



Original Research Article

Staphylococcus aureus: A Major Causative Agent of Community - Acquired Pyoderma

Varsha T. Kalshetti*, V.M.Bhate, Neha Haswani, and S.T.Bothikar

Department of Microbiology, A.C.P.M. Medical College and Hospital, Dhule, (Maharashtra), India

*Corresponding author

ABSTRACT

Keywords

Pyoderma, Methicillin Resistant *Staphylococcus aureus* (MRSA).

Staphylococcus aureus is the most common organism usually isolated in pyoderma and Methicillin Resistant *Staphylococcus aureus* (MRSA) is an important health care associated pathogen. Isolation of causative organisms and detection of Methicillin Resistant *Staphylococcus aureus* (MRSA) infections in community acquired pyoderma. Prospective study was done on 100 patients with pyoderma. MRSA detection was done using Oxacillin disc (1µg) and by using Muller-Hinton agar with 2% NaCl. Occurrence of primary pyoderma was more in males (54%) in first decades of life with highest number of cases of impetigo 31%, *Staphylococcus aureus* was detected in 70% cases and MRSA were detected in 15% cases. Prevalence of community-acquired methicillin resistance and resistance to other antibiotic can be reduced with appropriate antibiotic policy in clinical practice.

Introduction

Pyoderma is one of the most common and most challenging problems in clinical practice, especially in children (Nagmoti *et al.*, 1999). The majority of these skin infections are caused by *Staphylococcus aureus* and *Streptococcus pyogenes* (Neirita, 2012). The universal use of antibiotics has produced changes in the bacterial flora of man and established the development of increased resistance particularly in case of *Staphylococcus aureus*, which is the most common pathogen responsible for pyoderma. Other organisms occasionally come across in pyoderma are Gram negative bacilli (Ramani and Jayakar, 1980; Hee, 1996), *Corynebacterium* species (Ayyagay

et al., 1979), Coagulase negative *Staphylococci*(CONS), Anaerobic bacteria, *Haemophilus influenzae*, *Bacillus cereus* (Ghadge and Sali, 1999; Itzbak, 2002). Pyoderma is either primary or secondary. Primary pyoderma are impetigo, folliculitis, furuncle, carbuncle, ecthyma, sycosis barbae. Secondary pyoderma constitutes tropic ulcer, infected scabies, and various other dermatoses infected with organisms.

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 (Ojha *et al.*, 2012).

Changing trends are being noted in the etiological aspects of primary pyoderma, and the problem of emergence of drug resistance strains is an even increasing one. Community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) has become a challenging problem for the medical science (Nagmoti *et al.*, 1999). As MRSA is an important health care associated pathogen, the present study was undertaken to detect the prevalence of community-acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA) among the patients of pyodermas.

Materials and Methods

The study was conducted in the department of microbiology in our institutes hospital, for a period of one year, on 100 clinically diagnosed cases of pyoderma who had not taken any systemic antibiotics or applied any topical preparations for the past one month were included in the study.

Patients with skin lesions with formation of pus were included and patients with lesions without pus were excluded for the study. All the samples were collected aseptically with two sterile cotton swabs for each sample from the lesion, which were processed for isolations and identifications of bacterial pathogens, according to the standard microbiological techniques (Orbes *et al.*, 2002). Gram stain preparation were made from one swab, and culture plates were inoculated from another swab. Each sample was inoculated on blood agar, MacConkey agar and mannitol salt agar. The plates were incubated at 37°C for 18–24 hours in an incubator. The plates were observed for growth in the following day but incubation was extended to 48 hours if there was no bacterial growth within 24 hours. Isolated colonies were subjected to Gram staining and biochemical tests for identification.

Identification was carried out according to standard biochemical tests.

Antibiotic sensitivity of each *S. aureus* strain was determined by Kirby Bauer's disk diffusion method on Muller-Hinton agar, using following antibiotic discs. Amoxicillin (100µg), amoxycylav (20µg), cefixime (5µg), ceftriaxone (30µg), cefuroxime (30µg), cefoperazone/sulbactam (75/10µg), ciprofloxacin (5µg), cotrimoxazole (25µg), doxycycline (30µg), erythromycin (15µg), gentamicin (10µg), and vancomycin (30µg).

