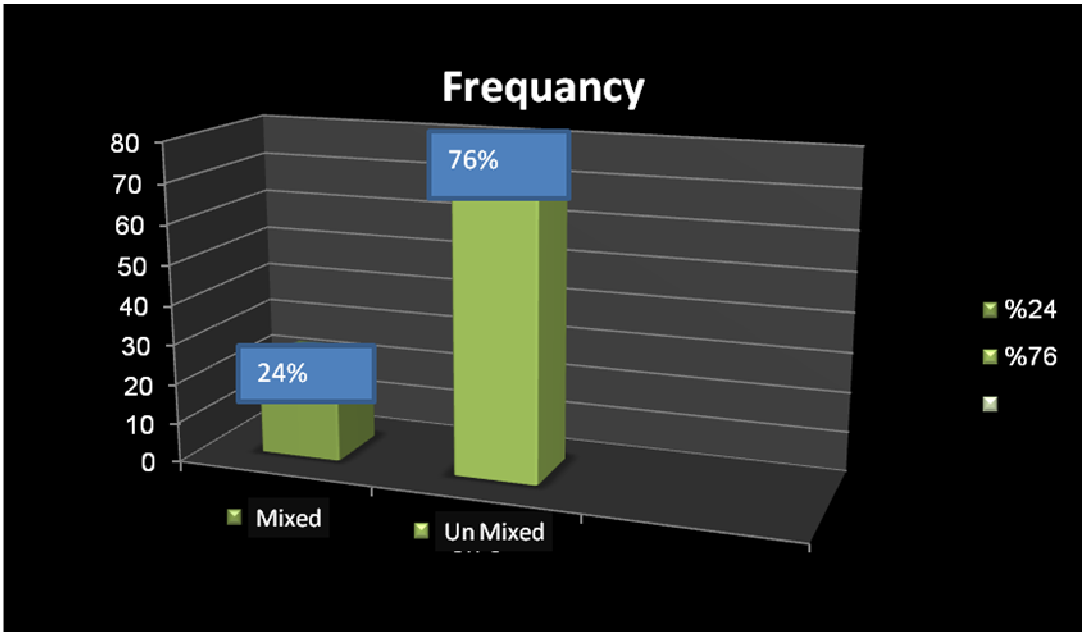

Figure (4-4) Frequency of Isolated bacteria According to Mixed and unmixed Infection:

Table (4-2): Frequency of Isolated Bacteria According to Gram positive &Gram negative Bacteria

Percent	Frequency	Isolated Bacteria
26.1%	29	Gram Positive
73.8%	82	Gram Negative
100%	111	Total

Table (4-3): Frequency of Isolated Bacteria According to Gram negative Bacteria

Percent	Frequency	Isolate bacteria
26.8%	20	*Ecoli*
13.4%	11	*Pseudomonas*
23.1%	19	*Proteus volgaris*
8.5%	7	*Klebsillapnemonea*
8.5%	7	*Enterobacter*
4.8%	4	*Citrobacter*
6%	5	*Morgenella*
3.4%	3	*Sirratia*
4.8%	4	*Proteus mirabilis*
100%	75	**Total**

Table (4-4): Frequency of Isolated Bacteria According to Gram positive

Percent	Frequency	Isolate bacteria
13.8%	5	*S. epidermis*
24.1%	7	*S.saprophyticus*
44.8%	13	*S.aureus*
13.7%	4	*S. fecals*
100%	**29**	**Total**

Table (4-5): Antibiotic susceptibility Pattern Against Cefixime

Percent	Frequency	Result
3.6%	4	Sensitive
96.4%	107	Resistance
100%	111	Total

Table (4-6): Antibiotic susceptibility Pattern Against Ceftriaxone:

Percent	Frequency	
37.8%	42	Sensitive
62.2%	69	Resistance
100%	111	Total

Table (4-7): Antibiotic susceptibility Pattern Against Ciprofloxacin:

Percent	Frequency	
67.5%	75	Sensitive
32.4%	36	Resistance
100%	111	Total

Table (4-8) Antibiotic susceptibility Pattern against Norofloxcin:

Percent	Frequency	Results
66.7%	74	Sensitive
33.3	37	Resistance
100%	111	Total

Table (4-9) Antibiotic susceptibility Pattern Against Gentamicin:

Percent	Frequency	
92.8%	103	Sensitive
7.2%	8	Resistance
100%	111	Total

Table (4.10): Relation between Age and Isolated Bacteria (Sig = 0.05)

