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Original Research Article

A clinico-bacteriological study of pyodermas in pediatric population

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ABSTRACT

Background: Pyodermas are frequently confronted skin infections by dermatologists in pediatric population. While treating them recurrence and resistance to commonly used antibiotics are the major concerns.
Methods: 456 cases of pyodermas in pediatric population attending dermatology outpatient department of Sri Guru Ram Das Medical College over the period of 8 months from February 2016- October 2016 were evaluated. Samples were collected with sterile swab and sent for gram staining, culture and sensitivity.
Results: Majority of cases of pyodermas in pediatric population were due to impetigo and secondarily infected scabies. Most cases were seen in the age group of 4-7 years. *Staphylococcus aureus* (49.5%) was the most frequently isolated organism from these cases followed by streptococcus (29.8%). Majority of these gram positive organisms were sensitive to antibiotics like amoxiclav, ampicillin and linezolid. *E. coli* and *enterococcus* were predominantly encountered gram negative isolates with high susceptibility to aminoglycosides and ceftriaxone.
Conclusions: Bacteriological study of pyodermas and knowledge of their susceptibility pattern is imperative for appropriate management. It also helps in prevention of emergence of resistant strains.

Keywords: Bacterial skin infections, Antibiotics, Resistance, Culture

INTRODUCTION

Pyoderma is the bacterial infection of skin and its appendages.[1] It is highly prevalent in pediatric age group.[2] Multiple factors like malnutrition, hot–humid climatic conditions, poverty, overpopulation and poor personal hygiene are the main culprits for making pediatric population more prone to both primary and secondary pyodermas.[3] Primary pyodermas include superficial bacterial infections like impetigo, folliculitis, furuncle, carbuncle etc. Whereas secondary pyodermas in children occur in diseased skin such as atopic dermatitis, scabies, insect bites etc. The injudicious use of antibiotics has resulted in emergence of resistant pyodermas.[4] Despite discoveries of many new antibiotics, it is becoming difficult to curb the menace of resistant pyodermas. Thus it is mandatory to study the clinical and antibiotic spectra of common causative organisms. With this perspective, the present study was conducted to identify the bacteriological profile of pyodermas and their current susceptibility pattern in pediatric age group.

METHODS

In this cross sectional study on pyodermas, we evaluated 456 cases of pyoderma in pediatric population attending dermatology outpatient department of Sri Guru Ram Das Medical College over the period of 8 months from February 2016- October 2016. All cases of primary and secondary pyodermas in age group <15 years were included. Cases with history of any antibiotic use within last 7 days were excluded from the study. After thorough clinical examination of the skin lesions, under strict

aseptic conditions, exudate from the lesions was collected with sterile swab and transported immediately to microbiology lab for further processing.

For isolation and antibiotic susceptibility of bacteria, following procedures were done on the sample:

1) Gram staining.
2) Culture on various media like – nutrient agar, blood agar and Mc Conkey agar.
3) Antibiotic susceptibility testing using Kirby-Bauer disc diffusion method.[5]

RESULTS

Out of 456 cases of pyodermas in children, most cases (31.7%) were seen in the age group of 4-7 years followed by 12-15 years of age (26.5%). Males outnumbered females (M:F=1:7). Higher proportions (60.6%) of pyodermas were present in children belonging to lower socio-economic status. History of overcrowding was present in (57.2%) of pyoderma cases (Table 1).

Table 1: Demographic profile of cases.

	Number of cases	Percentage of total number of cases (%)
Age group (years)		
0-3	106	23.2
4-7	145	31.7
8-11	84	18.4
12-15	121	26.5
Gender		
Male	289	63.3
Female	167	36.6
Socio economic status*		
Upper	28	6.1
Upper middle	40	8.7
Lower middle	111	24.3
Upper lower class	179	39.2
Lower class	98	21.4
Overcrowding**		
Present	261	57.2
Absent	195	42.7

*Kuppuswami classification;**persons per bedroom >2 persons.

Table 2: Layout of different pyodermas.

Type of pyoderma	Number of cases	Percentage of total number of cases (%)
Primary pyoderma	275	60.3
Periporitis	27	5.9
Furuncle	51	11.1
Impetigo	109	23.9
Ecthyma	11	2.4
Cellulitis	24	5.2
Erysipelas	13	2.8
Folliculitis	31	6.7
Abscess	9	1.9
Total		
Secondary pyoderma	181	39.6
Infected scabies	68	14.9
Infected atopic dermatitis	41	8.9
Infected molluscum contagiosum	34	7.4
Infected acne	13	2.8
Infected SJS	8	1.7
Infected exfoliative dermatitis	7	1.5

Table 3: Bacteriological analysis of pyodermas.

