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Research Paper

A Clinico-Bacteriological Study of Pyoderma with Special Reference to Antibiotic Sensitivity to Newer Antibiotics in Tertiary Care Rural Hospital

Medical Science

KEYWORDS : Primary pyoderma, Secondary pyoderma, Antibiotic sensitivity & resistance pattern

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ABSTRACT

Out of 93 patients, 55 (59.1%) patients were diagnosed as primary pyoderma while 38 (40.9%) of them were of secondary pyoderma. Among primary pyoderma, furuncle was diagnosed in maximum of 27(49.09%) patients and maximum patients 14 (36.84%) among seconday pyoderma had eczema. In primary pyoderma maximum growth of co-agulase positive staphylococcus aureus (60%) was seen followed by coagulase negative staphylococcus aureus (9.09%) and (3.64%) each combination of streptococcus pyogenes + staphylococcus aureus and E. coli + pseudomonas. Highest sensitivity was seen for vancomycin & cloxacillin (100%) followed by amikacin (93.99%), while maximum resistance encountered with penicillin (96.97%) followed each by jmipenem and ciprofloxacin (54.55%). In secondary pyoderma maximum growth of coagulase positive staphylococcus aureus (52.66%) was seen followed by streptococcus pyogenes (10.53%).Highest sensitivity was seen for vancomycin (100%) followed by each of gentamycin and amikacin (50%) in coagulase +ve staph.aures and (100%) sensitivity was seen with gentamycin in streptococcus isolates , while maximum resistance was encountered with penicillin (80%) followed by erythromycin (70%).
The most cost-effective drug with minimal resistance was cloxacillin for primary pyoderma. Gentamycin and amikacin was effective for secondary pyoderma. Penicillin has maximum resistance.

Introduction-

Pyoderma is a pyogenic infection of the skin and its appendages caused by pyogenic organism like staphylococcus and streptococcus and less commonly by other Gram-negative organisms. The emergence of antibiotic resistant strains poses a significant problem both in community as well as hospital practice in deciding appropriate antibiotic therapy. Indiscriminate use of systemic antibiotics has contributed to this situation. It is therefore important to monitor the changing trends in bacterial infections and their antimicrobial susceptibility patterns to ensure appropriate antibiotic therapy for prompt clinical and bacteriological cure. Hence the present study was conducted to know the various clinical presentations of pyoderma with isolation, identification and antibiotic susceptibility patterns of the isolates identified to different antibiotics with special reference to the newer ones.

METHODS AND MATERIALS:

This cross sectional study was conducted in the department of Dermatology in collaboration with the department of Microbiology, J.N. Medical College, Sawangi, wardha from June 2011 to May 2012. Ethical clearance was obtained from Institutional Ethics Committee.

The sample size of the study was of 93 patients with pyoderma attending Dermatology OPD of AVBR Hospital, sawangi, wardha. Inclusion criteria were patients of pyoderma of all age groups, all types of primary and secondary pyoderma, recurrent and chronic pyoderma, patients of pyoderma associated with immunosuppressive conditions. Exclusion criteria were patients of resolving pyoderma, patients of pyoderma responding to systemic antibiotic.

Diagnosis was made on clinical grounds. Pus from skin lesions of pyoderma was collected on two sterile cotton swabs after puncturing a fresh closed lesion with a sterile needle. The specimens were then transported to the laboratory and were processed within 2 hours. One swab was used for smear examination after Grams staining and another was used to put up culture on blood agar, MacConkey's agar. Isolates were identified by standard conventional methods. Antimicrobial susceptibility test was performed by the modified Kirby Bauer Disc Diffusion method as per Clinical Laboratory Standards International (CLSI) guidelines.

Statistical analysis was done by chi-square test from the result obtained and conclusions were drowned.

Observation and results

Out of 93 patients, maximum patients i.e 31(20.43%) were in age group 20-39, followed by 14 (15.05%) in10-19 and 50-59 age group each. Maximum patients i.e 70 (75.27%) were males and were farmers by occupation and belonged to middle class group of socioeconomic status.

Primary pyoderma was diagnosed in 55 (59.1%) and secondary pyoderma in 38 (40.9%) patients; among those of primary pyoderma, furuncle was diagnosed in 27(49.09%) [Fig 1], folliculitis in 19(34.55%) [Fig 2], cellulitis and abscess in 3 patients each (5.45%) followed by 1 patient (1.82%) each of ecthyma, carbuncle and paronychia [Table 1].

