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A bacteriological study of 100 cases of superficial pustular folliculitis with special reference to Staphylococci from lesions and carrier sites

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Abstract
This study was conducted to evaluate the etiological agent and prevalent phage types in cases of superficial pustular folliculitis, a primary pyoderma and community acquired infection common amongst the young men of fishing community, resistant to common antibiotics, with frequent recurrences.

Keywords: Superficial pustular folliculitis; community acquired pyoderma; *S. aureus*; phage typing.

Introduction

Superficial pustular folliculitis is a disease of common occurrence and a major constituent of pyodermas. It accounts for 26% of total pyodermas (Jasaja *et al.*, 2001). Scalp and extremities are the favourable sites. Chronic folliculitis of the legs has been described mainly in young adult males in India. The profuse eruption of superficial and deep follicular pustule on the thighs and lower legs persisted for many years and was resistant to treatment, *Staphylococcus aureus* was the regular isolate from the pustules.

Various factors like poverty malnutrition, overcrowding, illiteracy, customs and habits, climatic conditions etc. were stated to be responsible for the high incidence. The etiological agent implicated, Staphylococci are widely distributed in nature. They are isolated from several areas of normal skin especially perineum and intertregenous areas. Anterior nares are reported to be the commonest carrier site of pathogenic Staphylococci. Several workers reported the sources of infection in pyodermas being autogenous from anterior nares with varying percentages of correlation of identical Staphylococci from lesions and anterior nares (Chopra *et al.*, 1995).

In the present investigation, the bacterial flora from 100 random cases of clinically diagnosed superficial pustular folliculitis were isolated and their sensitivity to various antibiotics was tested. Staphylococci in the anterior nares and normal skin of these patients was studied and an attempt was made to know the number of cases where the infection is autogenous by matching the identical strains form lesions and carrier site by phage-typing, some of the biological properties like DNase, phosphates production and mannitol fermentation were studied for all the Staphylococci isolated from lesions as well as carrier sites with a view to correlate these properties with pathogenicity and coagulase production. Further biochemical studies were made on all the coagulase negative Staphylococci from lesions to characterize them according to Baird–Parker's grouping.

Materials and Methods

The material for the present study was collected from our patients who attended Department of Dermatology, KIMS Hospital, Amalapuram during a time span of 14 months. One hundred cases of superficial pustular folliculitis, which had no prior antibiotic treatment were selected for this study lesions were swabbed with alcohol and the pus was collected by using sterile swab. Simultaneously, swabs were also taken from the anterior nares and axillary region of the skin from the patients with lesions.

The swabs were inoculated on human blood agar and McConkey's medium and incubated aerobically at 37^{o}C for 24-48 hrs. The organisms thus grown were identified on the basis of their morphology and cultural character and biochemical reactions according to the standard methods (Mackie and McCartney, 1996).

Staphylococci were collected from the cultures and were sub cultured into nutrient agar slopes, which were refrigerated at 4^{o}C. All the

strains were tested for coagulase β haemolysis, phosphatases and DNase. Coagulase Negative Staphylococci isolated from lesions were further tested for fermentation of glucose mannitol, maltase and lactose aerobically and anaerobically and for the production of acetoin from glucose.

All the organisms isolated from lesions and skins were tested for antibiotic sensitivity as per standard disc diffusion technique. All the coagulase positive strains were sent for phage typing to the Department of Microbiology, Maulana Azad Medical College in Delhi. Antibiotic sensitivity testing was done on Muller Hinton agar using Kirby Bauer method.

Results

Out of the total 252 strains of Staphylococci isolated from lesions, anterior nares and normal skin of folliculitis patients, 136 were coagulase positive and 116 were coagulase negative.

Table 1: Coagulase activity of Staphylococci isolated from various sources.

Sources	Total Strains	Positive	%	Negative	%
Lesion	88	73	83	15	17
Nose	79	34	43	45	57
Skin	85	29	34	56	66
Total	252	136	-	116	-

High percentage of biochemical activity was observed among strains isolated from lesions, followed by nose and skin.

Table 2: Comparative analysis of biological activity of coagulase positive strains from lesions, nose and skin.

Biological activity	Total strains (73)		Coagulase +ve (34)		Coagulase -ve (29)		X^2	P-value
	Positive		Positive		Positive			
	No.	%	No.	%	No.	%		
B-haemolysis	56	76.8	25	78	17	58.6		
Pigment production	73	100	29	85.3	12	58.6	-	-
Phosphatase	71	97.3	24	70.5	19	65.9	21.58	<0.01
DNase	72	98.7	24	70.5	17	58.8	30.10	<0.01
Mannitol fermentation	62	84.9	23	67.7	15	51.7	18.4	<0.01

Table 3: Comparative analysis of biological activity of coagulase negative strains from lesions, nose and skin.

Biological activity	Coagulase –ve strains from lesions (15)		Coagulase –ve strains from nose (45)		Coagulase –ve strains from skin (56)		X^2	P-value
	No.	%	No.	%	No.	%		
B-haemolysis	-	-	-	-	-	-		
Pigment production	-	-	-	-	-	-	-	-
Phosphatase	9	60	15	33.3	17	30.3	4.72	>0.05
DNase	4	26.7	12	26.7	15	26.7	0.02	>0.05
Mannitol fermentation	1	6.7	5	11.1	3	5.3	-	>0.05

Table 4: Comparison between coagulase positive Staphylococci isolated from cases and carrier sites in antibiotic resistance.

