

Clinicobacteriological Study of Pyoderma with Special Reference to Community Acquired Methicillin Resistant Staphylococcus Aureus

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Abstracts: Background: Although prevalence of MRSA strains is reported to be increasing, there are scanty studies of their prevalence in community acquired pyoderma in western India. Aims: This study aimed at determining clinicobacteriological profile & prevalence of Methicillin Resistant Staphylococcus aureus (MRSA) infections in community acquired pyoderma. Materials and methods: Prospective study was carried out in tertiary care hospital in Baroda. 100 patients with pyoderma, visiting outpatient department of dermatology, were studied clinically and microbiologically. Sensitivity testing was done for gram positive & gram negative organisms by disc diffusion method. MRSA were detected by Agar dilution method. Result: Primary pyoderma accounts for 64% of cases with highest number of cases were of Impetigo (26%). The culture positive rate was 83% with Staphylococcus aureus being the major pathogen. (78.82%) Out of these 10.45% strains of Staphylococcus aureus were Methicillin Resistant Staphylococcus aureus. (MRSA) Conclusion: MRSA as a cause of pyoderma is a reality albeit in present study group. All the MRSA isolated were sensitive to Vancomycin. Sensitivity to Amoxycylav, Fluoroquinolones & Macrolides is quite good, which can be used for treatment. [Tushar S et al NJIRM 2012; 3(1) : 21-25]

Key Words: Methicillin Resistant Staphylococcus aureus. (MRSA), Pyoderma, Staphylococcus aureus

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Introduction: Pyoderma, is one of the most common and most challenging problems in clinical practice, especially in children¹. Pyoderma is either primary or secondary. Staphylococcus aureus & Streptococcus pyogens are the commonest causative agents of cutaneous bacterial infections. Other organisms occasionally come across in pyoderma are gram negative bacilli,^{1,2,3}

Corynebacterium species.⁴ Coagulase negative Staphylococci, Anaerobic bacteria, Haemophilus influenzae, Bacillus cereus.^{5,6} The universal use of antibiotics has produced changes in the bacterial flora of man & established the development of increased resistance particularly in case of Staphylococcus aureus, which is the most common pathogen responsible for pyoderma. Methicillin-resistant Staphylococcus aureus (MRSA) infection which have usually been associated with exposure to health care setting, but now they have been seen in patients with community acquired infection like pyoderma. Community acquired methicillin Methicillin-resistant Staphylococcus aureus (CA-MRSA) has become a challenging problem for the medical science.⁷ MRSA strains were more

common in Southern India (30.94%) than in the west (20.33%) or north (18.88%). Thus, it is likely that the prevalence of Methicillin resistance in community acquired Staphylococcus aureus strains also varies in different regions.⁸ The present study was undertaken to determine clinical distribution of primary as well as secondary pyoderma and the prevalence of community-acquired methicillin resistant Staph aureus (CA-MRSA) among these patients.

Material and Methods: The present study was carried out in 100 patients showing various clinical signs of pyoderma, attending the outpatient department of Skin and V.D, S.S.G. Hospital, Vadodara from July 2005 to August 2006. Written consent from the patient was taken The due approval of the ethical committee constituted at Medical College, Baroda was officially taken before commencement of the study.

Inclusion criteria for the study:

(i) The patient should have been come on outpatient basis.

(ii) There should not be any medical history in past year of Hospitalization, Dialysis, and Surgery.

(iii) There should not be any permanent indwelling catheters or medical devices that pass through the skin in to the body.⁹

Two sterile swabs were collected one dry swab for making a smear for microscopy (Gram stain) and the second wet swab in Stuart transport medium for culture. Before collecting sample from the lesion the surrounding area was cleaned with 70% alcohol & if dry scales were present, they were removed. The pus samples were collected with the help of a sterile cotton swab. In case of pustular lesions, the materials were collected after rupturing the pustule with a sterile needle. In case of cellulitis aspirates were taken from the advancing erythematous margin. The other swab in Stuart transport medium was taken immediately to the laboratory & the specimen was inoculated on Blood agar, MacConkey's agar, Nutrient agar. All the isolated organisms were identified by using standard microbiological methods. S.aureus was identified based on gram's stain morphology, colony characteristics, positive catalase and coagulase test.¹⁰

All the organisms isolated were tested for antibiotic susceptibility pattern on Mueller-Hinton Agar media using disc-diffusion method recommended by CLSI. But the sensitivity patterns for β -haemolytic Streptococci were observed on 10% blood agar media. The antimicrobial agents were tested included vancomycin, oxacillin, cloxacillin, roxithromycin, erythromycin, amoxyclav, ciprofloxacin, ofloxacin, chloramphenicol, cefotaxime, bacitracin & cefazolin for gram positive organisms. For gram negative organisms, cefotaxime, piperacillin, piperacillin + tazobactem, ampicillin-sulbactem imipenem, gatifloxacin, gentamicin, amikacin, tobramycin, & ciprofloxacin were used. Standard strains Staphylococcus aureus ATCC 25923; Methicillin Resistant Staphylococcus aureus ATCC 43330, Escherichia coli ATCC 25922 and Pseudomonas aeruginosa ATCC 27853 were used as control.¹¹

