

BACTERIOLOGICAL STUDY OF PYODERMA WITH SPECIAL REFERENCE TO ANTIBIOTIC SUSCEPTIBILITY TO NEWER ANTIBIOTICS

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Five hundred and forty-two cases of pyoderma were investigated to study bacterial aetiology and their antibiotic susceptibility patterns. Of these 65.87% cases were of primary pyoderma and the rest were of secondary pyoderma. Maximum cases were of impetigo (38.78%) followed by folliculitis (12.92%), furunculosis (2.95%), ecthyma (3.5%), carbuncle (1.5%) and sycosis barbae (0.4%). Secondary pyoderma constituted infected trophic ulcer (18.82%), infected pemphigus (7.2%), infected contact dermatitis (6.27%), and infected scabies (1.8%). Single organism was isolated from 46.9% cases and more than one type of organisms in 65.46% of cases. No organism was isolated in 5% of cases. Staphylococcus (67.34%) was the predominant species isolated followed by beta-haemolytic streptococcus (21.77%). Maximum strains of Staph. aureus were susceptible to amikacin (75%), co-trimoxazole (72%), cefotaxime (65%), chloramphenicol (62%), ciprofloxacin (61%) and clindamycin (61%). There was low susceptibility to cephaloridin (11%), gentamicin (12%) and penicillin (21%). Streptococcus beta-haemolyticus was highly sensitive to most of the antibiotics and less sensitive to cefotaxime (7%), co-trimoxazole (11%) and penicillin (27%). Most of the strains were found to be resistant to one or more antibiotics.

Key Words : Pyoderma. Antibiotic susceptibility

Introduction

Pyoderma is quite common in India and constitutes a major portion of patients in Dermatology clinics. Many cases do not respond to some antibiotics which were previously very effective for such cases. Perhaps indiscriminate use of topical and systemic antibiotics has contributed to this situation.³⁻¹³ Increasing resistance to antibiotics seen in microorganisms poses a big problem to the clinicians. So for successful treatment of cases of pyoderma a detailed knowledge about the causative microorganisms should be available. Hence keeping this view in mind the present study was designed on pyodermas to find out causative organisms and their latest antibiotic

susceptibility patterns.

Materials and Methods

We studied 542 cases of pyoderma of various age groups and of either sex attending the Skin O.P.D. of the Sassoon General Hospitals, Pune. The samples were collected before the antibiotic therapy was started. Specimens of pus were collected aseptically with the help of two sterile swabs. The swabs were transported immediately to the laboratory. Of the two swabs collected one was used for Gram stain and microscopic examination and the other for culture. Second swab was inoculated on to the following media.

- 1) Blood agar
- 2) MacConkey's agar

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3) Crystal violet blood agar (1:500000 of crystal violet in blood)

MacConkey's agar plate was used for Gram negative bacilli while crystal violet blood agar was used for the growth of streptococci. Blood agar and crystal violet blood agar were incubated in 5-10% CO₂. Inoculated media

Table I. Age and sexwise distribution of cases of pyoderma

Age group	Male	Female	Total
0-12 yrs.	105 (19.37%)	99 (18.27%)	204 (37.64%)
13 and above	234 (43.17%)	104 (19.19%)	338 (62.36%)
Total	339 (62.55%)	203 (37.19%)	542

were incubated aerobically at 37° C for 24 hrs. The organisms grown were identified by standard conventional method.¹ Antibiotic susceptibility testing of isolated organisms was performed on Muller Hinton agar and blood agar by modified Kirby Bauer disc diffusion method.²

Results and Observations

Males were affected more than females. It is observed that more patients belonged to adult age group than paediatric age group (Table I)

Primary pyoderma constituted 69.5% of cases and rest were of secondary pyoderma. There were 39% cases of impetigo, 13% of folliculitis, 6% of cellulitis, 3.5% of ecthyma, 3% of furunculosis, 1.5% of carbuncle and 0.4% of sycosis barbae. (Table II)

A single infecting organism was isolated from 46.9% cases and more than one type of organism from 65.46% cases. No organism was isolated from 5% cases. Staphylococcus was isolated alone from 67.35% cases, out of which coagulase negative staphylococci was isolated

from 23.6% cases. Coagulase positive staphylococci (43.7%) was the predominant species followed by beta haemolytic streptococci (21.7%). (Table III)

Discussion

Five hundred and forty-two cases of pyoderma were investigated for bacterial aetiology. Impetigo formed

