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A Study of Clinical and Bacteriological Aspects of Pyodermas in a Tertiary Care Centre

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Abstract: ***Background: Pyodermas are defined as bacterial infection of skin and soft tissue. Aim: To find out causative organism in various types of pyodermas, age and sex distribution of patients. Materials and methods: 100 cases of pyodermas presented in Dermatology OPD in Government Medical College, Patiala were enrolled. Specimen collected on sterile swab were sent to Department of Microbiology for culture. Results: Majority cases comprised of primary pyoderms(74%). The commonest clinical type of pyoderma was folliculitis (28%), followed by impetigo (12%) and cellulitis(12%). . S.aureus was the commonest organism isolated (66.2%), followed by pseudomonas aeroginosa (10.1%)***

Keywords: pyoderma, staphylococcus aureus, bacteriological analysis

1. Introduction

Pyodermas are defined as bacterial infection of the skin and soft tissues (excluding muscle) with pathogens that elicit a polymorphonuclear leucocyte response from the infected host.[1] Pyoderma is common in India and constitutes a major portion of patients in dermatological clinics.[2][3]

Staphylococcus aureus (S. aureus) and *streptococcus pyogenes* (S. pyogenes) are the aetiological agents most commonly isolated, the former being more common than the latter.[4][5][6] *Staphylococcus aureus* (coagulase positive) is invariably the sole organism responsible for follicular infections and is normal flora of skin. Coagulase negative Staphylococcus (CONS) are non pathogenic except in immunosuppressed individuals. Group A streptococcus (GAS) also known as *streptococcus pyogenes* are not normally present on skin. Their isolation indicates infection, either present or in the immediate past.[2]

Besides these, other organisms that are occasionally isolated from pyoderma are Enterococci, Pseudomonas, Escherichia coli, Proteus, Citrobacter, Enterobacter, and Klebsiella spp.[7][8]

Diagnosis is mainly based on clinical examination supported by laboratory investigations that include examination of the Gram stained smear along with culture and isolation of the causative organism and its identification by various biochemical tests.

Although easily treatable, pyodermas are known for their chronicity, recurrence, and other complications. Therefore timely recognition and prompt bacterial diagnosis is imperative for the effective management of pyoderma.[4]Hence, keeping this view in mind the present study is designed with the aim of isolation and identification of the causative organisms of pyoderma.[2]

2. Material and Methods

This open prospective study on "Bacteriology of pyoderma" was conducted in the Department of Dermatology and Department of Microbiology, Rajindra Hospital, Patiala.

A total of 100 cases of pyoderma, both primary and secondary were enrolled. Patients of all age groups and both sexes were included in the study and patient with history of using topical or systemic antibiotics in the recent past 2 weeks were excluded. Thorough clinical examination was performed.

Sterile swabs were used for aseptic collection of specimen of exudates or pus from the lesions swabs following puncturing of a fresh closed lesion with a sterile needle. The swabs were transported immediately to the Microbiology laboratory for gram staining and culture. Organisms grown were then identified on the basis of their colony characteristics and biochemical reactions as per the standard protocol.[9]

3. Result

One hundred consecutively selected cases of pyoderma were studied for their bacteriological profile. These were the OPD cases visiting the Dermatology department of Rajindra Hospital, Patiala.

Out of the 100 cases of pyoderma, primary pyoderma constituted 74% cases and secondary pyoderma 26% cases, thus primary pyoderma was more common than secondary pyoderma.

Out of 100 cases, 57 were male and 43 were female. Thus the Incidence was found to be more in males than in females, with the male to female ratio being 1.3:1.

Primary pyoderma was more common among males, with the male to female ratio of 1.6:1, whereas secondary pyoderma was more common among females, with the male to female ratio of 1:1.4.

Most of the patients belonged to the adult age group. Maximum number of cases fell in the age group 31-45 years (37%), followed by 0-15yrs age group (25%), where as the age group 61 years and above had the least number of cases (6%). The youngest case was a 2.6 years old child and the oldest case was 81 years old.

The various types of pyoderma[Table 1] include impetigo 12%, folliculitis 28%, furuncle 11%, carbuncle 4%, paronychia 4%, ecthyma 3%, cellulitis 12%, acne 6%, hidradenitis suppurativa 2%, infected eczema 9% infected sebaceous cyst 2%, infected pemphigus 2% and infected scabies 5%.

The commonest clinical type of pyoderma was folliculitis (28%), followed by impetigo (12%) and cellulitis(12%)

Out of 100 samples processed 89% yielded growth where as 11% did not yield any growth.

Out of 89 positive cases[Table 2] yielding growth 80 cases (89.9%) showed only one type of growth whereas 9 cases (10.1%) showed two types of organisms. Thus a total of 98 organisms were isolated from 89 patients

Out of a total of 98 organisms isolated from 89 positive cases 73 isolates (74.4%) were Gram positive and 25 isolates (25.5%) were Gram negative.

