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Efficacy of Some Antibiotics Against Certain Bacterial Types in Patients with Urinary Tract Infections.

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ABSTRACT

Background: The worldwide increase in resistance of pathogens that cause urinary tract infections ,unfortunately has had bad consequences on antibiotics that used in the treatment and prophylaxis against infectious complication after urological intervention.

Aim of the study: Demonstration of bacterial sensitivity for antibiotics and efficacy of these antibiotics against bacteria.

Method: Laboratory and biochemical tests were carried out to diagnose bacterial isolates causing urinary tract infection and pure isolates were obtained for (*E. coli, Klebsiella sp., Proteus sp., , Pseudomonas sp. and Actinomyces sp.*),Four different types of antibiotics(Cefotaxim, Vancomycin ,Meropenem and Amikacin) being used in this study were tested for efficasy against isolated bacteria.

Results: In this research all five bacterial species(*E.coli, Klebsiella, Proteus, Pseudomonas and Actinomyces*), included in the study appears resistant to Vancomycin at all different concentrations, while all bacterial types are sensitive to Meropenem at all drug concentration with maximal efficacy obtained at (10 Mg) against *Pseudomonas* bacteria.while Cefotaxime effectiveness demonstrated against *Actinomyces sp.* only with resistance of other four types of bacteria, lastly Amikacin which exhibit inhibitory effects against *E.coli*, *Klebsiella* and *Pseudomonas* with no effects against proteus and *Actinomyces* bacteria.

Conclusion: Even with a broad spectrum and potent antibiotics bacterial resistance emerges in many bacterial species therefore culture and sensitivity must be done to evaluate antimicrobial efficacy and bacterial tolerability for antibiotics.

Keywords: Efficacy,Sensitivity,Resistance,Meropenem,Cefotaxime,Amikacin,Van-comycin, UTI.

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INTRODUCTION

Antibiotics are synthetics that execute or restrain the development of microscopic organisms and are utilized to treat bacterial contamination. They are delivered in nature by soil microscopic organisms and growths. Antibiotics exploit the contrast between the structure of the bacterial cell and the host's cell, and it either bactericidal (eliminates bacteria)or bacteriostatic (quits increasing of microscopic organisms) [1].

The worldwide increase in resistance of pathogens that cause urinary tract infections ,unfortunately has had bad consequences on antibiotics that used in the treatment and prophylaxis against infectious complication after urological intervention[2,5].

The Infectious Diseases Society of America (IDSA) ,in 2011 admonish that trimethoprim-sulfamethoxazole cotrimoxazole , nitrofurantoin, fosfomycin, or pivmecillinam be utilized if neighbrhood opposition level of pathogens causing intense uncomplicated UTIs don't surpass 20% or if the contaminating species is known to be vulnerable to these medication [6].

Cell wall inhibitory antibiotic such as cephalosporins or Fluoroquinolones and aminoglycisides are recommended as alternatives.Therefore, attention should be given for regional susceptibility of uropathogen for choosing appropriate antibiotics. However, the rate at which *E. coli* strains are getting impervious to the outsized number of antibiotics is expanding around the world . Likewise, *Enterobacteriaceae* harbor gene(s) presenting protection from practically all antibiotics [7]

UTIs are classified as upper urinary tract infection (inflammation of the urethra and kidney) and lower urinary tract infection (cystitis, prostatic inflammation) by location of infection, and complicated or uncomplicated based on hidden ailments and basic or utilitarian variation from the norm in urinary tract. Urinary tract contamination (UTI) influence any piece of the urinary tract and incorporate for the most part cystitis, kidney irritation and urethritis, showing damage of the tissue [8,9].

STUDY OBJECTIVES

demonstration of sensitivity of certain bacterial types for antibiotics and efficacy of these antibiotics against bacteria.

METRIALS AND METHODS

Urine samples collected from Patients suffering from UTI admitted to Baquba Teaching Hospital, midstream urine samples were obtained from both sexes and of all ages by using sterile tubes.Laboratory and biochemical tests were carried out to diagnose bacterial isolates causing urinary tract infection and pure isolates were obtained for (*E. coli, Klebsiella ps., Proteus sp., , Pseudomonas sp. and Actinomyces sp.*).(10,11)

Four different types of antibiotics (Cefotaxim, Vancomycin ,Meropenem and Amikacin) being used in this study were tested for efficacy against isolated bacteria for accurate sensitivity test as follow , serial dilution (10Mg,15Mg, 20

Mg , 25 Mg). The agar -well diffusion method was used to determine the influence of different concentrations of antibiotics used on bacterial isolates under study.(12).

