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A Clinico-Bacterial Profile of Pyoderma

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A B S T R A C T

Pyoderma is the most common clinical conditions encountered in dermatological practice. The institution of appropriate treatment is necessary in these common dermatoses. Detailed knowledge about the causative organisms and antibiotic susceptibility pattern should be known for successful treatment of pyoderma. The present study was conducted for a period of one year in Department of Microbiology at KIMS, Hubli. Patients presenting with pyodermas belonging to various age groups and of either sex were included in the study. A pair of swabs for culture and sensitivity was collected from the base of skin. Gram's staining was done and the specimens were inoculated on to blood agar and Mac Conkey agar plates and incubated at 37°C for 24 hours. All the isolates were tested for antibiotic susceptibility testing by Kirby-Bauer disc-diffusion technique. Methicillin resistance was detected by using 1 mg oxacillin discs. *Staphylococcus aureus* being the most common organism isolated (67 in monomicrobial and 12 in polymicrobial) accounting for 79% followed by β hemolytic *Streptococci* in 11 cases, Escherichia coli in 2 cases, *Klebsiella* spp. in 1 case and *Pseudomonas* spp. in 1 case respectively. Among β hemolytic *Streptococci*, highest sensitivity was observed for cephalexin (90.90%) and erythromycin (81.81%). Moderate sensitivity was noticed for ampicillin (63.63%), co-trimoxazole (72.72%) and gentamicin (63.63%). Moderate resistance was observed for Tetracycline (54.54%) and penicillin (45.45%). One must consider the resistance profile of the infective agent, the antibacterial profile of the antimicrobial agent and its pharmacokinetic properties before choosing antimicrobial therapy. A combination of beta-lactam/beta-lactamase inhibitor may be a better option in community acquired infection.

Introduction

Pyoderma is defined as any purulent skin disease and represents infections in epidermis and dermis or in hair follicles (Neirita *et al*., 2012). The pyodermas are one of the commonest clinical conditions encountered in dermatological practice (Shashi *et al*., 2012; Nataraj *et al*., 2003). 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. *Staphylococcus aureus* and *Streptococcus pyogenes* are the common causative agents of pyodermas (Badabagni *et al*., 2016).

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 (Mishra *et al*., 2016). Detailed knowledge about the causative organisms and antibiotic susceptibility pattern should be known for successful treatment of pyoderma.

Materials and Methods

The present study was conducted for period of one year in Department of Microbiology at KIMS, Hubli. This is a hospital based cross-sectional study. Patients presenting with pyodermas belonging to various age groups and of either sex were included in the study. After taking informed consent from the patients a detailed history and clinical examination was done. A pair of Swabs 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. Gram's staining was done and the specimens were inoculated on to blood agar and MacConkey agar plates and incubated at 37°C for 24 hours. Plates showing no growth during first 24 hours were further incubated up to 48 hours. The organisms were identified on the basis of their morphology, cultural, and battery of biochemical characteristics as per the standard methods. All the isolates were tested for antibiotic susceptibility testing by Kirby-Bauer disc-diffusion technique. Methicillin resistance was detected by using 1 mg oxacillin discs. Minimum inhibitory concentration (MIC) for *Staphylococcus aureus* performed by agar dilution method using oxacillin powder as per NCCLS guidelines (Collee *et al*., 1996; NCCLS, 1997)**.**

Results and Discussion

A total of 100 samples from pyoderma were processed in the laboratory. A majority of 46% (46) were from children less than 10 years followed by 28% between 11 and 20 years. (Table 1) and 64% are among males.

A total of 87% were from lower socioeconomic status and 47% did not have any contact history, where as 29% gave history of contact at school and 24% family history of pyoderma during the disease course. (Table 2) Of these subjects, lesions were seen at different sites in 46% and confined to lower limbs in 31% and head neck in 15%. Majority of lesions were impetigo contagiosa (38%) followed by superficial folliculitis (27%) and furunculosis (21%).

The specimen on Gram's staining revealed Gram positive cocci (GPC) in clusters in 66% and in chains in 11% (Table) and on culture monomicrobial growth in 76% and rest polymicrobial.

Staphylococcus aureus being the most common organism isolated (67 in monomicrobial and 12 in polymicrobial) accounting for 79% followed by β Hemolytic *Streptococci* in 11 cases, *Escherichia coli* in 2 cases, *Klebsiella spp*. in 1 case and *Pseudomonas spp*. in 1 case respectively.

Staphylococcus aureus exhibited highest resistance for Tetracycline (92.4%), Co-trimoxazole (86.08%), ampicillin (87.35%), and gentamicin (56.97%). Occurrence of methicillin resistance among was 3.79% (3/79) by agar dilution method using oxacillin as per NCCLS guidelines. All the isolates were susceptible at MIC 32µg.

Among β hemolytic *Streptococci*, highest sensitivity was observed for cephalexin (90.90%) and erythromycin (81.81%). Moderate sensitivity was noticed for Ampicillin (63.63%). Co-trimoxazole (72.72%) and gentamicin (63.63%) moderate resistance was observed for tetracycline (54.54%) and penicillin (45.45%).

