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Original Article

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Comparison of Antibiotic Sensitivity of Fusidic Acid and Mupirocin in S. Aureus Isolates in a Series of Community Acquired Pyodermas

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Abstract

Background: Aim: To determine the sensitivity of topical antibiotics like fusidic acid and mupirocin in a series of 200 S.aureus isolates from community acquired pyodermas. **Subjects and Methods:** Prospective study conducted at the outpatient department of Dermatology, Venereology and Leprosy at AJ institute of Medical Sciences, Mangaluru between July to October 2018. All patients presenting to the outpatient department with primary or secondary pyodermas were eligible for the study. Patients of all age and both sex attending the outpatient department (OPD) of Dermatology with pyoderma after obtaining informed consent to participate in the study. Antibiotic sensitivity for fusidic acid and mupirocin was done for 135 cases and 101 cases respectively. Excluded patients where those who have had a hospital stay in the past one year, those who have already received topical or systemic antibiotics and non- consenting patients.The study was approved by the Institute's Review Board and Ethics Committee. **Results:** Total no of cases of resistance to mupirocin-0, Total no of cases of resistance to fusidic acid- 14. **Conclusion:** Mupirocin showed no resistance in any of our cases whereas 14 cases where resistant to fusidic acid.

Keywords: Fusidic acid, Mupirocin, S. aureus.

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Introduction

Pyodermas are one of the commonest bacterial pyogenic infections encountered in clinical practice.[1] Primary pyodermas are impetigo, folliculitis, furuncle, carbuncle, ecthyma, erythrasma, and sycosis barbae. Various factors like poverty, malnutrition, overcrowding, and poor hygiene have been stated to be responsible for its higher incidence in the lower socio- economic class. Climatic conditions also play a major role.[2] They constitute a major burden of preventable disease in dermatology outpatients.[3] A significant number of these pyodermas are caused by bacteriae, among which Staphylococcus aureus (S.aureus) is one of the most commonly implicated organisms in developed countries5 and in India.[4]

S. aureus is associated with significant morbidity by causing primary and secondary pyodermas due to which the local epidemiological and microbiological understanding of this species is essential in appropriate health care.[5] It is also known to possess a wide variety of pathogenicity factors.

The overall incidence of streptococcal disease has surged since the mid-1980s.[6] There are reports of invasive infections caused by GAS often associated with shock and multiorgan failure which have increased globally. Localized epidemics continue to appear and, during such outbreaks, the carrier and infection rates in the community increase. After recovery (without antibiotic treatment) from streptococcal pharyngitis, some individuals may carry the organism for prolonged periods. The carrier state may also occur in the absence of overt antecedent infection. 15-20 % of school children carry group A streptococci in the throat.

Pyodermas are commonly encountered in children.[7] If diagnosed early and treated appropriately, pyodermas and the skin structure are usually curable. If diagnosis is delayed or treatment is inadequate, some infections have the potential for serious sequelae such as nephritis, carditis, arthritis, and septicemia. Therefore selection of the appropriate therapy is the most important step in the management of skin infections, and requires an understanding of the in vitro antibacterial activity, pharmacokinetic properties, tolerability of the agent selected, as well as potential resistance of microorganisms.8 Pyodermas in children vary from generally localized conditions, such as impetigo and folliculitis, to systemic conditions, such as staphylococcal scalded skin syndrome (SSSS).

Subjects and Methods

All patients with pyoderma who were eligible for the study after meeting the inclusion and exclusion criteria were asked to participate in the study. The methodology was divided into clinical and microbiological methods.

Clinical method

The diagnosis of pyoderma was made based on a detailed clinical history and clinical examination including height, weight and blood pressure of the patient and was recorded in a standardized, pilot-tested proforma. If the patient was qualified for the study, details of the study were briefed. If voluntarily agreed for the study, a written informed consent was taken from the patient. Data on history of prior antibiotics was noted based on prior available medical documentation or 1 year-recall. Data collection in the outpatient was done by the principal investigator alone.

The pus collection from the pyoderma was done under standard sterile methods with sterile cotton-tipped swabs and in 2 cases the pus aspirate was taken with a help of a syringe when a large quantity of pus was obtained. 2 swabs were collected from the lesions, one for culture and the other for Grams stain. The pus swabs/aspirates were then sent to the department of Microbiology, for diagnostic tests on the same day.

Microbiological method

Once the swab reached the microbiology laboratory, the swab was smeared onto a glass slide and Grams stain was performed. The second swab was cultured on Blood agar and Mac Conkey agar as required. The plates were incubated at 37'C for 18-24 hrs aerobically. After overnight incubation, the organisms were identified by their culture characteristics and biochemical reactions according to standard procedures. Antimicrobial susceptibility testing was done for all S.aureus isolates by disc diffusion method of Kirby Bauer on Mueller Hilton agar and the results were interpreted as per CLSI guidelines. Then antibiotic sensitivity was done for fusidic acid and mupirocin . The results of sensitivity, resistance and intermediate result was determined by the size of the zones formed according to standard CLSI guidelines. The zone sizes are looked up on a standardized chart according to the CLSI guidelines.