For detection of MRSA (Community acquired MRSA) agar dilution method for determining

minimum inhibitory concentrations (MIC) was used as per CLSI guidelines.¹²

Result: The present study included 100 patients attending the outpatient department of dermatology & venereology, S.S.G. Hospital, Vadodara. These cases were diagnosed as pyoderma came on outpatient basis, without any medical history of hospitalization, dialysis or surgery in past year and without any permanent indwelling catheters or medical devices, which pass through skin into body.

The highest incidence was there in first decade of life (39%) followed by second decade (18%). The occurrence of pyoderma was more in males (58%) than in females (42%). Male predominate in cases of impetigo (70.37%), carbuncle (61.90%) & infected eczema (64.29%).

Primary pyoderma accounts for 64% of cases and secondary pyoderma for 36% of cases. There were 26% cases of Impetigo, 14% of folliculitis, 14% infected eczema, 10% infected ulcer, 4% infected scabies, 4% Immunobullous disorder and 2% pediculosis (Table-1)

Table: 1 Distribution of Pyoderma

Type of lesion	Number of patients	Percentage
Impetigo	27	27%
Carbuncle/ Furuncle/ Boil	21	21%
Folliculitis	14	14%
Cellulitis	02	2%
Infected eczema	14	14%
Infected Ulcer	10	10%
Infected Scabies	04	4%
Immunobullous disorders	04	4%
Paronychia	01	1%
Pediculosis	02	2%
Intertrigo	01	1%
Total	100	

In the children of 1-10 years, commonest pyoderma was impetigo (19%), followed by carbuncle / furuncle (10%). In case of aged patient

>70 years folliculitis (4%) and infected eczema (4%) were more common.

Out of 100 samples processed 83 were culture positive and 17 has shown no growth. Out of this 83 culture positive cases, 81 showed pure single organism growth, while 2 cases showed mixed growth. So, total 85 organisms were isolated from these 83 culture positive cases. *S.aureus* (78.82%) being the major pathogen responsible for pyoderma, followed by Coagulase Negative Staphylococci (12.94%), *E.coli* (4.71%), *Klebsiella* (2.35%) & β -haemolytic Streptococci (1.18%). (Table-2)

In the 67 strain of *S.aureus* tested by disc-diffusion method all were sensitive to vancomycin (100%). Out of 67 strains of *S. aureus*, 7 strains were found resistant to Oxacillin by disc diffusion. (10.45%) All the strains of Coagulase Negative

staphylococci were sensitive to Vancomycin & Oxacillin. The one strain of β -haemolytic Streptococci was resistant to penicillin only & sensitive to all the other antibiotics tested.

All the 4 strains of *E.coli* were sensitive to imipenem and gatifloxacin. Similarly 2 strains of *Klebsiella* have shown 100% sensitivity to piperacillin, piperacillin + tazobactem, Imipenem, gatifloxacin, gentamicin, amikacin & ciprofloxacin. Agar dilution method was used for detection of MIC of oxacillin in all 67 strains of *S.aureus* to know the prevalence of MRSA among them. This is community - acquired MRSA. Out of 67 strains 7 strains has MIC \geq 4 gm/L & rest 60 strains has MIC \leq 2 mg / L which suggest that prevalence of community acquired MRSA in our study was 10.45%, which co-relate with the prevalence identified by the disc-diffusion method.

Table – 2: Clinicobacteriological classifications of culture positive cases.

Clinical Diagnosis	NO. of Patients	<i>S.aureus</i>	CONS	<i>E.coli</i>	<i>Klebsiella</i>	β -haemolytic Streptococci	<i>E.coli</i> + <i>S.aureus</i>	<i>Klebsiella</i> + <i>S.aureus</i>	No growth
Impetigo	27	17	03	-	-	-	-	-	07
Folliculitis	14	10	01	01	-	-	-	-	02
Carbuncle / Boil / Furuncle	21	14	04	-	-	-	-	-	03
Cellulitis	02	-	-	-	-	01	-	-	01
Inf. Eczema	14	10	02	-	-	-	-	-	02
Inf. Ulcer	10	03	01	02	01	-	01	01	01
Inf. Scabies	04	04	-	-	-	-	-	-	-
Immunobullous disorder	04	04	-	-	-	-	-	-	-
Paronychia	01	01	-	-	-	-	-	-	01
Intertrigo	01	01	-	-	-	-	-	-	-
Total	100	65	11	03	01	01	01	01	17

Discussion: In our study majority incidence of pyoderma were in the first decade of life (39%) followed by second decade (18%). Males (58%) were more frequently affected than female (42%) These findings are similar to findings of Ahmed Khalil¹³ et al in their study. T. V. Ramani et al² reported slight predominance in females (53%) as compared to males (47%).

