

RESISTANCE AND SENSITIVITY PATTERN OF CLINICAL ISOLATES  
-OF STAPHYLOCOCCUS AUREUS AGAINST GENTAMYCIN, CO  
TRIMETHOPRIM, AMOXICILLIN AND CEFALEXIN IN AL-NAJAF AL-  
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الخلاصة:

البكتريا العنقودية واحدة من اكثر انواع البكتريا المسببة للأمراض في الإنسان وطبيعة  
الإمراض  
الناتجة منها تمتاز بالمدى الواسع حيث تبدأ بالتهاب الجلد البسيط ويمكن أن تنتهي بتسمم  
الدم واحتمالية الموت في دراستنا حاولنا اختبار مدى حساسية البكتريا العنقودية لأربعة  
أنواع من المضادات الحيوية وهي الجنتاميسين والكوترايمثوبريم والاموكسسلين  
والسيفالكسين ومن خلال العينات البالغ عددها 55 عينة من البول والقيح والجلد من  
مرضى مستشفى الصدر التعليمي في مدينة النجف الاشرف – العراق وأظهرت الدراسة  
أن الجنتاميسين كان أكثر أنواع المضادات الأربعة تحسسا من قبل البكتريا وبنسبة  
تحسس مقدارها 34.83% بينما أظهرت الدراسة أن الاموكسسلين اظهر أعلى نسبة من  
المقاومة (مقارنة بباقي الأنواع من البكتريا ) ومقدارها 30%

SUMMARY:

Staphylococcus aureus one of the most common pathogen that  
cause a wide range of infection started by simple skin infection and  
end by septicemias and high possibility of death .we try to study  
the sensitivity and resistance pattern of staphylococcus aureus  
against Gentamycin, Cotrimethoprim, Amoxicillin and Cefalexin  
.A 55 isolates of staphylococcus aureus obtained from urine, pleural  
fluid, joint aspiration, ear, skin, and pus, of indoor and outdoor  
patient in  
AL-SADER teaching hospital, AL-NAJAF AL-ASHREF, IRAQ.  
From a period extended between 9-1-2006 ---- 8-3-2007.And each  
isolate was tested for these 4 antibacterial drug , and we see that  
Gentamycin show the highest percentage of sensitivity by  
staphylococcus aureus (34.83%) while Amoxicillin show the  
highest percentage of resistance by staphylococcus aureus ( 30%).

INTRODUCTION:

Disease caused by *STAPHYLOCOCCUS AUREUS* vary from localized inflammation and end by fatal generalized septicemia. for this reason it became very important for physicians to know the resistance and sensitivity pattern for the dangerous pathogens like staphylococcus aureus .

Staphylococcus aureus is one of the most versatile nosocomial and dangerous human pathogen since publication of its role in sepsis by Ogston in 1880 and 1882 (1). In spite of the introduction of antimicrobial agents and improvements in the frequency and morbidity of staphylococcal disease in the twentieth century staphylococci have persisted as an important hospital and community pathogen. They are responsible for more than 80 percent of the suppurative diseases encountered in medical practice and are second only to *E. Coli* as a cause of hospital acquired infections .(2) The wide spread use of penicillin in 1950 s saw the spread of penicillin resistant staphylococcus aureus in hospitals . after this time methicillin and its derivatives became the drug of choice in treatment of infection caused by this organism. At the same time methicillin – resistant staphylococci were reported from USA and Italy .and even before methicillin was widely used , a strain of *S. Aureus* with natural resistance to this antibiotic was identified by Jevans in 1961. therefore methicillin-resistant *s. aureus* emerged as major pathogen world wide.

Several out-breaks were documented in many parts of the world caused by methicillin-resistant *s. Aureus* , these epidemic strains was labeled as EMRSA (3) . Vancomycin has long been considered that antibiotic of last resort against serious and multi-drug resistant infection caused by Gram- positive bacteria , however , Vancomycin resistance has emerged more recently in staphylococcus aureus. (4)

Hospital strains of *S. Aureus* are usually resistant to a variety of different antibiotic . few strains are resistant to all clinically useful antibiotic except Vancomycin , some workers have reported , however the presence of Vancomycin resistant strains.(5)

AIM OF THE STUDY:

The present study was designed to investigate sensitivity and resistance pattern of Gentamycin, Cotrimethoprim, Amoxicillin and Cefalexin against *STAPHYLOCOCCUS AUREUS* isolated from different patients .

