In vitro evaluation of some antibacterial drugs against *Staphylococcus aureus* isolated from recurrent boil

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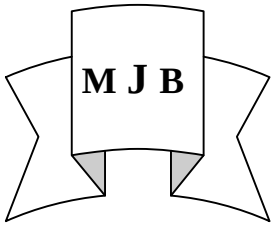

Abstract:

A comparison of the antibacterial activity for each of amikacin, amoxicillin, ampicillin, cephalexin, chloramphenicol, clindamycin, neomycin and rifampin was evaluated against *Staphylococcus aureus* isolated recently from recurrent boil. The antibacterial sensitivity was determined by agar diffusion assay using antibiotic disc on Muller-Hinton agar.

Rifampin and clindamycin were the most effective antibacterial drugs against this microorganism, Cephalexin and chloramphenicol approximately showed the same activity and they were more effective than amikacin. Neomycin, on the other hand had the lowest activity than the previous drugs.

Staphylococcus aureus that isolated from recurrent boil shown to be resistant for both amoxicillin and ampicillin.

الخلاصة:

تم تقييم الفاعلية المضادة للبكتريا لكل من الاميكاسين والاموكسيسلين والامبيسيلين و السيفالكسين والكلورامفنيكول والكلندامايسين والنيومايسين والرفامبين ضد المكورات المسبحية والمعزولة حديثا من الحبة الراجعة. وقد تم تحديد الحساسية المضادة للبكتريا بطريقة الانتشار بالوسط الزرعي باستخدام الأقراص الحاوية على المضاد البكتيري على الوسط الزرعي مولر -هنتن.

لقد كان الرفامبين والكلندامايسين هما الأكثر فاعلية ضد هذه الكائنات البكتيرية، وأظهر كل من السيفالكسين والكلورامفنيكول نفس الفعالية المضادة للبكتريا تقريبا والتي كانت هي الأكثر من فعالية الاميكاسين.

ومن ناحية أخرى كانت فاعلية النيومايسين أقل بكثير من العقاقير السابقة. وقد أظهرت المكورات المسبحية المعزولة من الحبة الراجعة مقاومة لكل من الاموكسيسلين والامبيسيلين.

Introduction:

Staphylococcus aureus is the most common cause of pyogenic infection, causing a range of infections that includes boils, abscesses, septic fingers, styes, impetigo and sticky eye in neonate [1].

Superficial infection of the hair follicle by *Staphylococcus aureus* is a common disorder leading to formation of small red pustules which resolve following discharge of pus. If, however, the follicle fails to discharge its contents, the infection spreads into the adjacent dermis resulting in a furuncle or boil [2].

Most clinical isolates of *Staphylococcus aureus* are resistant to penicillins such as benzylpenicillin, due to the production of betalactamase that binds to the antibiotic and destroys its activity by opening it at the beta-lactam ring [3]. Methicillin-resistant *Staphylococcus aureus (*MRSA) isolates had been resistant to most antibiotic except vancomycin and rifampin [4].

Systemic antibiotics are indicated in only special circumstances [5]. Treatment may include antibiotics, local moist heat, and cutting and draining [6].

This study was conducted to determine the activity of amikacin, amoxicillin, ampicillin, cephalexin, chloramphenicol, neomycin and rifampin against recently isolated *Staphylococcus aureus* from patients with furunclulosis.

Materials & Methods:

The antibacterial activity of amikacin, amoxicillin, ampicillin, cephalexin, chloramphenicol, clindamycin, neomycin and rifampin was evaluated in 11 isolates of *Staphylococcus aureus* obtained from patients severed from chronic boils.

The antibacterial activity was determined by agar diffusion assay [7] using antibiotic disc on Muller-Hinton media seeded with isolated *Staphylococcus aureus* bacteria. The concentration of antibacterial agents was 5?g/ml for each of cephalexin, chloramphenicol, clindamycin, neomycin, and 30?g/ml for cephalexin, chloramphenicol and neomycin .The diameter of the antibiotic disc was 6mm. Fisher test was conducted to test the significance of difference in the zone of inhibition of the different agents.

Results:

The diameter of the inhibitory zone (IZ) for different antibacterial agent against *Staphylococcus aureus* was measured in millimeter. The mean

of the (IZ) was 26.6mm for rifampin, 20.4mm for clindamycin, 19.4mm for chloramphenicol, 19.2mm for cephalexin, 16.3mm for amikacin and 14.4mm for neomycin(table 1). There was a resistance for both amoxicillin and ampicillin in a concentration of 5?g/ml.