Count														
		bacter	Total											
		epiderm	sapro	pseudo	aures	featis	proteus	klebsil	ecoli	enterobacter	citrobacter	morgenell	sirratia	T
age	20-40	0	2	6	3	3	7	3	2	3	1	1	1	38
	41-60	1	2	0	5	0	4	1	10	1	1	2	1	32
	61-80	1	1	0	3	0	8	3	10	1	2	2	0	30
Total		5	5	12	11	3	22	7	22	5	4	5	2	111

P .Value: 0.774

Table (4-11) Relation between Residence Area and Isolated Bacteria

Count														
		TOT												
		epiderm	sapro	pseudo	aures	featis	proteus	klebsil	ecoli	enterobacter	citrobacter	morgenell	sirratia	
residence	**Shendi town**	1	4	9	8	2	7	3	6	0	1	4	0	41
	Shendi village	2	1	3	1	1	9	4	8	4	2	1	2	38
	Almattma	0	1	0	1	0	1	0	0	1	1	0	0	5
	Almattma village	2	1	0	1	0	2	0	10	0	0	0	0	16
Total		5	7	12	11	3	19	7	22	5	4	5	2	111

P.Value: **0.097**

Table (4-12) Relation between susceptibity the prescribe antibiotics and the gaustive agents of uti:

Gentamicin		Norofloxcin		Ciprofloxacin	Ceftriaxone	Cefiximie		No	isolated bacteria	N0
20(90%)	S	8(360%)	10(33%)	0(0%)	s	0(0%)	S			
2(9.9%)	R	14(63%)	12(77%)	22 (100%)	R	22(100%)	R	22	Ecoli	1
11(100%)	S	10(90%)	10(90?%)	0 (0%)	S	0(0%)	S			
0(0%)	R	1(10%)	1(10%)	11(100%)	R	11(100%)	R	11	Pseudomonas	2
17(89.4%)	S	11(57%)	14(73.6%)	3 (15.7%)	S	0(0%)	S			
2(10.5%)	R	8(42%)	5(26.3%)	16(84.2%)	R	19(100%)	R	19	p.volgaris	3
7(100%)	S	2(28.5%)	2(28.5%)	0(0%)	S	0(0%)	S		klebsillapnem	
0(0%)	R	5(71.4%)	5 (71.4%)	7 (100%)	R	7 (100%)	R	7	one	4
7(100%)	S	7(100%)	7(100%)	5(74.4%)	S	0(0%)	S			
0(0%)	R	0(0%)	0(0%)	2(28.6%)	R	7 (100%)	R	7	Enter bacter	5
2(50%)	S	2(50%)	1(25%)	0(0%)	S	0(0%)	S			
2(50%)	R	2(50%)	3(75%)	4(100%)	R	4 (100%)	R	4	Citrobacter	6
4(100%)	S	4(100%)	4(100%)	0(0%)	S	0(0%)	S			
0(0%)	R	0(0%)	0(0%)	4()100%	R	4 (100%)	R	4	P.mirabialis	7
5(100%)	S	2(40%)	1(20%)	1(20%)	S	0(0%)	S			
0(0%)	R	3(60%)	4(80%)	4(80%)	R	5 (100%)	R	5	Morgenlla	8
3(100%)	S	0(0%)	0(0%)	3(100%)	S	0(0%)	S			
0(0%)	R	3(100%)	3(100%)	0(0%)	R	3)100%(	R	3	Sirratia	9
11(84.6%)	S	13(100%)	11(84.6%)	7(53.8%)	S	0(0%)	S			
2(15.4%)	R	0(0%)	2(15.3%)	6)46.1%(	R	13(100%)	R	13	S.areus	10
4(80%)	S	5(100%)	5(100%)	5(100%)	S	1(20%)	S			
1(20%)	R	0(0%)	0(0%)	0(0%)	R	4 (80%)	R	5	S.epidermis	11
7(100%)	S	4(57.1%)	7(100%)	7(100%)	S	0(0%)	S			
0(0%)	R	3(42.8%)	0(0%)	0(0%)	R	7 (100%)	R	7	S.saprofitcus	12
4(100%)	S	4(100%)	4(100%)	4(100%)	S	2(50%)	S			
0(0%)	R	0(0%)	0(0%)	0 (0%)	R	2(50%)	R	4	S.fecalis	13

CHAPTER FIVE

5. DISCUSSION

5.1. Discussion

The Present Study Done In Shendi to determine the commonly prescribed antimicrobial agents applied to treat urinary tract infected patient.

