

A study of antibacterial activity of plant extracts on bacterial pathogens isolated from Eye infections (conjunctivitis)

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Citation

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Abstract

Isolation of bacterial pathogens from eye infections (conjunctivitis) was carried out in this study . 49 specimens (77.7%) gave positive bacterial cultures from totally (63 samples). The double mode of isolation has a highly rate of 34.6%.

Staph.aureus is the predominant pathogen in percentage (53.06), followed by other bacterial types.

Activity of aqueous and alcoholic extracts of Zizyphus

spina

christi , and Olea

europaea (leaves and fruits) were also evaluated in the present study. Most aqueous extracts are not effected on Staph.aureus while alcoholic extracts have excellent activity against these bacteria.

The biggest inhibition zone (20mm) recorded for 1000mcg /ml of Zizyphus extract.

The MICs in all extracts ranged between 200-800 mcg / ml .

We also used some standard antibiotics to compare their activities with the activity of plant extracts.

INTRODUCTION

The conjunctiva is a mucous membrane which covers the under surface of the lids and is reflected from the lids to cover part of the eye ball up to the margin of the cornea. (jain ,1990) .

In spite of natural protective mechanism of the conjunctiva in the from of low temperature due to the exposure to the air, presence of enzymes in the tears called lysozyme (which have definite anti-bacterial property) and the mechanical action of blinking and flushing action of the lacirnal secretion, the conjunctival sac my be infected with pathogenic organisms causing infective conjunctivitis. (soy , 1995)

The choice of an antimicrobial is not only influenced by the type and susceptibility of the infecting organism, but also by the mode of action and the pharmacokinetics of the antibiotics, the severity and localization of the infections, the liver and kidney functions as well as the age of the patient. When more than one antibiotic is used, a part from the spectrum of the individual antibiotic, synergism and antagonism must be kept in mind.(smith , etal 1997) .

Many advanced studies such as (Aggarwal., etal. ,1992. , Fok , etal. , 1995 ., Harris , etal. , 1996 , Duch , etal ., 1997 ., and Zaidi , etal ., 1999) were interested in conjunctivitis and studied this disease and causative agents from various views .

Because there are no local study on conjunctivitis the aims of this study are determination the major bacterial types causing conjunctivitis and study of efficiency of some plant extracts from Zizyphus Spina christi and Olea europaea .

MATERIAL AND METHODS

SAMPLING

A total of 63 specimens were collected from patients with conjunctivitis (under supervision of ophthalmologist Dr. Abdul amir kassim) from saddam teaching hospital , collected by sterile swab.

BACTERIOLOGICAL STUDY

Brain heart infusion was added to the samples for 18-24 hrs for enrichment, and then three media were used for isolation, blood, nutrient, and macConkey agar.

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The identification of various bacterial pathogens were carried out depend on routine laboratory techniques (Finegold and Baron , 1986) .

All cultures were incubated aerobically in incubator for 24 hrs on 37 C. All media were sterilized by autoclave (1.5 pond /cm³) for 15 minutes. All glass wares were sterilized by oven (180-200 C) for 2 hrs .

PLANT EXTRACTS

Two plant were used in this study:

Zizyphus spina christi L. (Rhamnaceae) leaves and fruit .
Olea europaea L. (Oleaceae) leaves and fruit .

That is wide and common distributed in all regions of AL – Basrah city , various aqueous and alcoholic concentrations (100 , 250 , 500 , 750 , 1000 mcg / ml) of leaves and fruit. Extracts from each plants were prepared according to (AL – Saimary , 1999) , and sterilized by Millipore filter technique (diameter 25 mm, pore size 0.45 μ m).

ANTIBIOTICS

Eight Antibiotics (as Antibiotics disc) were used for comparison their effects : Penicillin G (10 units) , Chloramphenicyl (c) (30 mcg) , Cophalexin (CE) 30 mcg , Cloxacillin (30 mcg) , Tetracyclin (TE) 30 mcg , Neomycin (N) 30 mcg , Methicilline (30 mcg) , and Gentamicin (CN) 10 mcg . Antibiotics disc supplied from Himedia Co. India.

EVALUATION THE ANTIBACTERIAL ACTIVITY

Plant (agar diffuim) method was used to evaluated antibacterial activity of plant extracts and antibiotics on growth of bacterial types isolated from conjunctivitis patients to determine growth inhibition zones (mm) by using mueller – hinton agar .

Tub (dilution) method was used to determine minimal inhibitory concentration MICS . (mcg/ml) by using brain heart infusion of plant extracts .

RESULTS AND DISCUSSION

Our. results revealed a highly infected conjunctivitis (77.7%) with various species of aerobic and facultative anaerobic bacteria (87 isolates). Double mode of isolated bacterial types are predominant in 34.6 % from the cases followed by other modes .

Other studies revealed that any organisms which affects the mucous membrane any where in the body, can also invade

the conjunctiva. According to the frequency the common organisms which affect the conjunctiva and cause a conjunctivitis are coagulate positive staphylococci, bacilli which are ting gram negative bacilli. Adenomas can also cause conjunctivitis sometimes in epidemic form (Fok., etal ., 1995 ., Pitaksiripan ,etal ., 1995 ., Fleiszing ., etal., 1996)

The pathologic markers occur in conjunctivitis due to looseness of epithelium particularly of the bulbar conjunctiva and that of the for mix the exudate containing fibrin and leucocytes comes to the surface in the form of discharge. Also, the superficial cells, which form the second line of defense (first line being formed by the leucocytes) phagocytes are invading agents and are themselves desquamated. The basal layer of the cells proliferates and make up the deficiency .(Jain ,1990)

The Staph.aureus in our study was found predominant in 53.06% of positive cases followed by other bacterial types. The ability of Staph.aureus to cause a disease may be due to production of large number of enzymes, toxins and other substances, some of which may play an important role in their capacity to cause conjunctivitis.