Gram status	Organism	Primary pyoderma	Secondary pyoderma	Total cases	Percentage of total isolate
Gram positive	*Staphylococcus aureus*	129	97	226	49.5
	Coagulase negative staphylococcus	33	11	44	9.6
	Streptococcus	83	53	136	29.8
	Staphylococcus + streptococcus	10	4	14	3.0
	Enterococcus	3	2	5	1.0
	Micrococcus	2	1	3	0.6
Gram negative	*Klebsiella*	2	2	4	0.9
	Escherichia coli	3	3	6	1.4
	Pseudomonas aeroginosa	2	1	3	0.6
	Citrobacter	1	2	3	0.6
	Proteus	1	-	3	0.6
No organism isolated		6	5	11	2.4
		275	181	456	100

Table 4: Antibiotic sensitivity pattern of isolated organisms.

Antibiotic tested	*Staphylococcus aureus* (%)	Coagulase negative *staphylococcus* (%)	*Streptococcus* (%)	*Enterococcus* (%)	*E. coli* (%)
Ampicillin+sulbactum	92	79	100	55	45
Levofloxacin	18	31	40	65	78
Amoxiclav	85	82	99	12	19
Azithromycin	56	33	63	34	49
Linezolid	78	79	66	65	56
Ofloxacin	10	12	30	44	43
Vancomycin	71	65	32	34	55
Amikacin	65	55	20	76	87
Tobramycin	67	43	24	80	79
Cefotaxime	81	52	62	81	77
Ceftriaxone	80	78	58	88	91
Erythromycin	65	56	43	50	51
Ciprofloxacin	34	41	52	61	69
Clindamycin	67	65	45	60	65

On categorisation of different pyodermas, primary pyodermas (60.3%) were more prevalent than secondary pyodermas (39.6%). Out of the primary pyodermas, impetigo was the most common (23.9%) followed by furunculosis (11.1%). Infected scabies (14.9%) was most frequently encountered cause of secondary pyoderma followed by infected atopic dermatitis (8.9%) (Table 2). *Staphylococcus aureus* (49.5%) was the most common organism isolated from these cases followed by *Streptococcus* (29.8%) (Table 3).

Majority of these gram positive organisms were sensitive to antibiotics like amoxiclav, ampicillin and linezolid. Whereas, amikacin, ceftriaxone and tobramycin remained antibiotic of choice for gram negative pyodermas caused by Escherichia coli (*E. coli*) and *enterococcus* (Table 4).

DISCUSSION

Pyoderma is a common presenting complaint for most dermatological consultations in pediatric age group.[2] Different patterns of primary pyodermas encountered include impetigo, folliculitis, furuncle, carbuncle, abscess, periporitis etc. Out of these, impetigo (23.9%) outnumbered all other entities in the present study. This finding is in concordance to various other studies where incidence of impetigo was (19.67%- 24.2%).[3-7] Whereas, in another study done on adult population commonest pattern oberserved was folliculitis.[7] Scabies, molluscum contagiosum, atopic dermatitis with secondary infection are the common secondary pyodermas encountered in children.[8] Incidence of secondary pyodermas was higher (39.6%) in the present study as compared to other studies

done on mixed or adult population.[6,8] Present study correlated well with the various predisposing factors[3] and their association with pyodermas as higher prevalence (81.9%) of bacterial skin infections was observed in children belonging to lower socioeconomic class. Pyodermas are seen more frequently in first decade of life as reported in many studies.[7-9] Similarly, most cases in this study (31.7%) were seen in children belonging to age group 4-7 years followed by 12-15 years. In this study, males were affected more frequently than females as reported by others.[5] Recurrent pyodermas in children is becoming troublesome day by day due to increased antimicrobial resistance and changing pattern of microbiology of pyodermas.[10] Hence it is important to perform culture and susceptibility tests and treat accordingly with adequate dosage and duration of appropriate antibiotic. In present study, all cases were subjected to gram staining and culture before starting any empirical treatment with antibiotics. On gram staining majority of organisms (93.3%) were gram positive with *S. aureus* as most common isolate (49.5%) followed by *Streptococcus*. These finding were in concordance with other studies where *Staphyloccus* was isolated in (40%) cases.[11-14] Thus, currently there is a shift from streptococcus to *S. aureus* as the leading cause of pyoderma.[11] Among gram negative organisms (6.7%) most cases were due to *E. coli* (3.1%). This finding is similar to other studies.[10-13] Culture results were negative in 11 patients which is similar to other studies.[11-15] Over the counter availability of antibiotics and their inadvertent use facilitates development of resistance. In this study, strains of coagulase positive *S. aureus* and streptococcus were susceptible to ampicillin, amoxiclav, linezolid, ceftriaxone and cefotaxime whereas low susceptibility was observed to ofloxacin and levofloxacin. Coagulase negative strains of *S. aureus* were largely susceptible to penicillin group of antibiotics. On the other hand, gram negative isolates were highly susceptible to ceftriaxone and newer aminoglycoside group of antibiotics like tobramycin and amikacin. To conclude, knowledge regarding the causative organisms of various pyodermas and their susceptibility pattern helps in avoiding injudicious use of antibiotics.

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