RESULTS & DISSCUSION

Table 1: Effects of different concentrations of cefotaxime on different bacterial types.

Name of bacteria	Drug concentrations				
	10 Mg	15 Mg	20 Mg	25 Mg	P value
E.coli	Resistant	Resistant	Resistant	Resistant	1.00
Klebsiella sp.	Resistant	Resistant	Resistant	Resistant	1.00
Proteus sp.	Resistant	Resistant	Resistant	Resistant	1.00
Pseudomonas sp.	Resistant	Resistant	Resistant	Resistant	1.00
Actinomyces s p.	32 mm	34mm	34mm	38mm	0.90NS
P value	0.001***	0.001***	0.001***	0.001***	

Table (1) show that (*E.coli,Klebsiella,Proteus and Pseudomonas*) bacteria are resistant to cefotaxime at all different concentrations (10,15,20 and 25) Mg, while *Actinomyces* bacteria is sensitive to all concentrations of cefotaxime than other bacteria with no significant differences (p>0.05). cefotaxime concentrations (10,15,20,25) Mg are active only against *Actinomyces* bacteria but it not active against other bacteria with high significant differences (p<0.05).

Table 2: Effects of different concentrations of Vancomycin on different bacterial types.

Name of bacteria	Drug concentration				
	10 Mg	15 Mg	20 Mg	25 Mg	P value
E.coli	Resistant	Resistant	Resistant	Resistant	1.00
Klebseilla sp.	Resistant	Resistant	Resistant	Resistant	1.00
Proteus sp.	Resistant	Resistant	Resistant	Resistant	1.00
Pseudomonas sp.	Resistant	Resistant	Resistant	Resistant	1.00
Actinomyces sp.	Resistant	Resistant	Resistant	Resistant	1.00
P value	1.00	1.00	1.00	1.00	

Table (2) show there are no differences between different bacterial types and drug concentrations because all types of bacteria are Resistant to drugs.

Table 3: Effects of different concentrations of meropenem on different bacterial types.

Name of bacteria	Drug concentration				
	10 Mg	15 Mg	20 Mg	25 Mg	P value
E.coli	20 mm	22mm	22mm	24mm	0.94 NS
Klebseilla sp.	20mm	24mm	28mm	28mm	0.62 NS
Proteus sp.	20mm	22mm	22mm	24mm	0.94 NS
Pseudomonas sp.	4mm	12mm	12mm	20mm	0.01**
Actinomyces sp.	22mm	24mm	28mm	32mm	0.37 NS
P value	0.01**	0.31 NS	0.11 NS	0.51 NS	

Table (3) shows that (*E.coli,Klebseilla,Proteus and Actinomyces*) are sensitive to all different concentrations of meropenem (10,15,20 and 25) Mg with no significant different (p>0.05), while Pseudomonas bacteria is sensitive to all concentrations of meropenem with high significant different (p<0.05). in other hand, the drug concentration (10 mg) is active against all types of bacteria with high significant different (p<0.05), so the drugs concentrations (15, 20, 25) mg active against all types of bacteria but with no significant different (p>0.05).

Table 4: Effects of different concentration of Amikacin on different bacterial types

	Drug concentration				
Name of bacteria	**10 Mg**	**15 Mg**	**20 Mg**	**25 Mg**	**P value**
E.coli	15 mm	20mm	20mm	24mm	0.56 NS
Klebseilla sp.	16mm	18mm	18mm	20mm	0.93 NS
Proteus sp.	Resistant	Resistant	Resistant	Resistant	1.00
Pseudomonas sp.	12mm	16mm	20mm	20mm	0.45 NS
Actinimyces sp.	Resistant	Resistance	Resistance	Resistance	1.00
P value	0.001***	0.001***	0.001***	0.001***	

Table (4) shows that (*E.coli.Klebseilla and pseudomonas*) bacteria are sensitive to all Amikacin concentrations (10,15,20 and 25) Mg with no significant differences (p>0.05), while the (*Proteus* and *Actinomyces*) bacteria are resistant to all concentrations of drugs . In other hand, Amikacin concentrations (10,15,20,25 Mg) is active against (*E.coli.Klebseilla and pseudomonas*) types of bacteria but not active against (proteus and actinomyces) with high significant differences (p<0.05).

