

Clinico-etiological study of pyodermas in a tertiary care hospital

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Abstract

Background: Pyodermas are common cutaneous bacterial infection caused mainly by *Staphylococci* and *Streptococci*.

Aims: To know clinical patterns of pyodermas, causative organisms and their antibiotic susceptibility pattern.

Materials and Methods: It is hospital based cross sectional study carried out in tertiary care hospital. Patients with pyoderma presenting to Dermatology outpatient department were taken into the study. Clinical diagnosis of pyoderma was made based on the morphology. Swabs were collected for Gram's stain and culture. The organisms isolated from culture media were tested for antibiotic sensitivity.

Result: Three hundred cases of pyoderma were studied clinically and bacteriologically. Of these, 270 cases were of primary pyoderma and 30 were secondary pyoderma. Impetigo contagiosa was the most common type of primary pyoderma 81 (27%) followed by folliculitis 66 (22%), furunculosis 30 (10%), bullous impetigo 30 (10%), ecthyma 18 (6%), sychosis barbae 15 (5%), cellulitis 9 (3%), acute paronychia 9 (3%), perioritis 6 (2%), and carbuncle 6 (2%). Among the secondary pyodermas, infected scabies 9 (3%) and infected eczema 9 (3%) were most common. Coagulase positive *Staphylococcus* was isolated in majority of pyodermas. Highest sensitivity of *Staphylococcus aureus* was recorded to cephaloridine (95.5%) and least to ampicillin (24.8%) and penicillin (26.7%). Beta hemolytic *Streptococci* isolated were sensitive to cephaloridine (95.4%) followed by cefotaxime (89.3%), erythromycin (88.7%), ciprofloxacin (84.8%), ampicillin (79.6%), and tetracycline (77.2%).

Conclusion: With the knowledge of likely causative organism and their sensitivity patterns, proper antibiotic therapy can be given and thereby avoiding unnecessary medications known to be resistant.

Keywords: Antibiotic sensitivity, MRSA, Pyoderma

Introduction

The pyodermas are one of the commonest clinical conditions encountered in dermatological practice.¹ Various factors influence the incidence of pyodermas. Poverty, malnutrition, overcrowding, poor hygiene, climatic conditions like hot and rainy season have been stated to be responsible for its high incidence in the lower socio-economic strata in the developing countries.²

Staphylococcus aureus and *Streptococcus pyogenes* are the common causative agents of pyodermas. The institution of appropriate treatment is necessary in these common dermatoses. The antibiotic sensitivity pattern differs from region to region and in the same region they differ with progress of time. Many cases do not respond to same antibiotics which were previously very effective for such cases. The increasing resistance to the antibiotics seen in the microorganism seems to pose a big problem to the clinician.^{2,3} Detailed knowledge about the causative organisms and antibiotic susceptibility pattern should be known for successful treatment of pyoderma.² The present study was undertaken to find out the organisms responsible for pyodermas and their antibiotic susceptibility in and around Sangareddy.

Materials and Methods

The present study was conducted during the period from January 2014- January 2015 in MNR medical

college and hospital, Sangareddy, Telangana. This is a hospital based cross-sectional study. Ethical clearance was taken from the institution. Patients presenting with pyodermas belonging to various age groups and of either sex were included in the study. Patient who had taken either of systemic or topical antimicrobial treatment were excluded from the study. After taking informed consent from the patients a detailed history and clinical examination was done.

Swab for culture and sensitivity was collected from the base of skin, after prior cleaning the surrounding area with 70% alcohol and removal of any dry swabs, if present. In case of pustular lesion, material was collected with a sterile platinum loop after rupturing the pustule with sterile needle.

Gram's staining was done and the specimens were inoculated on blood agar, Mac Conkey agar and nutrient agar plates and incubated at 37°C for 24 hours. Plates showing no growth during first 24 hours were further incubated for another 24 hours. The organisms were identified on the basis of their morphology, cultural, and biochemical characteristics as per the standard methods. All the isolates were tested for their sensitivity to 10 antibiotics. Antibiotics sensitivity of the organisms was carried out on Muller-Hinton agar by Kirby-Bauer disc-diffusion technique. Methicillin resistance was detected by using 1 mg oxacillin discs.

