Pyoderma-Bacteriological Profile and its Antibiotic Sensitivity Pattern: A Retrospective Study

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Abstract

Aim: To know the bacteriological profile of pyoderma in this region and to determine its antibiotic sensitivity pattern along with special reference to MRSA.

Materials & Methods: Total samples collected were from 400 clinically diagnosed cases of pyoderma. A Retrospective study was conducted for a period of two years in department of Microbiology, Nalanda Medical College & Hospital, Patna, Bihar.

Results: Around 53.2% of pyoderma cases were primary and 46.7% cases were secondary to contact dermatitis, scabies, skin ulcers &eczema. The major associated risk factors for causation of Pyoderma were Malnutrition (33.2%) followed by Diabetes (19.7%). *Staphylococcus aureus* was found to be the most common cause of Pyoderma followed by CoNS streptococcus pyogenes.

Conclusion: *Staphylococcus aureus* was the primary pathogen causing pyodermas in this study. The antibiotic susceptibility pattern of the organisms isolated must be taken into account before starting therapeutic treatment.

Keywords: Antibiotic susceptibility, Methicillin-resistant Staphylococcus aureus, Primary and secondary pyoderma, Staphylococcus aureus

Introduction

Pyodermas are one of the most common conditions encountered in dermatological practice. They are purulent skin conditions caused by pyogenic bacteria and constitute a large proportion of skin diseases [1, 2]. Infections of the skin and soft tissues with microorganisms that produce an inflammatory response from the infected host are known as pyodermas [3]. The group name for dermatoses which are generally purulent are known as pyodermas [4]. The majority of pyodermas are caused by Staphylococcus aureus and Streptococcus pyogenes [5].

Malnutrition, poor hygiene, overcrowding, poor socioeconomic status, obesity, immunosuppressive conditions such as diabetes mellitus, malignancies, may increase the risk for pyoderma infection in developing countries [1,6].

Occasionally, superficial pyodermas may lead to complications like glomerulonephritis [7]. To treat pyodermas early, identification of causative organisms and initiation of appropriate antimicrobial therapy is essential. These days, many cases do not respond to antibiotics that were previously very effective. The emergence of antibiotic resistance has significantly eroded the utility of established antibiotics and poses a serious threat to public health worldwide. Indiscriminate use of antibiotics, both topical and systemic has led to development of resistance among pathogens which is problematic to the physicians [8].The prevalence of pyoderma in different studies varies from 1.5% to 16.2% in different regions of the world [5, 9].

Thus, this study aims to know the bacteriological profile of pyoderma in this region and to determine its antibiotic sensitivity pattern along with special reference to MRSA.

Materials & Methods:

Total samples collected were from 400 clinically diagnosed cases of pyoderma. A Retrospective study was conducted for a period of two years in department of Microbiology, Nalanda Medical College & Hospital, Patna, Bihar.

Inclusion criteria:

All the patients attending the Skin complaints of purulent skin infection were enrolled in the study after taking written consent from patient or attenders if the patient is minor.

Exclusion criteria:

All the patients with non purulent skin lesion, insect bite, patients already on antibiotic therapy.

Specimen collection:

Two sterile swabs were collected from clinically diagnosed case after cleaning the area with normal saline. In case of purulent lesions intact, pus was collected on the two sterile swabs after pricking the purulent lesion with sterile needle. The swabs were transported to the microbiology laboratory immediately within 15-30min. One of the swabs was used for direct grams stain and other swab for inoculation on sheep blood agar and MacConkey agar, both plates incubated at 37^0c for 24-48hrs. The colony morphology was studied and was subjected to battery of biochemical tests based on repeat gram staining for identification to species level.

Antibiotic sensitivity testing of isolates was done by modified Kirby Bauer's disc diffusion testing using 0.5 McFarland's standard as per CLSI guidelines. MRSA was detected using Cefoxitin disc method.