Table.1 Age wise distribution

Sl.No	Age Group	Numbers (%)
1.	0 – 10 Years	46%
2.	11 – 20 Yars	28%
3.	21 – 30 Years	15%
4.	31 – 40 Years	08%
5.	41 – 50 Years	02%
6.	Above 50	01%
TOTAL		**100%**

Table.2 History of contact

Sl.No	History of Contact	Numbers (%)
1.	Family Contact	24%
2.	School Contact	29%
3.	No History of contact	47%
TOTAL		**100%**

Table.3 Different sites of pyoderma lesions

Sl.No	Sites	Numbers (%)
1.	Multiple sites	46%
2.	Lower limb	31%
3.	Head and neck	15%
4.	Upper limb	8%
	TOTAL	**100%**

Table.4 Gram's smear examination

Organisms	No. of Cases	Percentage
Gram Positive cocci in clusters	66	66%
Gram Positive cocci in chains	11	11%
Mixture of Gram Positive cocci and Gram Negative bacilli	4	4%
No organisms	19	19%
TOTAL	**100**	**100%**

Table.5 Microbial profile of pyoderma

Sl.No	Organisms	Monobacterial Isolates	Polybacterial Isolates	Total
1.	*Staphylococcus aureus*	67	12	79
2.	Co-agulase negative staphylococci	6	0	6
3.	β Hemolytic *Streptococci*	3	8	11
4.	Escherichia coli	0	2	2
5.	Klebsiella spp.	0	1	1
6.	Pseudomonas spp.	0	1	1
TOTAL		**76**	**24**	**100**

Table.6 Antibiogram of *Staphylococcus aureus* (n = 79)

Sl.No	Name of the Antibiotic	Sensitive No.	%	Resistance No	%
1.	Ampicillin	10	12.65	69	87.35%
2.	Erythromycin	53	67.09%	26	32.91%
3.	Roxythromycin	62	78.48%	17	21.52%
4.	Clindamycin	73	92.4%	6	7.60%
5.	Vancomycin	79	100%	-	-
6.	Gentamicin	34	43.03%	45	56.97%
7.	Netilmicin	71	89.88%	8	10.12%
8.	Amikacin	73	92.40%	6	7.60%
9.	Ciprofloxacin	61	77.22%	18	22.78%
10.	Ofloxacin	73	92.40%	6	7.60%
11.	Sparfloxacin	75	94.94%	4	5.06%
12.	Co-Trimoxazole	11	13.92%	68	86.08%
13.	Tetracycline	6	7.60%	73	92.4%
14.	Oxacillin	76	95.63%	3	4.37%
15.	Cefotaxime	74	93.67%	5	6.33%
16.	Cefuroxime	74	93.67%	5	6.33%

Table.7 No of *S. aureus* Strains Susceptible at varying M.I.C. for Oxacillin

M.I.C	< 0.5 µg	1µg	2µg	4µg	8µg	16µg	32µg
No. of. Organisms Susceptible	**33**	**55**	**76**	**76**	**78**	**78**	**79**
Percentage	**41.77**	**69.62**	**96.20**	**96.20**	**98.73**	**98.73**	**100**

Table.8 Antibiogram of β hemolytic *Streptococci*

Antibiotic	Sensitive	%	Resistant	%
Penicillin	6	54.54	5	45.45
Ampicillin	7	63.63	4	36.36
Co – Trimoxazole	8	72.72	3	27.27
Gentamicin	7	63.63	4	36.36
Cephalexin	10	90.90	1	9.10
Erythromycin	9	81.81	2	18.18
Tetracycline	5	45.45	6	54.54

Infection of the skin constitutes a large percentage of skin diseases among which pyoderma takes a prominent place. Lower age, male sex, geographical distribution, lower socio-economic status, poor nutritional condition of the patient is the known predisposing factors of pyoderma. Pyoderma is an important public health problem with substantial economic and social costs.

Higher occurrence of disease was noted among younger age groups, 46% among 0-10 years and 28% between 11-20 years, a similar report have also been noted by Mariette (1992).

The maximum incidence was noted in the age group between 0 and 10 years (46%). It was postulated that children's skin is more susceptible for pyoderma because of their epidermis with less effective barrier zone and immature sebaceous glands and also relatively less developed immune system (Todd, 2000). Pyodermas were 1.78 times more among Males (64%) than females (36%), similar trends were also reported by Adarsh Chopra (1994), however Mariette Mathew (1992) and Ramani (1980) noted female predominance.

Overcrowding, poor personal hygiene, illiteracy, culture habits have been considered as contributing factors for the predisposition of pyoderma infection on skin (Ramani *et al*., 1980; Arthur, 1979). Pyodermas were more common among low socioeconomic group (87%) and also in other studies. Pyodermas manifested as impetigo (38%) superficial folliculitis (27%) and furunculosis (21%). These similar rates of common features were recorded by Adarsh Chopra (1994).