Table II. Distribution of cases of primary and secondary pyoderma

Primary pyoderma	No. of cases	Secondary pyoderma	No. of cases
Impetigo	210 (38.75%)	Infected scabies	10 (1.8%)
Folliculitis	70 (12.92%)	Infected trophic ulcer	102 (18.82%)
Furunculosis	16 (2.95%)	Infected pemphigus vulgaris	39 (7.2%)
Cellulitis	32 (5.9%)	Infected contact dermatitis	34 (6.27%)
Ecthyma	19 (3.5%)		
Carbuncle	8 (1.5%)		
Sycosis barbae	2 (0.4%)		
Total	357 (65.87%)		185 (34.13%)

the largest group followed by folliculitis, furunculosis, ecthyma, carbuncle and sycosis barbae in descending order of frequency. Similar high incidence of impetigo was reported by others.³⁻⁶ It is observed that more patients belonged to adult age group. Males were affected more than females. Similar findings were reported by others.^{6,8,9}

In the bacteriological analysis we observed that staphylococcus (67.34%) was the predominant species isolated.^{4,5} Beta haemolytic streptococcus was the next common aetiological agent.^{5,6} Staphylococci were isolated singly or in association with other organisms.

Among the staphylococci strains isolated 43.72% were coagulase positive and 23.61% were coagulase negative. High incidence of coagulase positive staphylococci in pyoderma was reported by several

percentages in India and abroad.⁹⁻¹¹

Number of other organisms were isolated (25.27%) from cases of pyoderma in this study which were

Table III. Aerobic bacteria isolated from cases of pyoderma

Clinical Condition	No. of cases studied	CPS	CNS	BHS	NHS	Esch. coli	Klebsiella spp.	Pseudomonas spp.	Citrobacter spp.	Proteus sp.	Acinetobacter spp.	No growth
PRIMARY PYODERMA												
1. Impetigo	210	125 (59.52%)	30 (14.28%)	74 (35.23%)	3 (1.42%)	1 (0.47%)	1 (0.47%)	2 (0.95%)	2 (0.95%)	5 (2.38%)	0	4 (1.90%)
2. Folliculitis	70	42 (60%)	13 (18.57%)	18 (25.71%)	1 (1.42%)	1 (1.42%)	1 (1.42%)	3 (4.28%)	2 (2.85%)			
3. Furunculosis	16	15 (93.75%)	-	1 (6.25%)								
4. Cellulitis	32	7 (21.87%)	6 (18.75%)	4 (12.5%)	3 (9.37%)	5 (15.62%)	4 (12.5%)	5 (15.62%)	3 (9.37%)	5 (15.62%)		
5. Ecthyma	19	4 (21.05%)	6 (31.57%)	4 (21.05%)	3 (15.78%)		1 (5.26%)	1 (5.26%)	1 (5.26%)			1 (5.26%)
6. Carbuncle	8	6 (75%)	2 (25%)									
7. Sycosis barbae	2	1 (50%)										1 (50%)
Total	357 (65.87%)	200 (56.02%)	57 (15.96%)	101 (28.29%)	7 (1.96%)	5 (1.40%)	8 (2.24%)	10 (2.80%)	10 (2.80%)	8 (2.24%)	0 (3.08%)	11
SECONDARY PYODERMA												
1. Inf. scabies	10 (90%)	9 (10%)	1 (90%)	9								
2. Inf. trophic ulcer	102	13 (12.75%)	40 (39.02%)	3 (7.69%)	4 (3.92%)	2 (1.96%)	7 (6.86%)	14 (13.72%)	8 (7.84%)	24 (23.52%)	1 (0.98%)	9 (8.82%)
3. Inf. pemphigus vulgaris	39 (28.20%)	11 (25.64%)	10 (7.69%)	3 (2.56%)	3 (7.69%)	1 (2.307%)	3 (7.69%)	9 (10.25%)	3 (10.25%)	4		4
4. Inf. contact dermatitis	34 (11.26%)	4 (58.82%)	20 (2.94)	1 (2.94%)	1 (5.88%)	2 (23.52%)	8 (17.64%)	6 (2.94%)	1 (2.94%)	1 (8.82%)	3	
Total	185 (34.13%)	37 (20%)	71 (38.37%)	17 (9.18%)	8 (4.32%)	5 (2.70%)	10 (5.40%)	31 (16.75%)	17 (9.18%)	29 (15.67%)	2 (1.08%)	16 (8.6%)
Grand Total	542	237 (43.72%)	128 (26.61%)	118 (21.7%)	15 (2.76%)	10 (1.84%)	18 (3.32%)	41 (7.56%)	27 (4.98%)	37 (6.82%)	2 (0.36%)	27 (4.98%)