Among 38 patients of seconday pyoderma , maximum patients i.e 14 (36.84%) were having eczema, herpes zoster and Hansen's disease was diagnosed in 5 (13.16%) patients each. 3 patients (7.89%) of scabies and 2 (5.26%) of pyoderma gangrenosum. Cutaneous malignancy, kerion [Fig 3], folliculitis decalvens, PPK, dermatophytosis, varicose ulcer [Fig 4], bedsores, vasculitis and pemphigus was diagnosed in 1(2.63%) patient each. Associated conditions common to both the pyodermas were anemia, trauma, diabetes mellitus and malnutrition but no significant relevance was found [Table 2].

Among 55 patients of primary pyoderma, coagulase+ ve staphylococcus aureus was isolated in 33 patients i.e 60% followed by coagulase - ve staphylococcus aureus in 5 patients i.e 9.09% followed by 2 patients each i.e 3.64% of streptococcus pyogenes + staphylococcus aureus and e.coli + pseudomonas.

Among 38 patients of secondary pyoderma coagulase + staphylococcus aureus was isolated in 20 patients i.e 52.63% followed streptococcus pyogenes in 4 patients i.e 10.53% followed by 2 patients (5.26%) each of streptococcus pyogenes + staphylococcus aureus and coagulase-staphylococcus aureus + e.coli [Table 3].

Among coagulase + ve staphylococcus aureus isolated from primary pyoderma all were sensitive to cloxacillin and vancomycin i.e(100%). 93.94% of isolates were sensitive to amikacin,75.76% were sensitive to gentamycin, 57.58% were sensitive

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to oxacillin, 54.55% of isoloates were sensitive to erythromycin. Maximum resistance was seen in penicillin 96.97%, 2 cases each of imipenem and ciprofloxacin 54.55%, followed by amoxiclav 51.52% [Table 4].

Among the coagulase + staphylococcus aureus isolated from secondary pyoderma 90% isolates were sensitive to vancomycin followed by 50% each of amikacin and gentamycin. Maximum resistance was observed with penicillin i.e 80% followed by erythromycin 70% and ciprofloxacin i.e 60% [Table 5].

Among the staphylococcus + streptococcus isolates from primary pyoderma, all were sensitive to oxacillin i.e 100% and 50% of isolates were sensitive to cefoxitine, erythromycin, vancomycin, amikacin and cloxacillin each [Table 6].

Among the Staphylococcal & Streptococcal isolates of secondary pyoderma, 100% sensitivity to Gentamycin, erythromycin, cefoxitine and bacitracin was noted. 50% resistance was seen with penicillin [Table 7].

Coagulase - ve staphylococcus isolated from primary pyoderma showed 80% sensitivity to penicillin. But a 100% resistance was seen with gentamycin.

Primary pyoderma with E.coli and pseudomaonas showed 50% sensitivity with erythromycin and cloxacillin each and 100% resistance with oxacillin and amikacin.

Among the streptococcal isolates from secondary pyoderma 100% sensitivity was observed in gentamycin followed by penicillin and bacitracin i.e 75% each; while a maximal resistance was seen for erythromycin and cefoxitin i.e 50% each.

Among the coagulase -ve staphylococcus and E.coli of secondary pyoderma 50% sensitivity was seen for each of cefotaxime, cefaclor, and erythromycin while 100% resistance was seen with amikacin.

Discussion-

Pyoderma is a major health concern in all age groups worldwide. Similar findings have been reported from different parts of India [(1), (2).]

Age distribution in our study showed that prevalence of pyoderma to be more or less equally distributed from childhood to adulthood which is different from other studies which have maximum cases below the age of 10 years of age (1).

Study conducted by Bhaskaran (2) has maximum cases between 11 to 30 years have comparable results to our study.

93 patients of pyoderma were studied clinically and bacteriologically. Males (75.27%) were more predominantly affected than female (24.73%) as observed in other studies (1), (2), (3).

79.6% cases of pyoderma were seen in middle socio-economic status which is comparable to literature. As the study was carried out in tertiary rural hospital the incidence of farmers (41.9%) was high in comparison to student (22.6%), housewife (17.2%) and laborers (10.8%).