Other studies supported results of our study that the same bacteria were associated with conjunctivitis (Harris , etal ., 1996 , Duch ., etal ., 1997 ., Iroha , etal .,1998, Friedlaender ., 1998 . and Zaidi , etal ., 1999)

Figure 1

Table 1: modes of infectious bacterial types isolated from 49 conjunctivitis patients

Mode of isolated bacterial types	No of cases	% from the +ve cases
Single	13	26.5
Double	17	34.6
Three	8	16.3
Over than three	11	22.4
Total no of case	63	
No of the positive cultured cases	49 (77.7 %)	

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Figure 2

Table 2: bacterial types isolated from 49 positive cultured cases of patients with conjunctivitis.

Bacterial types	No of cases	% from the +ve cases (49)	% from total isolates (87)
<i>E.coli</i>	10	20.4	11.49
<i>Proteus</i>	3	6.1	3.4
<i>Klebsiella</i>	5	10.2	5.74
<i>Staph. epidermidis</i>	13	26.5	14.94
<i>Staph. aureus</i>	26	53.06	29.88
<i>Pseudomonas</i>	7	14.2	8.04
<i>α.hem.streptococci</i>	20	40.8	22.98
<i>β.hem.streptococci</i>	3	6.1	3.4
Total no. of isolates	87		

Figure 3

Table 3: Antibacterial activity of extractes of Z

1. Extracts : *Zizyphus spina christi* : fruit

Concentration	Aqueous exts	Alcoholic exts
1000	NE	16
750	NE	10
500	NE	4
250	NE	NE
100	NE	NE

Zizyphus spina christi : leaves

Concentration	Aqueous exts	Alcoholic exts
1000	13	20
750	7	12
500	NE	10
250	NE	NE
100	NE	NE

Olea Europaea : fruit

Concentration	Aqueous exts	Alcoholic exts
1000	10	17
750	6	13
500	NE	9
250	NE	4
100	NE	NE

Olea Europaea : leaves

Concentration	Aqueous exts	Alcoholic exts
1000	15	18
750	8	11
500	4	8
250	NE	NE
100	NE	NE

Figure 4

Table 4: Determination of minimal inhibitory concentrations (mics) of extractes of and against . isolated from patients with conjunctivitis.

1:zizyphus	Spine christi	Aqueous exts	Alcoholic exts
	Fruit	700-800	500-600
	Leaves	350-400	250-300
1:olea	Spine christi	Aqueous exts	Alcoholic exts
	Fruit	350-400	200-250
	Leaves	500-600	400-500

Figure 5

Table 5: A comparison of antibacterial activity of standard antibiotics against isolated from conjunctivitis patients

2. Antibiotics :	diameter of inhibitim zone (mm)
Pencillin G (10)	NE
Methiciline (30)	12
Cephalexin (30)	12
Tetracyclin (30)	15
Neomycin (30)	24
Gentamicin (30)	19
Cloxacillin (30)	16
Chloramphenicol (30)	18

References

1. Aggaruial , R. etal ., (1992) .Bacterrology of ophthalmic infections with special reference to anaerobes .Indian J. Med .Res. 95 : 148 - 151 .
2. AL- saimary , I.E. (1999) A study of antibacterial agent of aqueous extracts of Alliam sativum . L . E.M.H.J. 5(4) :803 -810 .
3. Duch ,S.A.M. , Menezo , J.L. , Hurtado , S,M. (1997). Endophthalmitis following penetrating eye injuries . Acta ophthal mod . scaad ., 75(1) : 104 - 106 .
4. Finegold ,S.M. and Baron , F.A. (1986) . Baily and scotts diagnostic Microbiology . 8th ed . Saunders Co. philadelphia.
5. Fleiszing , S.M. ,etal ., (1996) . Relationship between cytotoxicity and corneal epithelial cell invasion by clinical isdates of ps. Aeraginsa . Infect . Immunot ., 64(6) : 2288- 2294 .
6. Fok , T.F., wong W. and cheng , A.F. (1995) . use of eyepatches in phototherapy : effects on conjuctival bacterial pathogens and conjunctivitis pediater . Infect .Dis .j. 14(12) : 1091 - 1094 .
7. Friedlaender , M. H . (1998) . Twice -a- day versus four times -a- day ofloxacin treatment of external ocular infection . CLAOJ ., 24(1) : 48 -51 .
8. Harris .M.G. etal ., (1996) . Survival of contaminating bacteria in over the counter artificial tears . J. Am . optom . Assoc .67(11) :676- 680 .
9. Iroha, E.O. etal ., (1998) . Bacterial Eye infection in neonates .Westes Afr .J. Med ., 17(3) :168 - 172 .
10. Jain ,M.R. (1990) . Diagnosis and management of ocular inflammations .znded . Jaypee broth . India .
11. Pitaksiripan ,s., etal ., (1995) . nosocomial infections in lampany hosoital .J.Med . Assoc . thai ., 78 (1) : 553 -6
12. Roy , I.S . (1995) . Hand book of ophthalmology . 4th ed . CBS .Pub . India .
13. Smith., M.A. etal .(1997) . traetment of Experimental meth icillin resistant staph . epidermidiis J. infect Dis ., 175 : 462 - 466 .
14. Zaidi , T.S etal ., (1999) . cystic fibrosis tronmembran . conductance regulator - mediated corneal epithelial cell . infect . Immun .67(3) 1481 -1492 .

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