CPS : Coagulase positive staphylococci

CNS : Coagulase negative staphylococci

BHS : Beta - haemolytic streptococci

NHS : Non-haemolytic streptococci

workers.^{4-6,8} Coagulase negative strains were also reported to be aetiologic agents^{5,8}. Staph aureus and beta-haemolytic streptococci are considered to be main aetiological agents. These have been isolated in different

non-haemolytic streptococci, pseudomonas spp, proteus spp., Citrobacter spp., klebsiella spp., Esch. coli, acinetobacter spp^{5,6}.

Percentage of antibiotic susceptibility patterns of various isolates are shown in Table IV.

In this study maximum strains of *Staph. aureus*

cloxacillin (83%), clindamycin (83%), ciprofloxacin (78%), cephalexin (72%) and amikacin (70%). With a low sensitivity to penicillin, cefotaxime (7%) and co-

Table IV. Antibiotic susceptibility (Percentage) of organisms isolated from cases of pyoderma

Antibiotic tested	CPS	CNS	BHS	NHS	Pseudomonas spp.	Proteus	Citro-bacter spp.	Klebsiella spp.	Esch. coli spp.	Acinetobacter
Older										
Amoxycillin	NT	NT	NT	NT	-	25	10	16	17	100
Ampicillin	59	54	94	70	06	19	07	10	10	100
Carbenicillin	NT	NT	NT	NT	57	NT	NT	NT	NT	NT
Cephalexin	45	83	72	56	NT	29	18	19	33	
Cephaloridin	11	42	58	NT	NT	NT	NT	NT	NT	50
Chloromphenical	62	61	83	80	15	31	27	35	19	
Cloxacillin	54	72	83	70	NT	NT	NT	NT	NT	NT
Co-trimoxazole	72	54	10	30	0	0	90	50	0	0
Erythromycin	41	58	52	70	NT	NT	NT	NT	NT	0
Gentamicin	12	56	61	70	34	47	30	29	38	100
Nalidixic acid	NT	NT	NT	NT	33	NT	NT	NT	NT	NT
Penicillin	21	08	27	33	NT	NT	NT	NT	NT	NT
Streptomycin	42	49	58	43	15	12	33	40	25	0
Tetracycline	37	45	58	50	15	09	13	29	33	0
Newer										
Amikacin	75	91	70	67	72	76	72	77	83	100
Cefotaxime	65	60	07	45	20	NT	NT	NT	NT	NT
Ciprofloxacin	61	65	78	70	42	56	55	58	29	100
Clindamycin	61	65	83	70	NT	NT	NT	NT	NT	100
Norfloxacan	39	45	67	60	38	03	40	55	28	100
Ticarillin	NT	NT	NT	NT	35	NT	NT	NT	NT	NT
Tobramycin	NT	NT	NT	NT	31	NT	NT	NT	NT	NT

NT - Not tested CPS - Coagulase positive staphylococci CNS - Coagulase negative staphylococci

BHS - Beta - haemolytic streptococci NHS - Non - haemolytic streptococci

were susceptible to amikacin (75%), co-trimoxazole (72%), cefotaxime (65%), chloramphenicol (62%), clindamycin (61%) and ciprofloxacin (61%). A low susceptibility was observed to cephaloridin (11%), gentamicin (12%), penicillin (21%) and norfloxacin (39%). *Beta-haemolytic streptococcus* strains were highly susceptible to ampicillin (94%), chloramphenicol (83%),

trimoxazole (10%), pseudomonas species were sensitive to amikacin (72%) and carbenicillin (57%).

Most of the strains were found to be resistant to one or more antibiotics.^{5,7,8} Penicillin resistance of coagulase positive staphylococci was reported by several workers.⁹⁻¹³ Most of the organisms were sensitive to newer

antibiotics. Multiple drug resistance was observed to currently used antibiotics.¹¹⁻¹³

In conclusion, this study gives an indication of the present state of pyodermas. Multidrug resistance has become a clinical challenge. Most of the strains were found to be resistant to one or more antibiotics. It is probably due to indiscriminate use of antibiotics which must be avoided. Newer antibiotics must always be kept in reserve for use only against strains resistant to common antibiotics. Proper antibiotic therapy can be given avoiding unnecessary medication with drugs known to be useless. For the selection of proper antibiotics in vitro testing is essential.

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