MRSA detection was done using Oxacillin disc (1µg), and using Muller-Hinton agar with 2% NaCl. The plates were incubated for 24 hours at 35°C, and zone diameter was ≥ 13 mm, it was considered as MSSA and if it was ≤ 10 mm, then it was considered as MRSA.

Results and Discussion

Out of 100 cases of pyoderma, occurrence of pyoderma was more in males (54%) than in females (46%). Maximum cases were in the age group less than 10 years. There were 31% cases of bullous impetigo, 25% cases of carbuncle, 13% cases of folliculitis, 15% cases of infected eczema, 12% cases of infected ulcer, 3% cases of cellulitis, 1% cases of paronychia (Table 1).

Culture positive cases were 85 and 15 cases shown no growth from total of 100 samples studied. Maximum number of bacterial isolates were *S. aureus* (70%) followed by Coagulase Negative *Staphylococcus* (8%), *Klebsiella* (3%), β -haemolytic *Streptococci* (2%), *E. coli* (1%). Mixed infections of *S. aureus* and *Streptococcus pyogenes* seen in only one case and 15 samples showed no growth (Table 2).

S. aureus was sensitive to vancomycin,

followed by ceftriaxone, sulbactam, gentamicin, amoxyclav, doxycycline, ciprofloxacin, cefuroxime, erythromycin, cotrimoxazole, amoxicillin, and cefixime. MRSA were found in 15% cases and MSSA were found in 85% of total *S. aureus* isolated.

Pyoderma is one of the commonest clinical condition encountered in dermatological practice (Singh *et al.*, 2005). In our study, we reported higher cases of pyoderma in males and in first decades of life, similar to observations made by Nagmoti *et al.*, (1999)

Thind *et al.*, (2010).

Maximum cases in this study were suffering from bullous impetigo (31%), Neirita (2012) 42.5% and Kar *et al.*, (1985) 47% also observed impetigo to be the commonest clinical type of pyoderma.

S. aureus was the most frequent isolate in this study (70%), co-relating with the previous studies of Nagmoti *et al.*, (1999) Mathews *et al.*, (1992) kakar N *et al.*, (1999) Kar *et al.*, (1985).

Table.1 Distribution of clinical types of pyoderma and no. of patients with percentage

Clinical type	Number of patients with percentage.
Bullous impetigo	31 (31%)
Carbuncle/Furuncle	25 (25%)
Folliculitis	13(13%)
Infected eczema	15(15%)
Infected ulcer	12(12%)
Cellulitis	3(3%)
Paronychia	1(1%)
Total	100 (100%)

Table.2 Correlation between clinical types of pyoderma and organism isolated

Clinical type	No. of patients	<i>S. aureus</i>	β -hemolytic <i>Streptococci</i>	CONS	<i>E. coli</i>	<i>Klebsiella</i>	<i>S. aureus</i> + <i>Streptococci</i>	No growth
Bullous impetigo	31	25	-	1	-	-	-	5
Carbuncle/ Furuncle	25	20	-	2	0	1	-	2
Folliculitis	13	10	-	1	-	-	-	2
Infected eczema	15	10	-	2	-	-	-	3
Infected ulcer	12	4	-	2	1	2	1	2
Cellulitis	03	-	02	-	-	-	-	1
Paronychia	01	01	-	-	-	-	-	-
Total	100	70	02	08	01	03	01	15

Pyodermas are common cause of skin infections in children and are associated with many multidrug-resistant organism such as MRSA. Many reports from India and Asia have highlighted the prevalence of MRSA in the hospital as well as community acquired pyoderma. In our study MRSA were found in 15% cases and MSSA were found in 85% of total *S. aureus* isolates. Ojha *et al.*, (2012) reported an isolation rate of MSSA and MRSA were 80% and 20% cases. Nagaraja *et al.*, (2004) reported an isolation of rate of MRSA as 10.9% and Qureshi *et al.*, (2004) from Pakistan had high isolation rate of MRSA up to 83% from pus samples.

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