DISCUSSION

There are a lot of researches underwent in the past upon bacterial sensitivity to antibiotics, now in the present research we will demonstrate the effectiveness of different antibiotics on different bacterial species, the first antibiotic is cefotaxime which is broad spectrum third generation cephalosporin antibiotic [13].different concentrations(10,15,20,25Mg) of cefotaxime tested on *E.coli, klebsiella, proteus, pseudomonas and actinomyces species,* cefotaxime shows inhibitory effect on bacterial growth just with actinomyces bacteria at all differents drug concentrations(10,15,20 and 25 Mg) with maximal effects obtained at 25 Mg concentration(which is the highest concentration but with no significant differences (p>0.05). while high significant differences (p<0.05) appear when we compare between actinomyces and other four types of bacteria since the other bacteria were resistant to cefotaxime at all different concentrations, the result of current study in agreement with the results obtained from the research on resistance of antimicrobial to cefotaxime and ertapenem in Enterobacteriaceae[14].

The second drug is Vancomycin which is a broad spectrum antibiotic become increasingly important because of its activity against multiple drug-resistant organisms, such as MRSA and enterococci ,The medical field is presently concerned with emergence of vancomycin resistance in these organisms [15].In the present study All bacterial species show resistance to all different concentrations of vancomycin. And this revert to emergence of resistance of bacteria to vancomycin.

The next drug was Meropenem that has been abroad spectrum bactericidal antibiotic, acts by inhibiting bacterial cell wall synthesis by binding and inhibiting transpeptidases[1]. Meropenem appears to be effective against (*E.coli, klebseilla, proteus and actinomyces)* at different concentrations (10, 15, 20 and 25) Mg with no significant differences (p>0.05), while the effectiveness of meropenem is more with Pseudomonas bacteria at all concentrations of drugs with maximal effect obtained at (10)Mg with high significant differences (p<0.05). on the particular other hand, the medication concentration (10 mg) is usually active against all varieties of bacteria with high significant differences (p<0.05), so the drugs concentrations (15, 20, 25) Mg active against all types of bacteria but with no significant different (p>0.05). these results in agreement with results obtained from study underwent in 2008 upon meropenem usage in the treatment sssociated with serious microb infections[16].

The fourth drug is Amikacin which is member from aminoglycoside group of antibiotic, it is a bactericidal antibiotic act by irreversibly inhibit protein synthesis[18].Result of Amikacin shows that (*E.coli.Klebseilla and pseudomonas*) bacteria are sensitive to the drug at all concentrations (10,15,20 and 25) Mg with no significant differences (p>0.05), while the (proteus and actinomyces) bacteria are resistant to all concentrations of drugs . In other hand, the drug concentrations (10,15,20,25 Mg) are active against (*E.coli.Klebseilla and pseudomonas*) types of bacteria but not active against (*proteus and actinomyces)* with high significant differences (p<0.05).the results of our study goes with results obtained from bactericidal efficacy of amikacin [17].

SUMMARY

In this research all five bacterial species(*E.coli, Klebsiella, Proteus, Pseudomonas and Actinomyces*), included in the study appears resistant to vancomycin at all different concentrations, while all bacterial types are sensitive to meropenem at all drug concentration with maximal efficacy obtained at (10 Mg) against *Pseudomonas* bacteria.while cefotaxime effectiveness demonstrated against *Actinomyces sp*. only with resistance of other four types of bacteria, lastly Amikacin which exhibit inhibitory effects against *E.coli, Klebsiella* and *Pseudomonas* with no effects against *Proteus* and *Actinomyces* bacteria.

CONCLUSION

Even with broad spectrum and potent antibiotics resistance emerges in many bacterial species therefore culture and sensitivity must be done to evaluate antimicrobial efficacy and bacterial tolerability for antibiotics.

CONFLICT OF INTEREST

None

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