In our study out of 100 patients 64 patients have primary pyoderma & 36 patients have secondary pyoderma. Maximum cases were of Impetigo (26%) followed by, boils / carbuncle / furuncle in 21% cases, folliculitis (14%), cellulitis (2%), Intertrigo &

paronychia (1%). Secondary pyoderma constituted infected eczema (14%) infected ulcer (10%) cases, infected scabies (4%), immunobullous disorder (4%), pediculosis (2%).

Ghadage D P et al⁵ in their study on pyoderma of 542 cases reported 65.87% cases of primary pyoderma and 34.13% cases of secondary pyoderma. Maximum cases were of impetigo (38.78%) followed by folliculitis (12.92%), ecthyma (35%), cellulitis (5.9%), furunculosis (2.95%), carbuncle (1.5%) and sycosis barbae (0.4%). Secondary pyoderma constituted infected ulcer (18.82%), infected pemphigus (7.2%), infected

contact dermatitis (6.27%) and infected scabies (1.8%). Rahul Patil et al⁸ studied 86 patients with primary pyoderma, & reported 58.9% cases of folliculitis, 33.3% cases of furuncle, 3.3% cases of impetigo, 3.3% cases of ecthyma and 1.1% cases of perioritis.

In our study of 100 samples culture positivity rate is 83% (83/100). Out of this 2 samples have shown mixed growth. Among them 67 (78.82%) were *S.aureus*, followed by Coagulase negative Staphylococci (CONS) (12.94%), *E.coli* (4.71%), *Klebsiella* (2.35%) & β -Haemolytic Streptococci (1.18%).

R.G. Baslas et al¹⁴ reported single organism from 64.56% cases and mixed growth from 20.53% cases. Rahul Patil et al⁹⁶, reported culture positivity rate of 83.7% (72/86) & only one organism was isolated from each positive sample.

Nagmoti M. Jyothi et al¹ studied 100 children with primary pyoderma commonest isolate was *S.aureus* (45%), followed by *Strep. pyogenes* (35%), *E.coli* (5%), *Citrobacter* (1%) and Staphylococci and Streptococci together (14%).

K.C. Kandhari et al¹⁵ isolated 113 organisms from 104 culture positive cases, *S.aureus* alone from 57 (54.81%), β -Haemolytic Streptococci alone from 28 (26.92%), *E.coli* alone 2 (1.92%), *S.aureus* & *E.coli* from 2 (1.92%), β -haemolytic Streptococci & *Proteus vulgaris* from 5 (4.81%) cases.

In the present study *S.aureus* showed maximum sensitivity to vancomycin (100%) followed in descending order by oxacillin (89.55%), cloxacillin (82.09%), amoxyclav (80.60%), ciprofloxacin (78.13%), roxithromycin (75.64%), erythromycin (75.64%), cefotaxime (70.15%), ofloxacin (64.18%), cefazolin (58.21%), chloramphenicol (58.2s1%), and penicillin (25.37%).

T.V. Ramani et al² performed sensitivity of strains of *S.aureus* isolated from pyoderma cases. They reported sensitivity of *S.aureus* to penicillin 39%, streptomycin 49%, tetracycline 78%, chloramphenicol 58%, erythromycin 95%, kanamycin 90% & garamycin 97% and like our study they have also reported lower sensitivity (39%) to

penicillin. Prevalence of community-acquired MRSA is now a day major concern for medical professionals. In our study we have reported 10.45% prevalence of community - acquired MRSA.

Low prevalence of CA-MRSA was reported by Nissim Ohana et al (1%)¹⁶ in their study on 1680 patients with pyoderma & 1.4% prevalence of community acquired MRSA was reported also by Rahul Patil et al (1.4%, 1/70)⁸ in their study of 86 patients with Primary pyoderma at K.E.M. Hospital, Bombay. Marria. W. Sugeng et al¹⁷ reported 3.3% prevalence of community acquired MRSA in adults & 3.2% in children while 7% prevalence of CA-MRSA was reported by Tan Hiok Hee³ in national skin centre. Sonal Saxena et al¹⁸ Guru Tegh Bahadur Hospital, Delhi reported 18.1% prevalence of community acquired MRSA. This was somewhat higher than what we have reported.

Conclusion: The emergence of antibiotic resistant strains poses a significant problem both in community as well as hospital practice in deciding empiric therapy. It is therefore important to monitor the changing trends in bacterial infection and their antimicrobial susceptibility patterns. Prevalence of community - acquired methicillin resistance & resistance to other antibiotic can be reduced with proper antibiotic policy in clinical practice. The messages should be taken to prevent spread of this MRSA in the community.

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