100 specimens were collected from patient prepared adopted different standardized tools and methods for realization of the problem through isolation and identification of bacterial strain which cause UTI .In This study the total number infected female (88%) an(12%)male is agree with (Kluwer, et al) [37] was infected female (67.4%) and male (34.6%) according to fact short urethra of female in compared with male in this study show most prevalence of UTI among age group (20-40)at 38 (38%)in(41-60)at 32(32%),in (61-80)at 30(30%)was agree with (Rosana,et al)[39] was showed 3.2%at age group (40-60),20%(61-80),77% at age group.

In this study the Isolate mixed infection was24% and unmixed was 76%this agree with (George, et al)[40]show mixed infection 18%and disagree with (Warsaw,et al)[38] show present of 100%unmixed .

Study relieved that Gram negative pathogens are commonly isolated from the patient and was predominate micro-organismis *proteus vulgarise* (25.3%) disagree with (Guillermo., et al)[36]whom found that *E.coli* was the common and also disagree with (George, et al)[40] Isolate E.coli was 72% and disagree with (YevaRosana, et al)[39]present *E.coli* (82%).and (Warsaw, et al)[38] found (78%).

In this study show the greatest increase of *Ecoli* resistance to Ciprofloxacin (86.6%) this is disagree with (Guillermo., et al)[36] the Resistance of *Ecoli* for Ciprofloxacin (3%- 17.1%) and agree with (Kluwer, et al)[37]which found resistance to Ciprofloxacin (72%) and agree with (Rosana, et al)[39] and (George, et al)[40]show resistance to Ciprofloxcin,Ceftrixone was (44%)and (35%)for

Gentamycin.

In this Study examining *klebsiella* Isolated high resistance to Ciprofloxacin (71.4%), Cefixime (10%) and Ceftriaxone (100%) and Gentamycin (40%) disagree with (Kluwer, et al)[37] the *klebsiella* resistance to Ciprofloxacin (19%), Cefixime (53%), and Ceftrixon (40%) and Gentamycin(38%).

In *Staphylococcu*s resistance (36.4%) to Ciprofloxacin and (69%) to Gentamycin was disagree with (Kluwer, et al)[37]*Staphylococcus* resistance to Ciprofloxacin(20%) and Gentamycin(49%).

Very low incidence of community infection caused by Gram-positive Bactria was observed(32.5) agree with (Warsaw, et al)[38] the incidence of Gram-positive(2.2%) the percentage of resistance Ceftriaxone was (100%) *Ecoli, Pseudomonas, klebsiella, Citrobacter*, *Proteus mirabilis*,and *Proteus vulgaris* resistance to Ceftriaxone (84.2*%), Enterobacter*(28.2%) and *Morgenella*(80.4%) but *Sirratia* sensitive to Ceftriaxone(100%)was disagree with(Warsaw,et al)[38] show the resistane to Ceftrixone (60%).

In this studyThe number of *P.aregenosa* was isolate from urine sample was11show the sensitive of Cefixime 0(0%), Ceftrixone 0(0%), Ciprofloxcin 10(90%), Norofloxcin 10(90%)and Gentamycin ,present the resistance of *P.aregenosa* for Cefixime 11(100%), Ceftrixone 11(100%),Cipofloxcin 1(10%),Norofloxcin 1(10%)and Gentamycin 0(0%).

In this study The number of *P.vulgaris* was isolate19 show sensitive for Cefixime 0(0%), Ceftrixone 3(15.7%), Ciprofloxcin 14(73.6%), Norofloxcin 11(57%) and Gentamycin 17(89.4%).present *of P.vulgaris* isolate bacteria was resistance to Cefixime 19(100%),Ceftrixone 16(84.2%), Ciprofloxcin 5(26.3%), Norofloxcin 8(42%)and Gentamycin 2(10.5%).

In this studyThe number *of k.pneumone* for isolate bacteria was 7 and isolate (6.3%)was sensitive of Cefixime 0(0%), Ceftrixone 0(0%), Ciprofloxcin

2(28.5%),Noroflxcin 2(28.5%)and Gentamycin 7(100%), present of *k.pneumone* was resistance to Cefixime 7(100%), Ceftrixone 7(100%), Ciprofloxcin 5(71.4%), Norofloxcin 5(71.4%) and 0(0%) and agree with(George, et al)[40]show *K.pneumone* isolate (9.4%) and agree with (Rosana ,et al)[39]show resistance to Ciprofloxcin present (67%)and disagree with (Warsaw,et al)[38]present resistance to Ciprofloxcin was (33%).