Antibiotic	Staphylococci strains from lesions (73)		Staphylococci strains from nose (34)		Staphylococci strains from skin (29)		X^2	P-value
	No.	%	No.	%	No.	%		
Penicillin	73	100	34	100	29	100	-	-
Methicillin	0	0	0	0	0	0	-	-
Ciprofloxacin	9	13	2	5.8	2	6.9	1.52	>0.05
Cephalexin	33	46	7	20.5	1	3.5	19.25	<0.01
Cloxacillin	14	20	5	14.1	4	13.8	0.73	>0.05
Lincomycin	5	7	1	3	1	3.5	2.15	>0.05
Garamycin	3	5	0	0	0	0	2.96	>0.05

With an exception of 10 strains, all the 252 strains of Staphylococci were resistant to Penicillin, moderate resistance was observed to Cephalexin and Cloxacillin in coagulase positive Staphylococci. The strains from all the sources were sensitive to Methicillin and Gentamycin.

Discussion

Very high incidence of folliculitis was recorded in Amalapuram and all the affected were actively involved in fishing, mostly men in the age group of 20-35 making a total of 56% organisms isolated from all cases were purely Staphylococci, of the total 88 strains isolated, 73 (83%) were coagulase positive, this is in accordance to the study carried out by Patel *et al.* High incidence of coagulase positive Staphylococci in pyoderma was reported by several other workers (Mathews *et al.*, 1992; Ramani *et al.*, 1980; Khare *et al.*, 1988; Bhaskaran *et al.*, 1979).

Table 5a: Phage pattern of Staphylococci from cases.

Group	Type	No. of cases	Group total
I	29	5	6
	29/79	1	
II	3A	1	
	3A/3C	1	4
	3A/3C/71	2	
III	47	2	
	53	1	
	75	2	
	53/54/75	2	13
	6/42E/47/53/85	1	
	6/42E/53/54/	2	
	53/54/75/85	3	
IV	0	0	0
Mixed	GI29, G III 54	4	
	GI29, G III 54/75/84	2	
	GI29, G III 6/42E/53/54/75	3	
	GI29, GIII6/42E/53/54/75/77/84/85	3	16
	GI29, GII3A/3C	1	
	GI29, GII 3A/3C/71	1	
	GI29, GIV 81	2	
	TOTAL TYPABLE		39
	NON-TYPABLE		34
	GRAND TOTAL		73

Table 5b: Phage types of coagulase positive Staphylococci from anterior nares.

Group	Type	No. of cases	Group total
I	29	1	1
II	55	2	
	3A/3C/71	2	4
III	6/42E	1	
	54/75	2	
	53/54/75	2	8
	47/54/77/83/85	1	
	6/42E/47/54/77/83/85	2	
IV	81	1	1
Mixed	GI29, G III 54	1	4
	GI 29, GIII 53/54/75/85	1	
	GI 29, GIII 47/54/75/77/85	1	
	GI 3C/71	1	
	TOTAL TYPABLE		18
	NON-TYPABLE		16
	GRAND TOTAL		34

Table 5c: Phage pattern of Staphylococci from normal skin.

Group	Type	No. of cases	Group total
I	29	1	1
II	55	1	2
	3C/71	1	
III	53/54/75	1	3
	47/53/54/75/85	2	
Mixed	GI 29, G III 47/53/54/75/85	1	2
	GI 29, G III 6/47/54/77/85	1	
	TOTAL TYPABLE		8
	NON-TYPABLE		21
	GRAND TOTAL		29

Table 5d: Distribution of identical phage types of Staphylococci between lesions, anterior nares and normal skin.

Areas	Phage types	Total no. of cases
Lesion, anterior nares and skin	1. GI 29 2. GII 3C/71 3. GI 29, GIII 53/54/75	3
Lesion and anterior nares	1. 54/75 2. GI29, GIII53/54/75 3. GI29, GIII 47/53/54/75 4. GI29, GIII6/42E/47/53/54/85	2 2 1 1 6
Lesion and normal skin	0	0
GRAND TOTAL		9

All the coagulase positive strains were found to be resistant to Penicillin, whereas coagulase negative strains depicted some degree of sensitivity. Next to penicillin, high resistance was observed in Cephalexin followed by Cloxacillin as reported by several workers (Kandhari *et al.*, 1962; Baslas *et al.*, 1990; Pasricha *et al.*, 1992; Kar *et al.*, 1985). High degree of sensitivity was seen to Lincomycin and Gentamycin. All the strains were found to be sensitive to Methicillin, as our study included only community-acquired primary pyodermas. All the biochemical activities were found to be higher in coagulase positive strains.

Of the total 136 strains from various sites sent for phage typing 65 were typable, and 71 non-typable. Majority of strains belonged to mixed group, followed by group III and group II. More than 50% of strains were non typable. This is in accordance to the study carried out by Arora *et al.* In 3 samples, same phage type was isolated from all 3 sites and 6 cases same phage type was isolated from lesion and anterior nares which accounts for an autogenous infection of 12.3%.

Conclusion

The emergence of antibiotic resistant strains poses a significant problem both in community aswell as hospital practice in deciding empiric therapy. Studies like the present one help in establishing prevalent phage types of microbes and their susceptibility pattern along with changing biological activities. Our findings also indicate that it may probably be unnecessary to use antibacterial useful for MRSA strains on a routine basis for the empirical treatment of community acquired pyodermas. However, these findings need to be confirmed by a larger study.

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