Direct microscopic examination of pus swab by Gram's smear for qualitative and quantitative assessment of the organisms revealed predominance of Gram positive cocci over Gram negative bacilli.

Monobacterial isolates were seen in 76% of cases while 24% yielded Polybacterial growth. Whereas Adarsh chopra *et al*., found Mono bacterial isolates in 85% of cases and Poly bacterial isolates in 7% of cases, as noted by Baslas (1990).

The most common organism happens to be *Staphylococcus aureus* (79%), followed by β Hemolytic *Streptococci*, which has been also isolated by other studies (Ashok *et al*., 1988).

In most of secondary pyoderma, apart from Staphylococcus and Streptococcus, *Escherichia coli* (2%), *Klebsiella spp*. (1%), and *Pseudomonas aeruginosa* (1%) have been isolated in present study. However others have reported them to range from 0.5% to 20%. Highest resistance noted for ampicillin, tetracycline, co-trimoxazole and gentamicin as reported by others. But showed sensitivity to vancomycin (100%), sparfloxacin (94.63%), cefuroxime (93.76%) reflecting their limited use in the community at large and were found to be the most useful drug in treating staphylococcal infection. Methicillin resistant (MRSA) among community acquired pyoderma is 3.79%.

Beta hemolytic *Streptococci* showed moderate resistance to tetracycline (54.54%), penicillin (45.45%), ampicillin (36.36%), gentamicin (36.36%) and least resistance to co-trimoxazole (27.27%), Erythromycin (18.18%), cephalexin

(9.10%) which is higher compared to other studies.

Thus the antimicrobial options for treatment of cutaneous infections have undergone a sea change. In choosing the appropriate antimicrobial therapy, one must take into account the resistance profile of the infective agent, the antibacterial profile of the antimicrobial agent and its pharmacokinetic properties. A combination of beta-lactam/beta-lactamase inhibitor may be a better option in community acquired infection.

References

Adarsh Chopra, Ramesh Puri, *et al*. 1994. A clinical and Bacteriological study of pyodermas. *Ind. J. Dermatol. Venereol. Leprol.*

Arthur Rook. 1979. Text Book of Dermatology, Vol. 2, III Edn.

Ashok Kumar Khare Bansal, N.K. and Dhruv, A.K. 1988. A Clinical and Bacteriological study of pyodermas. *Ind. J. Dermatol. Venereol. Leprol.*, 54: 192-195.

Badabagni, P., Malkud, S. 2016. Clinico-etiological study of pyodermas in a tertiary care hospital. *Ind. J. Clin. Experimental Dermatol.*, 2(2): 53-57.

Baslas, R.G., Arora, S.K. 1990. Changing phage pattern of *Staphylococcus aureus* in pyoderma cases. *Ind. J. Path. Microbiol.*

Collee, G.J., Fraser, A.G. 1996. Marmoion BP and Simmons A. Mackie and McCartney Practical Medical Microbiology. 14th Edn.. Churchill Livingstone. London, 51-178.

Cowan, S.J., Steel, K.J. Manual for identification of medical bacteria, 2nd Ed. London, Cambridge University Press.

Mehta, T.K., Mehta, V.R. 1965. Management of Pyoderma and Eczematoid Dermatitis with varied conditions. *Ind. J. Dermatol. Venereol.*

Methew, M.S., Garg, B.R., Kanungo, R.A. 1992. Clinico-Bacteriological Study of Primary Pyoderma of Children in Pondichery. *Ind. J. Dermatol. Venereol. Leprol.*, 58: 183-187.

Mishra, D., Palo, S. 2016. Antibiotic resistance pattern of bacterial isolates from skin and soft tissue infections. *Int. J. Res. Med. Sci.*, 4(5): 1458-1462.

Nataraj, G., Baveja, S. 2003. Cutaneous bacterial infections; Changing trends in bacterial resistance. *Ind. J. Dermatol. Venereol. Leprol.*, 69: 375-376.

NCCLS. 1997. Performance standards for antimicrobial susceptibility testing NCCLS approved standard M100-S13. National Committee for Clinical Laboratory standards. Wayne. Pa.

Neirita Hazarika. 2012. A Clinico-Epidemiological Study of Pyoderma in Children. *Nat. J. Res. Com. Med*., 1(4): 178-241.

Ramani, T.V. and Jaykar, P.A. 1980. Bacteriological study of 100 cases of Pyodermas with special reference to Staphylococci, their antibiotic sensitivity ad phage pattern. *Ind. J. Darmatol. Venereol. Leprol.*, 46: 282-286.

Shashi Gandhi, A.K., Ojha, K.P., Ranjan, Neelima. 2012. Clinical and Bacteriological Aspects of Pyoderma. *N. Am. J. Med. Sci.*, 4(10): 492–495.

Todd, L.K. 2000. Staphylococcal infections, Group B *Streptococci*. Nelson's Text book of paediatrics. 16th Edn. WB Saunders. Singapore, Vol 1.793-798.810-815.

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