In this study The number *of Enterobacter* isolate was 7show sensitive of Cefixime 0(0%), Ceftrixone 5(74.4%), Ciprofloxcin 7(100%), Norofloxcin 7(100%) and Gentamycin 7(100%), *Enterobacter* resistance show Cefixime 7(100%), Ceftrixone 2(28.6%),Ciprofloxcin 0(0%), Norofloxcin 0(0%)and Gentamycin 0(0%).and agree with (Rosana, et al)[39] show the sensitive to Ciprofloxacin was(10%)and disagree with (Warsaw, et al)[38]show sensitive to Ciprofloxcin was (82%).

In this study The number of isolate *Citrobacter* was4 show sensitive to Cefixime 0(0%), Ceftrixone 0(0%), Ciprofloxcin 1(25%), Norofloxcin 2(50%)and Gentamycin 2(50%), the resistance toCefixime 4(100%), Ceftrixone 4(100%), Ciprofloxcin 3(75%), Norofloxcin 2(50%)and Gentamycin2(50%) and gree with (Rosana, etal)[39]found the resistance to Ciprofloxacin was (69%)and dis agree with (Warsaw, et al)[38]found resistance (34%).

In this study The number of isolate *P.mirabils* was 4 show sensitive to Cefixime 0(0%), Ceftrixone 0(0%), Ciprofloxacin4(100%), Norofloxcin 4(100%) and 4(100%) Gentamycin, the resistance to Cefixime 4(100%), Ceftrixone 4(100%), Ciprofloxcin 0(0%), Norofloxcin 0(0%),and Gentamycin 0(0%).and agree with (Rosana,et al)(39) show the sensitive to Ciprofloxacin (92%) and disagree with (Warsaw,et al) [39]show the sensitive to Ciprofloxcin was (50%).

In this study The number of isolate *M.morgenii* was 5 show sensitive to Cefixime 0(0%), Ceftrixone 1(20%), Ciprofloxcin 1(20%), Norofloxcin 2(40%),

Gentamycin 5(100%), resistance to Cefixime 5(100%), Ceftrixon 4(80%), Ciprofloxcin 4(80%), Norofloxcin 3(60%)and Gentamycin 0(0%)and agree with (Rosana, et al)[39] resistance to Ciprofloxcin (78%) and disagree with (Warsaw, et al)[38%] show the resistance to Ciprofloxacin (12%).

In this study The number of isolate *Sirratia* was3 show sensitive to Cefixime 0(0%), Ceftrixone 3(100%),Ciprofloxcin 0(0%), Norofloxcin 0(0%),Gentamycin 3(100%).Resistance show Cefixime 3(100%), Ceftrixone 0(0%), Ciprofloxcin 3(100%), Norofloxcin 3(100%) and Gentamycin 0(0%).and agree with (Rosana, et al) [39] the resistance to Ciprofloxcin was (89%) ana disagree with (Warsaw, et al)[38] show the resistance was (23%).

In this study The number of *Isolale S.epidermis* was 12 show the sensitive to Cefixime 2(16.6%), Ceftrixone 12(100%), Ciprofloxcin 12(100%), Norofloxcin 12(100%)and Gentamycin 11(90%),resistance of *S.epidermis* show Cefixime 10(83.3%), Ceftrixone 0(0%), Ciproflxcin 0(0%), Norofloxcin 0(0%)and Gentamycin 1(10%).

In this study The number of isolate show *S.fecalis* was 4show sensitive to Cefixime 2(50%), Ceftrixone 4(100%), Ciprpfloxcin 4(100%), Norofloxcin 4(100%)and Gentamycin 4(100%), resistance of S.fecalis to Cefixime 2(50%), Ceftrixone 0(0%), Ciprofloxcin 0(0%), Norofloxcin 0(0%)and Gentamycin 0(0%) and disagree with (Warsaw, et al)[38] show resistance to Gentamycin (75%).