Result

Three hundred patients of pyodermas were studied clinically and bacteriologically. Out of 300 patients, 270 (90%) were primary pyodermas and 30 (10%) patients were secondary pyodermas. Of the 270 cases of primary pyodermas, impetigo contagiosa was the most common 81 (27%) (Fig. 1), followed by folliculitis 66 (22%), furunculosis 30 (10%), bullous impetigo 30 (10%), ecthyma 18 (6%), sychosis barbae 15 (5%), cellulitis 9 (3%), acute paronychia 9 (3%), periporitis 6 (2%), and carbuncle 6 (2%) (Table 1).

(10%), ecthyma 18 (6%) (Fig. 2), sychosis barbae 15 (5%), cellulitis 9 (3%), acute paronychia 9 (3%), periporitis 6 (2%), and carbuncle 6 (2%) (Table 1).

Among the secondary pyodermas, infected scabies 9 (3%) and infected eczema were most common 9 (3%) followed by infected wound 6 (2%), infected pemphigus 3 (1%) and infected trophic ulcer 3 (1%) (Table 1).

Table 1: Distribution of primary and secondary pyoderma

Primary pyoderma	No. of patients	Secondary pyoderma	No. of patients
Impetigo contagiosa	81 (27%)	Infected scabies	9 (3%)
Folliculitis	66 (22%)	Infected eczema	9 (3%)
Furunculosis	30 (10%)	Infected wound	6 (2%)
Bullous impetigo	30 (10%)	Infected pemphigus	3 (1%)
Ecthyma	18 (6%)	Infected trophic ulcer	3 (1%)
Sychosis barbae	15 (5%)		
Cellulitis	9 (3%)		
Acute paronychia	9 (3%)		
Periporitis	6 (2%)		
Carbuncle	6 (2%)		

Out of 300 cases, 174 were males and 126 were females. The incidence of pyoderma was highest in 0-10 years (37%) followed by 21-30 years (18%). It was noted less commonly in 61-70 years (3%) and least in 71-80 years of age group (2%). Among the patients of pyoderma in the present study, 131 (43.6%) were children and 169 (56.3%) were adults. Age and sex wise distribution of study cases is presented in Table 2.

Table 2: Age wise distribution of pyoderma

Age in years	No of cases		Total
	Male	Female	
0-10	66	45	111 (37%)
11-20	27	18	45 (15%)
21-30	24	30	54 (18%)
31-40	18	12	30 (10%)
41-50	15	15	30 (10%)
51-60	9	6	15 (5%)
61-70	9	0	9 (3%)
71-80	6	0	6 (2%)
Total	174	126	300

Out of 300 samples, only 273 (91%) samples yielded organisms and 27 (9%) samples did not yield any organisms on culture media. Infection with single organism was seen in 231 (77%) samples and in 42 (14%) samples mixed infection was noted.

Of the total 300 cases, 157 cases yielded pure growth of coagulase positive *Staphylococcus* (Fig. 3) and 66 cases yielded pure growth of β hemolytic *Streptococcus*. In 42 cases mixed infection with coagulase positive *Staphylococcus* and β hemolytic *Streptococcus* were isolated. Among 157 *Staphylococcus aureus* samples, 142 (90.5%) were methicillin sensitive *Staphylococcus aureus* (MSSA) and 15 (9.5%) were methicillin resistant *Staphylococcus aureus* (MRSA) (Fig. 4). In 5 of our cases *Pseudomonas aeruginosa* and in 3 cases *Klebsiella pneumoniae* were isolated. No organisms were isolated in 27 cases.

Of the 81 cases of impetigo contagiosa, coagulase positive *Staphylococcus aureus* was isolated in 45 cases, beta hemolytic *Streptococcus* in 22, mixed infection in 11 and no organisms were isolated in 3. In 66 cases of folliculitis, coagulase positive *Staphylococcus aureus* was isolated in 50 cases, β hemolytic *Streptococcus* in 11 and mixed infection in 1 case and no organisms were isolated in 4 cases. Among 30 cases of bullous impetigo majority (22 cases) had only coagulase positive *Staphylococcus*, and in 5 cases mixed infection was found. Coagulase positive *Staphylococcus* was isolated in majority of other pyodermas like furunculosis, carbuncle, cellulitis, sychosis barbae, acute paronychia, periporitis staphylogenes. No organisms were isolated in 24 cases of primary pyodermas.