Those cases in which no organisms isolated were excluded from the study

Results

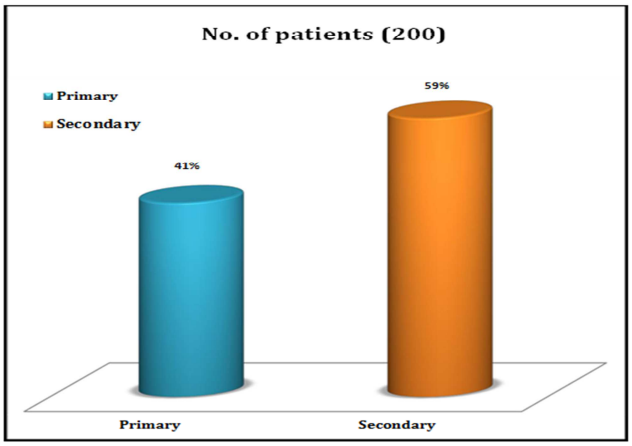

Figure 1: Percentage of clinical types of pyodermas involved in the study

Table 1: Percentage of clinical types of pyoderma in the study

Type	N=200	Percentage
Primary	82	41%
Secondary	118	59%

Table 2: Primary pyodermas included in the study

Types	No of cases (82)	Percentage
Furuncles	38	46.1%
Folliculitis	27	33%
Cellulitis	5	6%
Ecthyma	4	5%
Impetigo	4	5%
Erysipelas	2	2.5%
Carbuncle	1	1.2%
Acute paronychia	1	1.2%

Table 3: Secondary causes of Pyoderma.

Pyodermas secondary to	No of cases (118)	Percentage
Eczema	65	55%
Scabies	18	15%
Papular urticaria	17	14%
Ulcers	7	6%
Autoimmune blistering disorders	5	4%
Psoriasis	2	2%
Dermatophytosis	2	2%
Molluscum contagiosum	1	1%
Balanitis	1	1%

Bacteriological Profile:

Among all cases which were sent for bacterial culture, 18 cases showed no growths and were not included in the study. Out of 200 cases that showed growth on culture, 5 cases had mixed infections (2 organisms each were isolated from 1 case) and hence a total of 205 organisms were isolated.

Staphylococcus aureus was the commonest isolate accounting to 185 of the cases followed by Streptococcus pyogenes (9), 5 isolates each of Pseudomonas aeruginosa and Kliebsella ssp and 1 isolate of Acinetobacter species

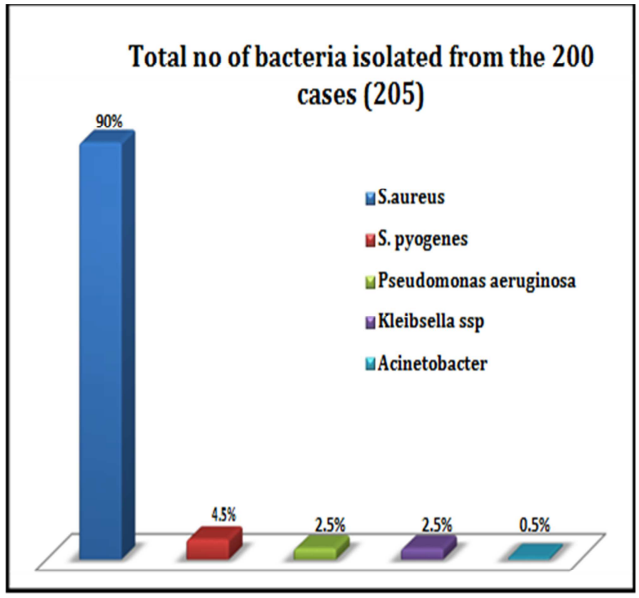

Figure 2: Percentage of various bacteria isolated from the study

Table 4: Various bacteria isolated from the samples included in the study

Bacteria	N=205	Percentage
S.aureus (including 7 MRSAs)	185	90%
S. pyogenes	9	4.5%
Pseudomonas aeruginosa	5	2.5%
Klebsiella ssp	5	2.5%
Acinetobacter	1	0.5%

Note: The above total of 205 organisms includes additional 5 isolates due to mixed infections. This includes 4 cases of mixed infection with S.aureus and S.pyogenes and 1 case of S.aureus and Pseudomonas aeruginosa.

Table 5: Sensitivity for Fusidic acid and Mupirocin for 135 and 101 cases respectively

Fusidic acid (out of 149 cases)	135	14
Mupirocin (out of 101 cases)	101	0

Discussion

Pyodermas constitute a significant burden of cutaneous diseases across the world, and more significantly, in the tropical countries.[9] They can be classified into primary and secondary pyodermas. In our study out of the 200 cases included 82 were primary pyodermas and 118 were secondary.

Out of the 200 cases, 205 bacteria were isolated. Furuncles were the commonest type of primary pyoderma accounting to about 46% of the cases of primary pyodermas which shows almost a near similar prevalence of 39% in the study conducted by Parikh et al.[10] This finding is quite contrasting to study conducted by Gandhi et al,[11] where in the prevalence of furuncle was just 7% with a higher incidence of impetigo (53%) in their study. Among the secondary pyodermas eczemas were the commonest cause accounting to 55% of the cases followed by scabies. This finding is similar to the study conducted by Ahmed K et al,[12] in which eczemas were found to be the commonest cause of secondary pyoderma. Such wide variations can be expected due to sampling errors and the virulence of the organisms.

S. aureus was the commonest isolate accounting to 90% of the cases as was described in other studies by Jones et al and Mohanty S et al S .pyogenes was prevalent only in 4.5% of the cases.[13,14]

Conclusion

Staphylococcus aureus was the most common organism (90%) isolated from primary or secondary pyodermas. This is a global phenomenon and our study has also depicted the same. Furuncles and folliculitis constituted majority of the primary pyoderma. Eczemas with secondary infection constituted majority of the secondary pyodermas. There were no invasive infections in all cases of MRSA in our study.

Our sampling involved patients from rural areas of Mangalore and Kasargod district of Kerala. Mupirocin was found to have no resistance in any of the cases. However 14 cases showed resistance to fusidic acid.

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