Conclusions

The study revealed that high resistance pattern of *isolated bacteria* to Cefixime, Ceftrixone, Norofloxacin, Ciprofloxcin and Gentamycin, the most high sensitive to Genatamicin, Norofloxcin, Ciprpfloxcin, Ceftrixone and Cefixime. Despite that *P.volgares* was the most isolated organism, *Sirratiamarsacen* found the lowest isolated bacteria from them pseudomonas was the most resistant isolate to Ceftrixone, *Sirratiamarsacen* was the most resistance to ciprofloxacin in this study show the most isolate bacteria was unmixed 76%,mixad infection present 24(24%),

Recommendations

- Larger sample size should be tested to cover wider range of isolates.
- To improve education and information for general practitioners in relation to rational antibiotic prescribing for urinary tract infection (UTI).
- Recommend to any doctors should not was start prescribe any treatment unless request urine culture and sensitivity to avoid resistance of drug and reduce the cost from UTI patient .
- Should be use special requirement for isolate other bacteria cannot growth in ordinary media (special requirements recommend for fastidious bacteria).
- Specific methods for detection prescribe antibiotic resistance bacteria isolates should be used routinely such as detection of c enzyme production for the resistant isolates was performed .
- Future molecular technique (PCR)should be used to detect gene resistance .
- Proper control strategy to control the spread of the resistance isolates.

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APPENDIX

Appendix 1

University of Shendi

College of Graduate Studies & Scientific Research

In vitro resistance of commonly prescribed antimicrobial agents applied to treat urinary tract infection in Shendi Locality

Questionnaire No ( )

Name:…….

Sex…….....……

Village: ……..

Sample number: ☐

1- Age:

a- <15 – 24 (…) b- 25 – 34 (…). c- 35 – 44 (…..).d- 45 and more (…).

2- Treatment:

a- Treated with antibiotic (……). b- Not treated (……).

3- If under treatment, the name of treatment used :

- ……..
- ……..
- ……..

4- Response to treatment:

a- Good (…..) b- Few (……) c- No response (……)

5- Other disease:

a-Diabetes (….) b- Hypertension (……) c- Other (……) d- No (……)

Date: ……. Signature:……

إقــرار بالموافقة

الاسم :----------

العمر :---------- العنوان :----------

أوافق بمحض إرادتي بالمشاركة في البحث العلمي المتعلق بدراسة مقاومة الأدوية الموصوفة بواسطة الأطباء لعلاج مرضي المسالك البولية في مدينة شندي وما حولها .

الطالبة: إيمان عبد القادر علي احمد

بعد أن شرح لي بأنه لا يترتب عليه أي أذى جسدي أو نفسي واعلم أن المشاركة في هذا البحث لن تؤثر بأي حال من الأحوال في الرعاية الطبية التي أتلقاها كما أنه يحق لي بدون إبداء أسباب الانسحاب:

إشراف:

د. هادية عباس الطيب

التوقيع: .....

التاريخ: .....

Appendix (III)