Both coagulase positive *Staphylococcus* and β hemolytic *streptococcus* were isolated in majority of the cases of secondary pyodermas. The complete clinico-bacteriological analysis is given in Table 3.

Table 3: Organisms isolated from different types of pyodermas

Type of pyoderma	No. of patients (n=300)	Organisms isolated							No organism
		<i>Staphylococcus aureus</i>		<i>Streptococcus</i>		Mixed growth	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella pneumoniae</i>	
		Coagulase +	Coagulase -	β hemolytic	Non β hemolytic				
Impetigo contagiosa	81 (27%)	45	-	22	-	11	-	-	3
Folliculitis	66 (22%)	50	-	11	-	1	-	-	4
Furunculosis	30 (10%)	12	-	10	-	5	-	-	3
Bullous impetigo	30 (10%)	22	-	-	-	5	-	-	3
Ecthyma	18 (6%)	3	-	5	-	3	3	-	4
Syphosis barbae	15 (5%)	7	-	4	-	3	-	-	1
Cellulitis	9 (3%)	-	-	2	-	2	2	-	3
Acute paronychia	9 (3%)	5	-	1	-	1	-	1	1
Periporitis	6 (2%)	2	-	2	-	1	-	-	1
Carbuncle	6 (2%)	2	-	-	-	1	-	2	1
Infected scabies	9 (3%)	2	-	3	-	3	-	-	1
Infected eczema	9 (3%)	4	-	3	-	2	-	-	-
Infected wound	6 (2%)	2	-	2	-	2	-	-	-
Infected pemphigus	3 (1%)	-	-	1	-	2	-	-	-
Infected trophic ulcer	3 (1%)	1	-	-	-	-	-	-	2
Total	300	157		66		42	5	3	27

Highest sensitivity of *Staphylococcus aureus* was recorded to cephaloridine (95.5%), Cefotaxime (91.7%), erythromycin (91.7), and least to ampicillin (24.8%) and penicillin (26.7%).

Beta hemolytic *Streptococcus* isolated from various specimens was sensitive to cephaloridine (95.4%), cefotaxime (89.3%), erythromycin (88.7%), ciprofloxacin (84.8%), ampicillin (79.6%), and tetracycline (77.2%).

All isolates of *Pseudomonas aeruginosa* were sensitive to amikacin and cephaloridine. None of the isolates were sensitive to tetracycline. Susceptibility pattern of organisms isolated to different antimicrobials is given in Table 4.

Table 4: Antibiotic susceptibility pattern to various drugs

Sl no	Antibiotics	Coagulase positive <i>Staphylococcus</i>	β hemolytic <i>Streptococcus</i>	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella pneumoniae</i>
1	Penicillin	26.7%	65.1%	20.0%	0%
2	Amikacin	73.8%	56.0%	100.0%	66.6%
3	Ampicillin	24.8%	79.6%	60.0%	0%
4	Cephaloridine	95.5%	95.4%	100.0%	66.6%
5	Tetracycline	61.7%	77.2%	0%	33.3%
6	Erythromycin	91.7%	88.7%	40.0%	0%
7	Gentamicin	51.6%	40.9%	60.0%	66.6%
8	Kanamycin	52.2%	63.6%	60.0%	0%
9	Ciprofloxacin	82.1%	84.8%	20.0%	33.3
10	Cefotaxime	91.7%	89.3%	60.0%	0%

Discussion

Among 300 patients with pyogenic skin infections, 270 (90%) cases were primary pyodermas and 30 (10%) cases were secondary pyodermas. The age of the patients varied from 2 months to 72 years. The peak incidence of pyoderma was observed in first decade. This is similar to finding observed in other studies.^{4,5} A study by Bhaskaran et al noticed maximum cases of pyodermas in 11 to 30 years of age group.⁶ Males were affected more than females. The similar findings were reported by other authors.^{3,4,7} Ramani et al noticed female preponderance in their study.⁵

Impetigo formed largest clinical group with 111 cases of which 81 cases (27%) were impetigo contagiosa and 30 (10%) cases were bullous impetigo followed by folliculitis 66 (22%), furunculosis 30 (10%), ecthyma 18 (6%), sychosis barbae 15 (5%), cellulitis 9 (3%), acute paronychia 9 (3%), periporitis 6 (2%), and carbuncle 6 (2%). In case of secondary pyodermas, infected scabies 9 (3%) and infected eczema 9 (3%) formed the largest group followed by infected wound 6 (2%), infected pemphigus 3 (1%) and infected trophic ulcer 3 (1%).

