STUDY OF IMPETIGO AND THE RESISTANCE PATTERN OF THE ISOLATES TO VARIOUS ANTIBIOTICS

Pages with reference to book, From 129 To 132

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Abstract

Of 162 cases of impetigo 134 (82.7%) had impetigo contagiosa and 28 (17.3%) were of bullous type. Staphylococcus aureus was isolated from 113 (69.75%), Streptococcus pyogenes from 30 (18.51%) and both of these from 19 (11.74%) cases.
All isolates were tested for their resistance pattern to 13 antibiotics in varying concentrations ranging from 0.01-100 yg/mI. The minimum inhibitory concentration required to inhibit the growth of 90%, 75%, 50% and 25% of isplates were investigated. Amp icillin, bacitracin and erythromycin had low activity. Procain penicillin, dexycycline, gentamicin and chloramphenicol were found most effective of the antibiotics used.
The study indicates that resistance is being commonly used antibiotics (JPMA 37: 129, 1987).

INTRODUCTION

Impetigo is a contagious superficial infection of the skin caused by Staphylococcus, Streptococcus or both. The relative prevalence of these two organisms varies greatly, that of staph impetigo relatively frequent throughout the world and pure strep impetigo less frequent, intemperate climate, than mixed Streptococci[1]. In strep impetigo, isolation of Staphylococci has been regarded as secondary invader but their association may be synergistic, and that either organism may be the primary invader[2].
Certain strains of Staphylococcus and Streptococcus have been attributed to be the main cause of impetigo but rarely with skin infection of other types as staphylococci, causing impetigo, acquired by these organisms against majority of the are lipase negative while those causing deep skin lesion are lipase positive.
There are two types of impetigo known as Impetigo contagiosa of Tilbury Fox and bullous impetigo differentiated on the basis of epidemiological and clinical picture[2,3].
Impetigo heals spontaneously in 2-8 weeks without treatment[2]. Complications are rare. The only serious hazard is the acute glomerulonephritis but its incidence in impetigo is under 1%[4].
Indiscriminate use of antibiotics has led to the multiple antibiotic resistance in bacteria.[5] Antibiotic resistance is due to the natural occurrence of an extra piece of DNA called plasmid that usually causes the cell to produce enzymes which inactivate the specific antibiotics. In Staphylococcus aureus the resistance spreads by phage mediated transduction[6].
The present research work deals with the study of 162 cases of impetigo caused by Staphylococcus aureus, Streptococcus pyogenes, or both and the determination of their resistance pattern to various antibiotics.

MATERIALS AND METHOD

The clinical material was collected with the help of sterile cotton swabs after cleaning the lesion thoroughly with 95% ethanol. The pus was streaked on Staphylococcus medium 110 (Oxoid) and blood agal' and incubated at 37°C for 18-24 hours. The suspected colonies showing characteristic growth and

hemolysis were isolated and identified. Out of 162 cases, 113 were identified as Staphylococcus aureus and 30 Streptococcus pyogenes. From 19 cases of impetigo, both S. aureus and S. pyogenes were isolated.
Master plates of the isolated cultures were prepared (25 spots per plate). The impressions were transferred by replica device to the plates containing varying concentrations of different antibiotics and plane plates (which served as control). Plates were incubated overnight at 37°C and the results recorded. The MICs of each isolate against 13 antibiotics were determined. MIC (Minimal Inhibitory concentration) is the lowest concentration of the antibiotic which inhibits visible growth of the organism.

RESULTS

One hundred and sixty two patients suffering from impetigo were seen at Dermatology Department, Jinnah Postgraduate Medical Centre, Karachi. The clinical material was collected and cultures isolated and identified.
The study includes 134 (82.72%) cases of Tilbery Fox Variety and 28 (17.28%) of bullous type. Incidence of infection was very high in young children (Table 1).

TABLE – I

Age and Sex Distribution of Patients.

Sex	Age in Years							
	0-2	2-4	4-6	6-8	8-10	10-12	12-18	
Male	21	30	14	10	04	03	02	= 84
Female	20	28	15	10	04	01	00	= 78
Total	41	58	29	20	08	04	02	= 162

In majority of cases the infection was found on face (usually around mouth), head and hands but less frequently on other parts of the body.
Out of 162 cases, 54 acquired the infection from their family members, 51 had past history of recurrence and 60 were suffering from scabies. 55 cases presented with fever and 56 had
The incidence of infection peaks during summers probably due to the high temperature and humidity. Recurrence of infection in low income group of the population may be due to poor personal hygiene. Staphylococcus aureus accounted for 113(69.75%) cases and Streptococcus pyogenes for 30 (18.51%). Mixed infection of S. aureus and S. pyogenes was found in 19 (11.74%) cases. A total of 181 isolates of S. aureus and S. pyogenes were recovered from 162 patients (Table II).