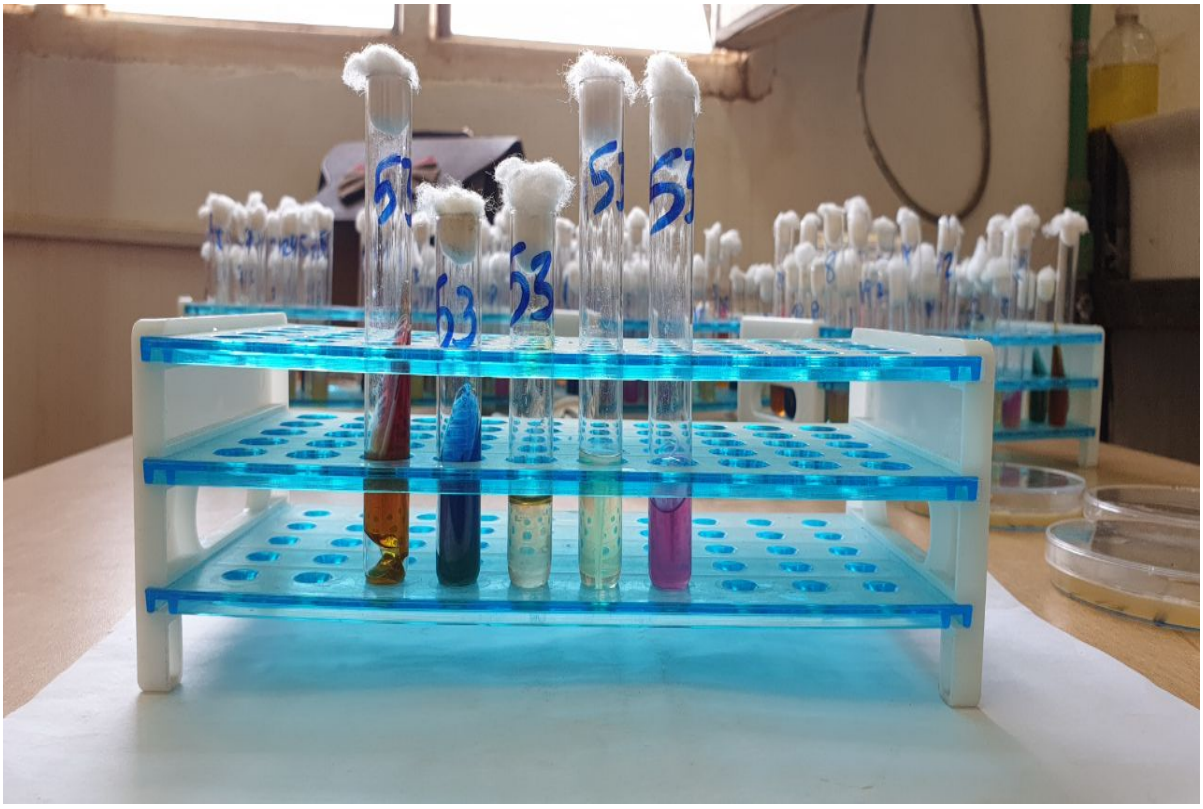

Figure (1): Shows biochemical test for *Klebsiella pneumonia* isolated pathogen from Urine Samples .