Cases of primary pyoderma (59.1%) were more common than secondary pyoderma (40.9%). Among the primary pyoderma furuncle (49.09%) was more common. Folliculitis (34.55%), abscess (5.45%) and paronychia (1.82%) were in descending order. Our observation doesn't match with other studies result which reports impetigo to be most common primary pyoderma observed.

Secondary pyoderma was found secondary to eczema (36.84%), herpes zoster (13.16%), Hansen's disease (13.16%), scabies and cellulitis. Both primary and secondary pyoderma was associated with anemia, diabetes mellitus, malnutrition and trauma.

Bacteriologically, staphylococcus strains were most commonly cultured organism,as even reported by several workers (4),(5),(6).Staphylococcus both coagulase positive and coagulase negative were isolated singly or in associated with other organisms.

In our entire study, coagulase + ve staphylococcus aureus was the predominant species of bacterial isolate; the cases of primary pyoderma showed 100% sensitivity to vancomycin and cloxacillin, 93.99% sensitivity to amikacin followed by gentamycin 75.76% alongside a 100%sensitivity was observed with vancomycin and 50%each for gentamycin and amikacin for secondary pyoderma as well.

Resistance in primary pyoderma was a maximal with penicillin i.e 96.9% followed by 54.5% each of imipenem and ciprofloxacin. For the secondary pyoderma a maximal resistance was seen with erythromycin i.e 70% followed by 60% for ciprofloxacin and 50% for penicillin (7).

In one of the study, Streptococcus pyogenes was found as the major cause in children and second to Staphylococcus aureus in the adults as is the case in our study (3).

In another study after culture and sensitivity, it was found that all strains of S.aureus were sensitive to vancomycin (100%) followed by amikacin (93.99%) and gentamycin (75.76%) (4), (5).

High degree of penicillin resistance correlated well with wide spread use of penicillin in practice and also to penicillinase producing Staphylococci (6). Second most common resistance was observed in ciprofloxacin (8).

In another study primary pyoderma patients outnumbered the secondary ones. In this study also staphylococcus aureus was a predominant pathogen, isolated in 79% of the cases while beta-hemolytic streptococci were isolated in 9% of the cases. All the strains (100%) of staphylococcus were resistant to penicillin. All the strains appeared to be sensitive to amikacin, fusidic acid, vancomycin, teicoplanin, linezolid, dalfopristin (9).

In another study Staphylococcus aureus was the commonest organism isolated in 36 (59.01%) cases and out of these, coagulase positive strains were found to be highly susceptible to amikacin (21cases-100%). Coagulase negative strains were sensitive to amikacin (7 cases-77.7%) and gentamycin (6 cases-66.6%) respectively (10).

Whenever possible culture & sensitivity should be performed to prevent recurrence & unnecessary use of costly drugs and community spread of resistant strain.

Conclusion-

The most cost-effective drug with minimal resistance was cloxacillin for primary pyoderma. Gentamycin and amikacin was effective for secondary pyoderma. Although vancomycin was sensitive for both primary and secondary pyodermas, it should be reserved for the m*ethicillin*-resistant staphylococcus aureus (MRSA); nevertheless of its high cost. Penicillin has maximum resistance.

Table 1- Distribution of types of primary pyoderma with associated conditions.

Primary Pyoderma	Anaemia	Nil	Trauma	DM	Malnutrition	Total
Folliculitis	2	17			-	19(34.55%)
Abscess		3			-	3(5.45%)
Furuncle		25	1	1	-	27(49.09%)
Ecthyma		1			-	1(1.82%)
Carbuncle	1				-	1(1.82%)
Paronychia		1			-	1(1.82%)

Cellulitis		1	2		-	3 (5.45%)
Total	3	48	3	1	-	55(100%)
ϰ2-value						
p-value						

DM- Diabetes Mellitus

Table 2- Distribution of types of secondary pyoderma with associated conditions.