Table 1: Types of pyoderma

Clinical Condition	No Of Cases Studied	Percentage
PRIMARY PYODERMA		
Impetigo	12	12%
Folliculitis	28	28%
Furuncle	11	11%
Carbuncle	04	4%
Paronychia	04	4%
Ecthyma	03	3%
Cellulitis	12	12%
SECONDARY PYODERMA		
Acne	06	6%
Hidradenitis suppurativa	02	2%
Infected eczema	09	9%
Infected sebaceous cyst	02	2%
Infected pemphigus	02	2%
Infected scabies	05	5%
TOTAL	100	100%

Table 2: Growth pattern

Type Of Isolate	Number Of Cases	Percentage
Single isolate	80	89.9%
Multiple isolates (two types of organisms)	09	10.1%
Total	89	100%

Out of 89 cases [Table 3] yielding growth 66.2% showed the growth of S.aureus, 8.9% CONS, 2.2% Group A Strep., 4.5% Enterococcus, 2.2% E.coli, 2.2% C. freundii , 7.9% Klebsiella spp, 5.6% Proteus spp, and 10.1% Ps.aeruginosa. S.aureus was the commonest organism isolated (66.2%), followed by pseudomonas aeroginosa (10.1%)

Table 3: Bacteriological analysis

Organisms Isolated	*Number Of Cases*	*Percentage*
S.aureus	59	66.2%
CONS	08	8.9%
Group A strep.	02	2.2%
Enterococci spp	04	4.5%
E. coli	02	2.2%
Citrobacter spp	02	2.2%
Klebsiella spp	07	7.9%
Proteus spp	05	5.6%
Ps. Aeruginosa	09	10.1%

Of the 12 cases of impetigo, 8 (66.7%) were caused by S.aureus alone, and 1 case (8.3%) by CONS. 1 case (8.3%) showed a mixed growth of S.aureus and Ps.aeruginosa. 2 cases (16.7%) yielded no growth.

Of the 28 cases of folliculitis, S.aureus was isolated from 16 cases (57.1%), and CONS from 2 cases (7.2%). Among Gram negative bacilli Klebsiella spp was isolated from 2 (7.2%) case, Citrobacter from 1(3.6%)case, Pseudomonas from 1(3.6%) case and Proteus spp from 2 (7.2%) cases. 4 cases (14.3%) yielded no growth.

8 (72.7%) of the 11 cases of furunculosis were caused by S.aureus and CONS was isolated from 2 cases (18.2%). 1 case (9.1%) yielded no growth.

All four cases of Carbuncle yielded S.aureus (100%). Also all four cases of paronychia showed the growth of S.aureus(100%). Among the 3 cases of ecthyma, 2 cases (66.7%) yielded S.aureus where as 1 case (33.3%) yielded a mixed growth of S.aureus and GAS.

Out of the 12 cases of cellulitis S.aureus was isolated from 2 cases (16.7%), Enterococcus from 4 cases (33.3%), E.coli from 1 case (8.3%), C.freundii from 2 cases (16.7%), Klebsiella spp from 1 (8.3%) case . A mixed growth of Klebsiella spp and Ps. aeruginosa was obtained from 1 case (8.3%) and that of S.aureus and Klebsiella spp from 1 case (8.3%)
Among the 6 cases of acne S.aureus was isolated from 3 (50%) cases and CONS from 1 case (16.7%). 2 cases (33.3%) yielded no growth.

Out of 2 cases of hidradenitis suppurativa S.aureus was isolated from 1 case (50%) and 1 case (50%) yielded the growth of CONS.

Out of 9 cases of infected eczema 3 cases (33.3%) showed growth of Ps.aeruginosa where as 1 case (11.1%) yielded the growth of Proteus spp. Mixed growth of organisms was seen in four cases. Mixed growth of S.aureus and E.coli was seen in one case (11.1%).One case yielded mixed growth of Klebsiella and pseudomonas(11.1%). one case yielded mixed growth of Pseudomonas and proteus(11.1%). One case showed mixed growth of Klebsiella and proteus(11.1%). One case (11.1%) yielded no growth.

Both cases of infected sebaceous cyst yielded S.aureus (100%). Out of the two cases of infected pemphigus 1 case (50%) showed the growth of Citrobacter spp and 1 case (50%) yielded no growth. Among the 5 cases of infected scabies 4 cases (80%) yielded S.aureus and 1 case (20%) yielded CONS.

4. Discussion

Bacterial skin infections are a common problem encountered in clinical medicine. The present study was carried out on a group of 100 cases of pyoderma, visiting the Dermatology out patient department of Rajindra Hospital, to establish the cause of common primary and secondary pyodermas as well as to determine the organism implicated.

The results were compared with other studies and discussed as follows.