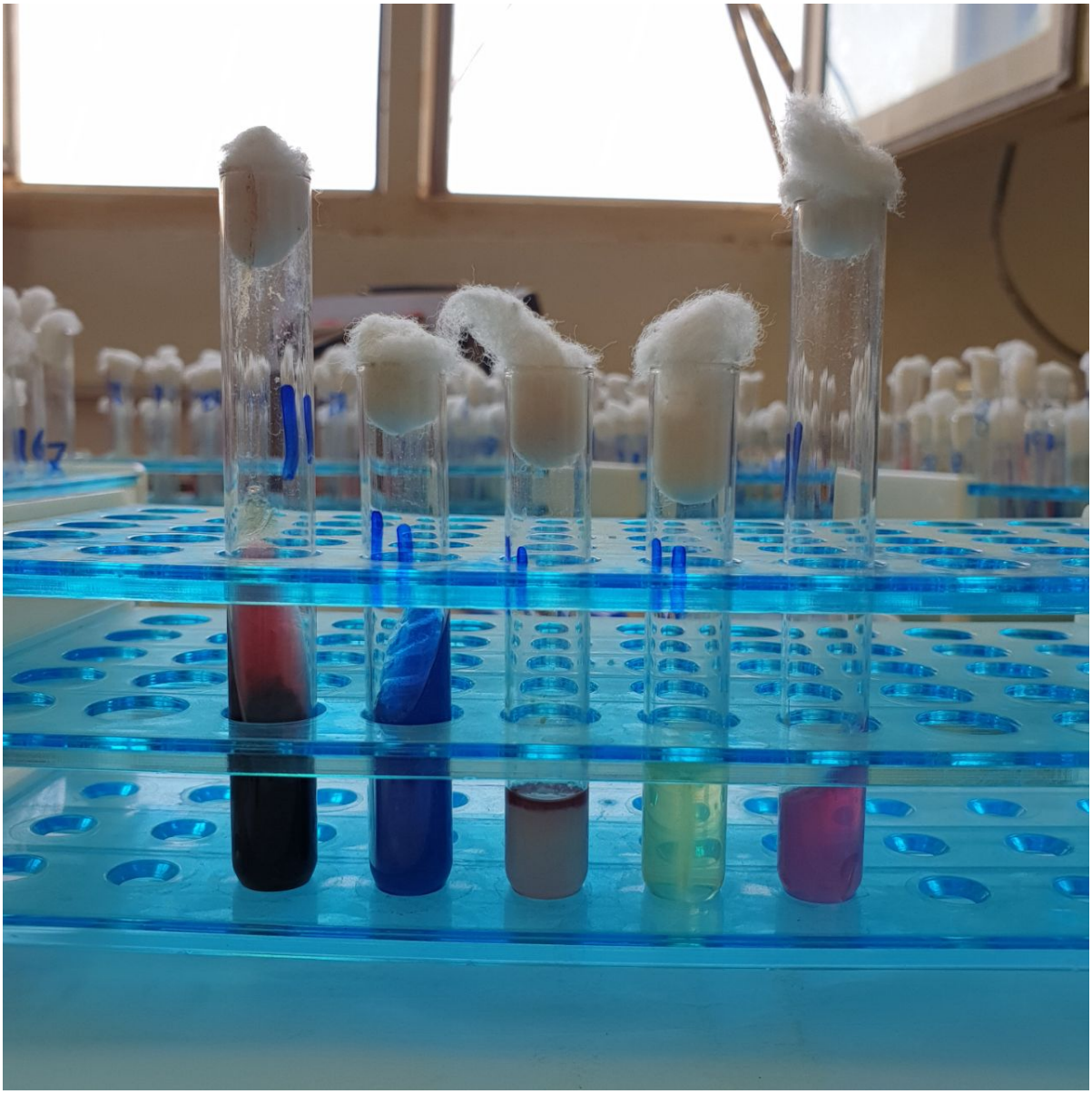

Figure (2): Shows biochemical tests for *Proteus vulgaris* isolated pathogen from Urine Samples.