TABLE – II
Etiology of the Impetigo.

		Patients	
Pure	Staphylococcus aureus =	113	69.75%
Pure	Streptococcus pyogenes =	30	18.51%
Both	S. aureus and S. pyogenes	19	11.74%

Isolated cultures were tested for their resistance pattern to 13 antibiotics in varying concentrations ranging from 0.0 1-100 jig/mi. The Minimum Inhibitory Concentration of various antibiotics required to inhibit the growth of 90%, 75%, 50% and 25% isolates have been shown in Table III.

Resistance Pattern of the isolates of Impetigo to various Antibiotics.

Antibiotics	MIC (Minimal inhibitory concentrations) (μg/ml)					
	Range	No. of isolates resistant to 100 μg	MIC_{25}	MIC_{50}	MIC_{75}	MIC_{90}
Ampicillin	0.1 - > 100	15	5	20	60	80
Bacitracin	5 - > 100	21	4	30	70	> 100
Chloramphenicol	⩽0.01 - 30	–	0.05	01	04	08
Erythromycin	0.02 - > 100	10	1	03	20	50
Gentamicin	⩽0.01 - 30	–	0.05	02	01	04
Carbencillin	⩽0.01 - > 100	05	0.5	03	10	35
Kenamycin	⩽0.01 - 30	–	0.05	01	04	06
Neomycin	⩽0.01 - > 100	01	0.05	01	05	25
Procain Penicillin	⩽0.01 - 10	–	0.01	00.05	00.3	01
Streptomycin	⩽0.01 - 60	–	1	04	20	40
Sulphamathoxazole	0.02 - > 100	01	0.5	03	08	25
Tetracyclin	⩽0.01 - 60	–	0.3	02	08	15
Doxycycline	⩽0.01 - 20	–	0.01	00.05	01	04

MIC_{25} = Minimal Inhibitory Concentration which inhibits 25% isolates.
MIC_{50} - Minimal Inhibitory Concentration which inhibits 50% isolates.
MIC_{75} = Minimal Inhibitory Concentration which inhibits 75% isolates.
MIC_{90} = Minimal Inhibitory Concentration which inhibits 90% isolates.

The data shows that ampidillin, bacitracin and erythxomycin had low activity. For MIC90 (Minimal Inhibitory Concentration for 90% isolates) concentration of 50 ug/ml or higher was required. Doxycycline, procain penicillin, gentamicin and chioramphenicol were most effective, tetracycline comparatively less. Carbencillin had MIC90 of 35 ug/ml and neomycin and suiphamethaxazole MIC90 of 25 ug/ml.

The data shows that the organisms are acquiring resistance to the majority of commonly used antibiotics. Most of the isolates were found to be resistant to the concentration attained in blood during therapy.

DISCUSSION

The high incidence of antibiotic resistance among bacteria from patients has helped in selection and dissemination of transferable antibiotic resistance among pathogenic bacteria. Overcrowding in cities like Karachi and hospitalization of patients provide ideal conditions for dissemination of resistant

organisms and indiscriminate use of antibiotics results in selective survival of resistant strain[7].
The data shows that ampiciffin had MIC75 of 60 jig/mi, MIC90 of 80 Ug/mI and erythromycin MIC75 of 20 ug/mi and MIC90 of 50 ug/ml (Table III). These concentrations are much higher than those attained in serum during therapy.
The majority of isolated cultures showed resistance to ampicillin, bacitracin, erythromycin, carb encillin, neo mycin and suiphamethaxazole. Some culture were found resistant to streptomycin and tetracycline and had MIC as high as 60 jig/mi a few others showed MIC of 30 jig/mI of chloramphenicol, kanamycin and gentamicin.
The invitro susceptibility of the isolates (both S. aureus and S. pyogenes) has been shown in Table Ii!. Procain penicillin was found most effective among the antibiotics used with MIC90 of 1 jig/mi. For doxycycline and gentamicin MIC90 was 4 pg/mi. However, a few isolates were found resistant to 4 pg/mi for gentamicin. Chioramphenicol and kanamycin had MIC90 of 8 jig/mi and 6 pg/mI. A few isolates to these antibiotics were inhibited at 20 jig/mi.
This data shows that organisms are acquiring resistance to a majority of the commonly used antibiotics. The MIC of most of the isolates were much higher than that of the concentration of antibiotics attained in blood during therapy[8] and consequently response was very poor.
Inadequacy of facilities in the hospitals for proper selection of antibiotics and the non-availability of the proper drugs contribute to the proliferation of antibiotics resistant organisms.

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