MATERIALS AND METHEDS:

Staphylococcus aureus isolates employed in this study was conducted at *AL-SADER* teaching hospital in *AL-NAJAF AL-ASHREF, IRAQ* during the period from 9-1-2006 to 8-3-2007. The sensitivity and resistance pattern of staphylococcus aureus isolated from the samples brought to hospital laboratory – Microbiology Unit , was determined against some of commonly used antibiotics using disc diffusion method at the hospitals laboratory .

Samples comprised of urine, wound swab, joint aspiration, ear swab, aural swab, pleural fluid and pus from outdoor patients and indoor patients from different wards of the hospital. Out of 351 growth positive samples, 220 were staphylococcus aureus . These 220 *S. aureus* samples were identified for sensitivity test against Gentamycin, Co- Trimethoprim, Amoxicillin and Cefalexin types of antibiotics .

RESULTS:

A total of 220 sensitivity test was done to 55 samples of staphylococcus aureus and the results was divided in to sensitive, intermediate, resistant .The results appear that number of total sensitive tests was 89 for all 4 antibiotics drugs, and the total resistant tests was 90 for all 4 antibiotics , while the rest (41) tests show intermediate results

Table.(1) numbers of sensitive, intermediate and resistant test of Gentamycin, cotrimethoprim, amoxicillin and Cefalexin against staphylococcus aureus .

	Gentamycin	cotrimethoprim	amoxicillin	Cefalexin	Total
<b>sensitive</b>	31	14	14	30	<b>89</b>
<b>Intermediate</b>	7	15	14	5	<b>41</b>
<b>resistant</b>	17	26	27	20	<b>90</b>
	<b>55</b>	<b>55</b>	<b>55</b>	<b>55</b>	<b>220</b>

### **GENTAMYCIN:**

The results show that from a total of 55 test was done to Gentamycin against staphylococcus aureus ,it was appear that 31 ( 34.83%) show sensitive results, and 17 ( 18.88%) resistant, while the rest 7 was intermediate, as shown by table no.(1). And table no. (2) below. and table no.3

Table (2): The number and percentage of sensitivity of Staphylococcus aureus to Gentamycin, Co-Trimethoprim, amoxicillin and Cefalexin .

Antibacterial drug	No. of sensitive test	Percentage of sensitive test (%)
<b>Gentamycin</b>	31	<b>34.83 %</b>
<b>Co-Trimethoprim</b>	14	<b>15.73 %</b>
<b>Amoxicillin</b>	14	<b>15.73 %</b>
<b>Cefalexin</b>	30	<b>33.70 %</b>
<b>Total</b>	<b>89</b>	<b>100 %</b>

Table (3): The number and the percentage of resistance of Staphylococcus aureus to Gentamycin, Co-Trimethoprim, Amoxicillin and Cefalexin .

Antibacterial drug	No .of resistant test	Percentage of resistant test %
Gentamycin	17	18.88 %
Co-Trimethoprim	26	28.88 %
Amoxicillin	27	30.00 %
Cefalexin	20	22.22 %
<b>Total</b>	<b>90</b>	<b>100%</b>

***CO\_TRIMETHOPRIM:***

From a total of 55 test done to Cotrimethoprim against Staphylococcus aureus ,it was appear that 14 (15.73 % )show sensitive reaction and 26 ( 28.88 % ) show resistance , while the rest (15 ) show intermediate results ( table no. 1 and table no. 2 and table no.3 )

***AMOXICILLIN:***

From a total of 55 test done amoxicillin against staphylococcus aureus , it was appear that 14 (15.73 % ) show sensitive reaction , and 27 ( 30 % ) show resistance , while the rest 14 show intermediate sensitivity as shown by table no. 1 and table no. 2 and table no.3.

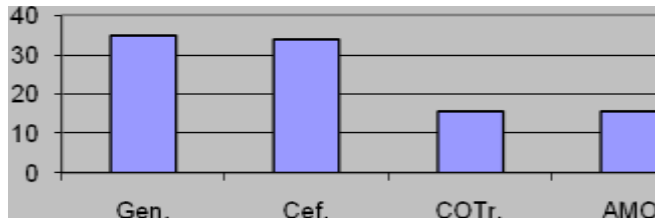
***CEFALEXIN:***

From a total of 55 test done for Cefalexin against staphylococcus aureus ,it was appear that 30 ( 33.70 % ) show sensitive reaction and 20 ( 22.22 % ) show resistance while the rest 5 show intermediate sensitivity as shown by table no . 1 and table no. 2 and table no.3.