Type of pyoderma

In the present study out of the 100 cases of pyoderma, primary pyoderma constituted 74% of the cases and the remaining 26% constituted secondary pyoderma. Thus showing that primary pyodermas are more common than secondary pyoderma. Similar finding was reported by other workers.[2][10][11]

Table 4: Comparison of the type of pyoderma between various studies

Study series	*Year*	*Primary pyoderma*	*Secondary pyoderma*
R G Baslas et al[11]	1990	58.8%	41.2%
D P Ghadage et al[2]	1999	65.8%	34.2%
N Kakar et al[10]	1999	72%	28%
Present study	2013	74%	26%

In the present study folliculitis constituted majority of the cases (28%). It is consistent with the work of R Patil et al[12] (2006) where folliculitis constituted 58.8% of the total cases. Although a few studies have shown impetigo to be the commonest lesion, however, since majority of our patients were adults, which accounts for the high frequency of folliculitis in our study.

Sex

Incidence of pyoderma was found to be more in males (57%) than in females (43%) in the present study. This is consistent with other workers. [2][4][11][12][13]

Table 5: Comparison of sex wise incidence

Study series	Year	Male	Female
R G Baslas et al[11]	1990	64.7%	35.3%
D P Ghadage et al[2]	1999	62.5%	37.5%
M J Nagmoti et al[13]	1999	62%	38%
R Patil et al[12]	2006	62.8%	37.2%
K V Ramana et al[4]	2008	53%	46%
Present study	2013	57%	43%

Age

Most of the patients belonged to the adult age group. Maximum number of cases fell in the age group 31-45 years (37%). Similar finding has been noted by K V Ramana et al[4] (2008), where 64% of the cases were more than 40 years old.

Isolates obtained

Out of 100 samples processed in the present study 89 cases (89%) yielded growth where as 11 cases (11%) did not yield any growth. Out of the 89 cases which yielding growth, a single infecting organism was isolated from 80 cases (89.9%) and mixed isolate were obtained from the remaining 9 cases (10.1%). Similar findings were noted by other workers.[10][11][13] A few workers, 3 however have isolated a higher percentage of mixed organisms than single organism.

Table 6: Comparison of the type of isolate

Study series	Year	Single isolate	Mixed isolate
R G Baslas et al[11]	1990	75.9%	24.1%
D P Ghadage et al[2]	1999	46.9%	65.46%
M J Nagmoti et al[13]	1999	86%	14%
N Kakar et al[10]	1999	84%	16%
Present study	2013	89.9%	10.1%

Aetiological agents

In the present study conducted on 100 cases the most common pathogen isolated was S.aureus (66.2%). The same finding has been reported by other workers. [2][4][7][11][12][13]

8.9% of CONS have been isolated in the present study. Percentage of isolation of CONS in other studies has been variable and includes 23.6% by D P Ghadage et al,[2] 19.2% by K V Ramana et al,[4] and 2.02% by A Chopra et al.[7]

Isolation of Streptococci in the present study was 2.2% which is similar to that of R Patil et al,[12] where the isolation was 2.3%. However other studies[2][4][11][12][13] have shown a higher isolation rate.

In the present study Enterococcus spp were isolated in 4.5% cases. In study conducted by K V Ramana et al[4] isolation rate of Enterococcus spp was 11.4%. Among the Gram negative bacilli, Pseudomonas spp were the commonest isolate in the present study (10.1%). This is similar to the study conducted by DP Ghadbage et al,[4] where the isolation rate of Pseudomonas species was 7.56%.

5. Conclusion

Pyodermas are frequently encountered in day to day clinical practice. Their management is complicated by the emergence of multidrug resistance amongst the commonly isolated aetiological agents, thus limiting treatment options.

Also, if not treated promptly they are followed by various complications. Multidrug resistance has resulted from indiscriminate use of antibiotics. With knowledge of the likely causative organisms and their resistance patterns, proper antibiotic therapy can be given, thus avoiding unnecessary medication with drugs known to be resistant and also keeping newer antibiotics in reserve for use only against strains that are resistant to the common antibiotics.

Hence timely recognition, and prompt bacterial diagnosis and antibiotic susceptibility testing is very important for the management of pyoderma and also to check the major complications.

Table 7: Comparison of aetiological agents isolated

Study series	Year	S.aureus	CONS	BHS	Enterococcus	E.coli	Citrobacter spp	Klebsiella spp	Enterobacter spp	Proteus Spp	Pseudomonas Spp	0thers
R G Baslas et al[11]	1990	73.6%	-	25%	-	-	-	-	-	-	-	1.4%
AChopra et al[7]	1994	80.08%	2.02%	13.3%	-	3.03%	-	-	-	-	-	-
D P Ghadage et al[2]	1999	43.7%	23.6%	21.7%	-	1.84%	4.98%	3.32%	-	6.82%	7.56%	-
M J Nagmoti et al[13]	1999	45%	-	35%	-	5%	1%	-	-	-	-	14%
R Patil et al[12]	2006	81.4%	-	2.3%	-	-	-	-	-	-	-	-
K V Ramana et al[4]	2008	52.1%	19.2%	-	11.4%	-	-	7.8%	-	-	-	-
Present study	2013	66.2%	8.9%	-	4.5%	2.2%	2.2%	7.9%	2.2%	5.6%	10.1%	-

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