Discussion:

This study observed that rifampin had a superior antibacterial activity against *Staphylococcus aureus* isolated from furunculosis. Clindamycin approximately showed the same activity to rifampin and both were more effective than chloramphenicol. In a study of 390 isolates of *Staphylococcus aureus*, which were tested against 13 different antibiotics by the same method, the susceptibility of methicillin-resistant Staphylococcus aureus strains to rifampin and clindamycin, remained active [7]. Clindamycin is effective and has been indicated against gram-positive aerobic cocci, chiefly *Staphylococcus aureus* [8]. Marvoic *et al*. found that chloramphenicol MICs for multiresistant *Staphylococcus aureus* ranging from 25 to 100 mg/l [9]. Whereas Rohani, *et.al*. showed that the resistance of 390 isolates of *Staphylococcus aureus* to chloramphenicol was 8.5% [7].

The activity of amikacin was better than cephalexin and lower than neomycin. There were no literature about the use of cephalexin and neomycin in the treatment of furunclosis.

Both amoxicillin and ampicillin were shown to be not effective against this bacteria, due to the production of beta-lactamasees [3] which is the major defence mechanism of pathogenic bacteria against beta-lactam antibiotic. When the beta-lactam ring of this antiobiotic class is hydrolyzed, the antimicrobial activity is destroyed [10]. Resistance to other antibiotics is achieved by a number of different mechanisms, depending on the class of antibiotic; these include membrane impermeability, alteration of the target site and enzymatic degradation of the antibiotic [11]. Further studies need to investigate the effect of these drugs clinically.

References:

1-Gould, D. and Brooker, C. (2000). Applide Microbiology for Nurses. 137.

2- MacSween, RNM and Whaley, K. (1992). Muir's Text Book of Pathology. Arnold Oxford University Press, Inc, New York. 1110.

3-Collee, JG.; Fraser, AG.; Marmion, BP. And Simmons, A. (1996).

Practical Medical Microbiology. 14th ed. Churchill livingstone. 247.

4- Alvin, P.C. (2001). Harrison's Principles of Internal Medicine. 15th. ed. Vol. 3.

5-Dahl, M.V. (1987). , South.Med.J. 80(3): 352.

6-Mosby's Medical Encyclopedia, Copyright (C)1994-5, 1996, 1997. The learning Company Inc.

7- Rohani, MY; Raudzah, A; Lau, MG; Zaidatul, AA; Salbiah, MN; Keah, KC; Noraini, A and Zainuldin-T. (2000). Susceptibility pattern of *Staphylococcus aureus* isolated in Malaysian hospitals. Int. J. Antimicrob. Agents. 13(3): 209.

8-Stefani, S; Mezzatesta, M; Gismondo, M.R; Romeo,A; Nicoletti G., (1986), Chemioterapia. 5(5): 297.

9-Mraovic, M; Canic-Radojlovic, M. (1986), Infection. 14 Suppl 4: S231.

10-Bush, K. (1988). Clin. Microbiol. Rev. 1(1): 109.

11-Lyon, BR. and Shurray, R. (1987). Microbiological Reviews. 51: 88.

Table 1 The zone of inhibition (mm) for some antibacterial agents against recently isolated *Staphylococcus aureus* from patients with recurrent boil.

Isolate No.	Antibacterial agent					
	Amikacin	Cephalexin	Chloramphenicol	Clindamycin	Neomycin	Rifampin
1	15.5	19	21.5	24	14	24.2
2	13	20	22	21.1	13.2	26.2
3	14	21	20	20	16	27.4
4	19.5	21	20.1	21	16	28
5	18.5	16.5	16.5	19	13.4	28.2
6	18	15.3	19	20	14.5	30
7	18	19	19.1	19	14	25.8
8	17	22	17.6	20	15.1	26.6
9	20	18.3	18.5	20.8	13.3	26.9
10	13	20.1	20.1	19.2	15.2	24.6
11	13	18.9	18.8	20.3	14	25.1
mean	16.3 [c]	19.2 [b]	19.4 [b]	20.4 [a]	14.4 [d]	26.6 [a]

*Different letters means significant difference, similar letters means non-significant difference.