Among the impetigo patients, impetigo contagiosa was the most common clinical type and most cases occurred on face, scalp and neck. The proximity of carrier sites like nares and throat may be responsible for the increased incidence at these sites.⁸ Most of the cases occurred in first decade of life. *Staphylococcus* was the most common organism isolated followed by *Streptococcus*.³

In the present study coagulase positive *Staphylococcus* was isolated in 157 (52.3%) cases, β hemolytic *Streptococcus* in 66 (22%) cases and mixed cases in 42 (14%) cases. Pasricha et al isolated

Staphylococcus aureus from 68% of cases, β hemolytic *Streptococcus* from 5% and both from 17% cases.⁹ Bhaskaran et al isolated coagulase positive *Staphylococcus* in 48.6% cases, β hemolytic *Streptococcus* in 8% cases and both in 18.66% of cases.⁶ Ghadage et al isolated *Staphylococcus* from 67.35% cases and β hemolytic *Streptococcus* from 21.7% cases.³

In pyodermas *Staphylococcus aureus* and β hemolytic *Streptococcus* are considered to be main etiological agents. Conflicting reports are available regarding the causative agent of different types of pyodermas. Mathew et al² and Thind et al¹⁰ noted coagulase positive *Staphylococcus aureus* was the main causative organism of impetigo in their study. Bigger et al incriminated β hemolytic *Streptococcus* as chief etiological agent.¹¹ In our study of 81 cases of impetigo contagiosa, coagulase positive *Staphylococcus* was isolated in 45 cases, β hemolytic *Streptococcus* in 22 cases and mixed infection in 3 cases. In ecthyma, β hemolytic *Streptococcus* was the most common organism. This finding is similar to other authors.⁷ In case of folliculitis, furunculosis, sychosis barbae and acute paronychia coagulase positive *Staphylococcus* was the most common organism isolated.

Flood et al¹² reported β hemolytic *Streptococcus* while Ghadage et al³ held *Staphylococcus* as the chief causative agent in secondary pyodermas. In our study both coagulase positive *Staphylococcus* and β hemolytic *Streptococcus* were equally isolated.

Out of 157 strains of coagulase positive *Staphylococcus* isolated, highest susceptibility was noted to cephaloridine (95.5%) followed by erythromycin (91.7%) and cefotaxime (91.7%). Drug sensitivity patterns showed high resistance to penicillin

and ampicillin. Only 26.7% were sensitive to penicillin and 24.8% were to ampicillin. Susceptibility patterns of *Staphylococcus aureus* to ampicillin in other studies were variable (12-88%).^{5,6,7,13}

One hundred forty two of total 157 strains of *Staphylococcus* (90.4%) were sensitive to methicillin (MSSA) and fifteen strains appeared to be resistant to methicillin (MRSA). Thind et al noted 8 (9.6%) out of 83 strains were resistant to methicillin.¹⁰

In our study, 43 isolates (65.1%) of β hemolytic *Streptococci* were sensitive to penicillin. Strong susceptibility was noted with cephaloridine (95.4%) followed by cefotaxime (89.3%), and erythromycin (88.7%). Mathew et al² and Baslas et al¹⁴ noted penicillin sensitivity 90.8% and 23.2% respectively.

In this study cephaloridine and cefotaxime showed least resistance for both the organisms due to its discriminate use because of high cost and non-availability of an outpatient basis.

Conclusion

This present study gives the current status of pyodermas in and around Sangareddy. Knowledge of likely causative organisms causing pyodermas and their antibiotic sensitivity patterns should be known for empirical treatment of pyodermas and thereby avoiding unnecessary medication which are known to be resistant.

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