*SENSITIVITY PATTERN OF STAPHYLOCOCCU AUREUS :*

We see that Gentamycin show the highest percentage of sensitivity by staphylococcus aureus 34.83 % , while Cefalexin was The 2<sup>nd</sup> by 33.70 % , and both Co-Trimethoprim and Amoxicillin was the lowest by 15.73 % . ( Figure no. 1 )

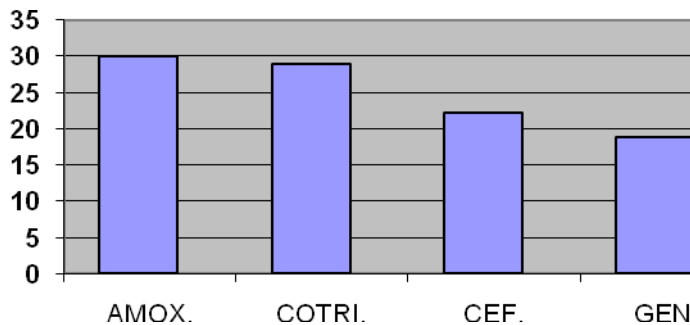
figure. 1: sensitivity pattern of staphylococcus aureus against Gentamycin, Cefalexin cotrimethoprim, and amoxicillin.



*RESISTANCE PATTERN OF STAPHYLOCOCCUS AUREUS:*

We see that Amoxicillin show the highest resistance percentage 30 % , and Cotrimethoprim was the 2<sup>nd</sup> by 28.88 % ,then Cefalexin by 22.22 % while Gentamycin was the lowest by 18.88 % ( Figure no. 2 )

Figure.2: resistance pattern of staphylococcus aureus against Amoxicillin, Cotrimethoprim, Cefalexin and Gentamycin.



## **DISCUSSION:**

Staphylococcus aureus was recognized as an important bacterial pathogen contributing towards hospital infection , globally , staphylococcus aureus causes localized infection spreading in to the blood stream (6). Despite the use of potent antibiotic , still high mortality exist in case of staphylococcus aureus infection.

In the present study , the culture sensitivity pattern was assessed for staphylococcus aureus from ear, pleural fluid, aural, urine ,joint aspiration and pus and high resistance was recorded against Amoxicillin (30 % ) fallowed by Cotrimethoprim by 28.88 % , Saddiqui et al ( 7 ) reported a similar results while Kalssom et al (8) reported that resistance of staphylococcus aureus to Cotrimethoprim was more than (30%) . Our possible explanation for this high percentage of resistance to Cotrimethoprim was the excessive use of cotrimethoprim without culture and sensitivity that may lead to increase in the resistance of staphylococcus .

Our study show that staphylococcus aureus resist Cefalexin by 22.22 % , Mahmood (9 ) reported that 29% resistant pattern of isolates of staphylococcus aureus against Cefalexin . Our possible explanation for this relatively low results was due to uncommon use of Cefalexin as a drug of choice against staphylococcus aureus in our locality that lead to maintain activity ( as compared with the others ) of Cefalexin against staphylococcus aureus .

In case of Gentamycin , our study show that Gentamycin resistance pattern to staphylococcus aureus was 18.88 % while Namias (10) reported that Gentamycin resistance pattern against staphylococcus aureus was 30% , while Trejo (11) reported the percentage of Gentamycin resistance as 29.4%, and saddiqui report ed it by more than 20% , while Kalssom (8) reported it by 22%. Our possible explanation to our low results (as compared with the others ) percentage of resistance of Gentamycin to staphylococcus aureus was the small prescription and uncommon use of Gentamycin as first line antibiotic in treatment of staphylococcus aureus infection . Our study show that Gentamycin was found to be the most effective against staphylococcus aureus (34.83%) from the 4 antibacterial drugs that included in our study , Kalssom(8) reported that sensitivity of Gentamycin was 41.99% .Our possible explanation

for this relatively high percentage of sensitivity was uncommon prescription of Gentamycin for treatment of staphylococcus aureus in our locality ,in spite of the last years show increased in the use of Gentamycin for treatment of staphylococcus aureus infection.

Moreover, when low doses of antibiotics are used against bacteria , they inhibit the growth of susceptible bacteria , leaving the smaller number of already resistant bacteria to thrive and grow. These bacteria spread their resistant strain to other previously non-resistant cells then eventually affecting other cells ( 11).

The study document the importance of staphylococcus aureus as important Gram- positive pathogen , and increasing resistance in commonly used antibiotics . although the high cost and inappropriate use of antibiotics have been documented and the long courses of prophylactic antibiotics may lead to increase resistance to antimicrobials, increase incidence of drug reaction and increased money cost.

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