Secondary Pyoderma	Associated Condition						
	Anaemia	Nil	Leucopenia	Trauma	DM	Malnutrition	Total
Scabies	2	1					3(7.89%)
Eczema	1	9	1	1	1	1	14(36.84%)
Leprosy		1		4			5(13.16%)
PPK	1						1(2.63%)
Varicose Ulcer		1					1(2.63%)
Bedsore		1					1(2.63%)
Vasculitis		1					1(2.63%)
Pyoderma gangrenosum		1		1			2(5.26%)
Tinea corporis		1					1(2.63%)
Cutaneous. Malignancy					1		1(2.63%)
Kerion		1					1(2.63%)
Herpes zoster		5					5(13.16%)
Folliculitis Decalvens		1					1(2.63%)
Pemphigus		1					1(2.63%)
Total	4	24	1	6	2	1	38(100%)
ϰ2-value	64.31						
p-value	0.501,NS,p>0.05						

DM- Diabetes Mellitus

Table 3- Distribution of patients with pyoderma according to organism isolated

Organism isolated	Primary Pyoderma		Secondary Pyoderma	
	No of pts	%	No of pts	%
Coag. Positive Staph	33	60.00	20	52.63
Enterococci	1	1.82		
Proteus			1	2.63
Strepto + Staph	2	3.64	2	5.26
Nil	6	10.91	1	2.63
Coag. Negative Staph	5	9.09		
Contaminated	1	1.82		
Strepto			4	10.53
E.coli +Pseudomonas	2	3.64		
Proteus mirabilis			1	2.63
Coag. Negative Staph + E.coli			2	5.26
Coag. Positive Staph + Enterococi	1	1.82	1	2.63
No Growth	2	3.64	5	13.16
E.coli	1	1.82		
Coag. Positive Staph + E.coli	1	1.82	1	2.63
Total	55	100	38	100

Table 4- Antibiotic sensitivity & resistance pattern among coagulase + ve staphylococcus aureus isolated from primary pyoderma.

Organism isolated	Sensitive		Resistant	
	No of pts	%	No of pts	%
Oxacillin	19	57.58	3	9.09
Ampicillin	1	3.03	2	6.06
Amikacin	31	93.94	2	6.06
Amoxyclav	3	9.09	17	51.52
Aztreonem	0	0.00	0	0.00
Bacitracin	0	0.00	0	0.00
Ciprofloxacin	12	36.36	18	54.55
Clindamycin	2	6.06	0	0.00
Cefotaxime	1	3.03	0	0.00
Ceftazime	0	0.00	0	0.00
Cefazolin	0	0.00	0	0.00
Cephalothein	0	0.00	0	0.00
Cefuroxime	0	0.00	0	0.00
Cefaclor	0	0.00	0	0.00
Co-trimoxazole	0	0.00	1	3.03
Cefoxitin	15	45.45	4	12.12
Erythromycin	18	54.55	14	42.42
Gentamicin	25	75.76	8	24.24
Penicillin	0	0.00	32	96.97
Vancomycin	33	100.00	0	0.00
Cloxacillin	33	100.00	0	0.00
Imipenem	11	33.33	18	54.55
Tetracycline	0	0.00	0	0.00
Netelin	0	0.00	0	0.00
Citiearcillin	0	0.00	0	0.00
Furazolidone	1	3.03	0	0.00

Table 5- Antibiotic sensitivity & resistance pattern among the coagulase + ve staphylococcus aureus isolated from secondary pyoderma.

Organism isolated	Sensitive		Resistant	
	No of pts	%	No of pts	%
Oxacillin	7	35	0	0
Ampicillin	0	0	0	0
Amikacin	10	50	5	25
Amoxyclav	1	5	6	30
Aztreonem	0	0	0	0
Bacitracin	0	0	0	0
Ciprofloxacin	4	20	12	60
Clindamycin	0	0	0	0
Cefotaxime	0	0	0	0
Ceftazime	0	0	0	0
Cefazolin	0	0	0	0
Cephalothein	0	0	0	0
Cefuroxime	0	0	0	0
Cefaclor	0	0	0	0
Co-trimoxazole	0	0	1	5

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Cefoxitin	3	15	1	5
Erythromycin	3	15	14	70
Gentamicin	10	50	5	25
Penicillin	0	0	16	80
Vancomycin	18	90	0	0
Cloxacillin	2	10	8	40
Imipenem	0	0	0	0
Tetracycline	0	0	0	0
Netelin	0	0	0	0
Citiearcillin	0	0	0	0
Furazolidone	0	0	0	0

Table 6- Antibiotic sensitivity & resistance pattern among among the staphylococcus + streptococcus isolates from primary pyoderma.