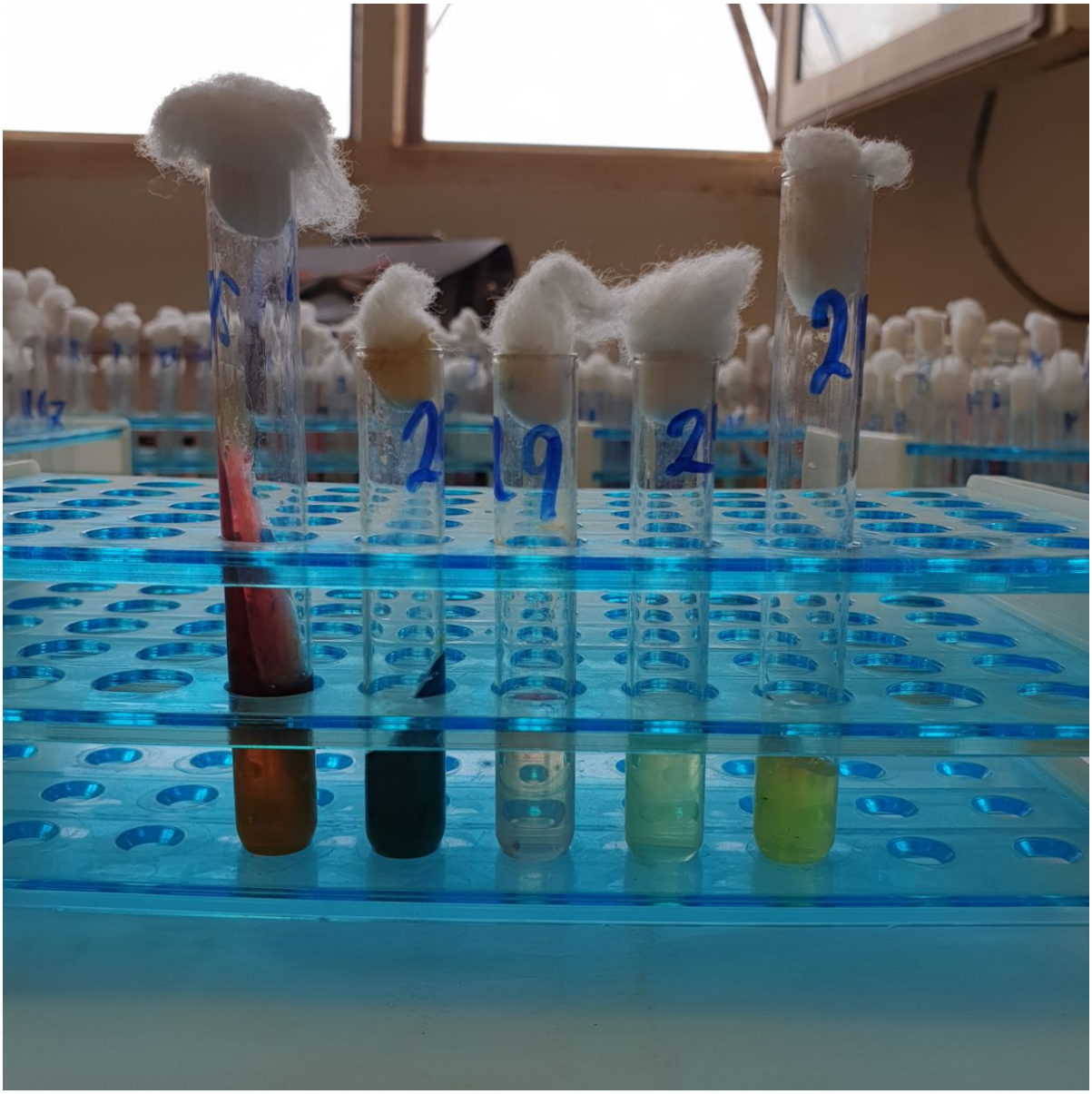

Figure (3): Shows biochemical tests for *Escherichia coli* isolated pathogen from Urine Samples.

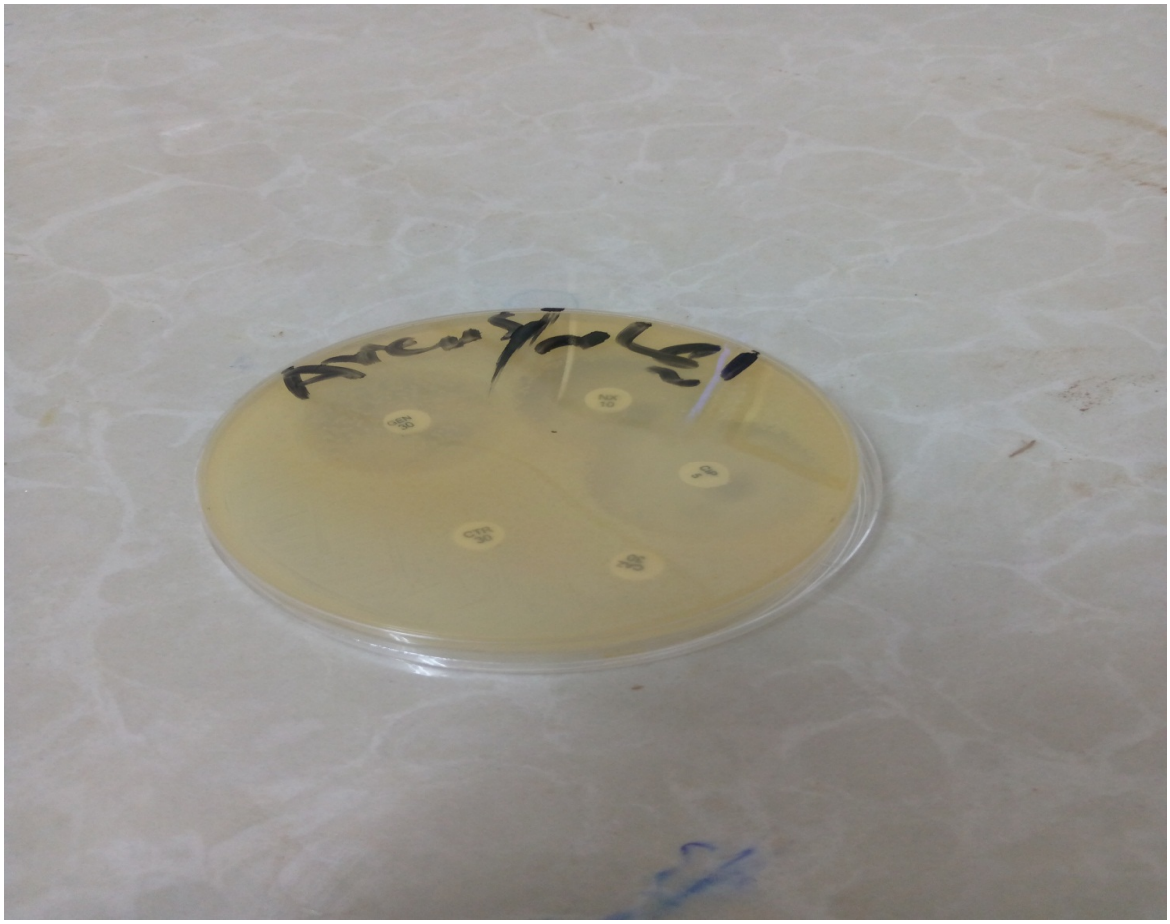

Figure (4): Antimicrobial susceptibility test for S.areus Isolate from Urine Samples.