Organism isolated	Sensitive		Resistant	
	No of pts	%	No of pts	%
Oxacillin	2	100	0	0
Ampicillin	0	0	0	0
Amikacin	1	50	1	50
Amoxyclav	0	0	0	0
Aztreonem	0	0	0	0
Bacitracin	0	0	0	0
Ciprofloxacin	0	0	2	100
Clindamycin	0	0	0	0
Cefotaxime	0	0	0	0
Ceftazime	0	0	0	0
Cefazolin	0	0	0	0
Cephalothein	0	0	0	0
Cefuroxime	0	0	0	0
Cefaclor	0	0	0	0
Co-trimoxazole	0	0	0	0
Cefoxitin	1	50	0	0
Erythromycin	1	50	1	50
Gentamicin	0	0	2	100
Penicillin	0	0	2	100
Vancomycin	1	50	1	50
Cloxacillin	1	50	1	50
Imipenem	0	0	0	0
Tetracycline	0	0	0	0
Netelin	0	0	0	0
Citiearcillin	0	0	0	0
Furazolidone	0	0	0	0

Table 7- Antibiotic sensitivity & resistance pattern among the staphylococcal + streptococcal isolates of secondary pyoderma.

Organism isolated	Sensitive		Resistant	
	No of pts	%	No of pts	%
Oxacillin	0	0	0	0
Ampicillin	1	50	0	0
Amikacin	0	0	0	0
Amoxyclav	0	0	0	0
Aztreonem	0	0	0	0
Bacitracin	2	100	0	0
Ciprofloxacin	0	0	0	0
Clindamycin	0	0	0	0
Cefotaxime	0	0	0	0
Ceftazime	0	0	0	0
Cefazolin	0	0	0	0
Cephalothein	0	0	0	0
Cefuroxime	0	0	0	0
Cefaclor	1	50	0	0
Co-trimoxazole	1	50	0	0
Cefoxitin	2	100	0	0
Erythromycin	2	100	0	0
Gentamicin	2	100	0	0
Penicillin	1	50	1	50
Vancomycin	1	50	0	0
Cloxacillin	1	50	0	0
Imipenem	0	0	0	0
Tetracycline	0	0	0	0
Netelin	0	0	0	0
Citiearcillin	0	0	0	0
Furazolidone	0	0	0	0

REFERENCE

1) Pasricha A, Bhujwala RA, Srinivas A. Bacterial study of pyoderma. Indian J Path Bact 1972;15:131-138.| 2) Bhaskaran CS, Shyamsundara Rao, Krishnamurthy P et al, Bacteriological study of Pyoderma. Indian J Dermatol Venerol Leprol 1979;45:161-168.| 3) Dillion Hc.Topical and systemic therapy for pyodermas. Int J Dermatol 1980;19:443-451.| 4) Baslas RG, Arora SK, Mukhija RD, Mohan L, Singh UK. Organisms causing pyoderma and their susceptibility pattern. Indian J Dermatol Leprol 1990;56:127-129.| 5) Bhat KG, Nagesh CN, Parvati CN, Joseph KM, Shivanand PG. Drug resistance and penicillinase activity in skin isolated Staphylococcus aureus. Indian J Dermato Venerol Leprol 1990;56:371-374.| 6) Bhujwala RA, Mohapatra LN. Bacteriophage pattern and antibiotic resistance of Staph.aureus. Indian J Path Bact 1972;15:66-72.| 7) Ghadage D P, Sali Y A. Bacteriological study of pyoderma with special reference to antibiotic susceptibility to newer antibiotics. Indian J Dermatol Venereol Leprol 1999;65:177- 181.| 8) Nagmoti M, Jyothi, Patil CS, Matgud SC.Bacteriological study of pyoderma in Belgaum. Indian J Med Microbial 1999;65:69-71.| 9) Thind P, Prakash SK, Wadhwa A, Garg VK, Pati B. Bacteriological profile of community-acquired pyodermas with special reference to methicillin resistant Staphylococcus aureus. Indian J Dermatol Venereol Leprol 2010;76:572-574.| 10) Malhotra SK, Malhotra S, Dhaliwal GS, Thakur A. Bacteriological study of pyodermas in a tertiary care dermatological center. Indian J Dermatol Venereol Leprol 2012;57:358-361.