Results:

Total of 400 cases diagnosed as pyoderma clinically were included in the study. Of 400 cases, 370 were culture positive and 30 culture negatives. (Table 1)

Around 53.2% of pyoderma cases were primary and 46.7% cases were secondary to contact dermatitis, scabies, skin ulcers & eczema. (Table 2)

The incidence of pyoderma in Males is higher than females with ratio of 1.50:1. (Table 3)

The major associated risk factors for causation of Pyoderma was Malnutrition (33.2%) followed by Diabetes (19.7%), Hypertension (5.5%) & multiple comorbidities found in 8.7% of cases. However, in 101 cases (27.3%) no associated risk factors were detected. (Table 4)

Staphylococcus aureus was found to be the most common cause of Pyoderma followed by CoNS streptococcus pyogenes in gram positive bacteria. In gram negative bacteria E. coli is most common followed by Klebsiella pneumoniae, pseudomonas aeruginosa & citrobacter species. (Table 5)

Out of 225 Staphylococcus aureus isolated 26 (11.7%) were Methicillin Resistant Staphylococcus Aureus (MRSA) by cefoxitin disc method. Antibiotic sensitivity pattern of staphylococcus aureus was analyzed to find the Penicillin G as the least resistant and Linezolid & Vancomycin as completely sensitive for all isolates. (Table 6)

Table 1: Clinically diagnosed cases pyoderma

Total number of clinically diagnosed cases pyoderma	Culture positive	Culture negative
400	370	30

Table 2: Primary and secondary pyoderma

Primary pyoderma	Numbers of cases	Secondary pyoderma	Number of cases
Impetigo	68	Contact dermatitis	68
Furunculosis	54	Scabies	56
Folliculitis	37	Skin ulcers	29
Ecthyma	25	Eczema	25
Carbuncle	10	Dermatophytic infection	9
Cellulitis	5	Total	187 (46.7)
Abscess	9		
Acute paronychia	5		
Total	213 (53.2)		

Table 3: Case distribution in male and female

Total cases	Males	Females
400	230 (57.5)	170 (42.5)

Table 4: Distribution of cases with respect to co morbidities

Co morbidities	Number of cases	Percentage
Malnutrition	143	33.25
Diabetes	79	19.75
Hypertension	32	5.5
Multiple co morbidities	45	8.75
None	101	25.25
Total	400	100

Table 5: Bacteriological profile of isolated bacteria

Type of organism isolated	Number of cases	Percentage
Staphylococcus aureus	225	56.3
CoNS	58	14.5
Streptococcus pyogenes	49	12.3
Escherichia coli	37	9.3
Klebsiella pneumoniae	15	3.7

Pseudomonas aeruginosa	11	2.7
Citrobacterspecies	5	1.3
Total	400	100%

Table 6: Antibiotic sensitivity pattern of Staphylococcus aureus

Antibiotics	Number of isolates sensitive	Percentage
Penicillin G	26	11.6
Gentamicin	172	76.5
Amikacin	222	98.7
Erythromycin	142	63.1
Ciprofloxacin	126	56.0
Clindamycin	191	84.9
Doxycycline	225	100.0
Cotrimoxazole	160	71.1
Linezolid	225	100.0
Vancomycin	225	100.0

Discussion:

According to our study there was male preponderance with 57.5% compared to females with 42.5% and with Male to female ratio 1.50:1 which was in accordance with the study done by Shanker Venkatesh BM et al. [9] Ghadage DP et al, [10] Paudel et al. [11] This could be due to comparatively more exposure and outdoor physical activities in males compared to females.

Majority of the lesions were confined to lower limbs (45.3%) followed by upper limbs (31.1%) which can be compared to a study by Nandihal NW and Ravi GS where 31% of the lesions were on the lower limbs [12]. On Gram staining, 82.6% of cases showed gram-positive organisms and 7.9% showed gram negative organisms which is comparable to the findings of Ghadage DP and Salil YA, where 67% of cases showed gram positive organisms [10].

Co-morbidities in the present study were found in 299 cases, Malnutrition being most common followed by diabetes which was comparable with study done by Singh A et al [13] and Nipa Singh et al. [14] Hypertension was found in 32 cases only, but may not be associated directly in causing the pyoderma.

Among the Staphylococcus aureus strains, 14 (6.1%) were MRSA strains which can be compared to the findings of Malhotra SK et al., where the incidence of MRSA among Staphylococcus aureus strains was 9.83%. [15]

Out of 225 Staphylococcus aureus isolated 26 (11.7%) were Methicillin Resistant Staphylococcus Aureus (MRSA) by cefoxitin disc method. Antibiotic sensitivity pattern of staphylococcus aureus was analyzed to find the Penicillin G as the least resistant and Linezolid & Vancomycin as completely sensitive for all isolates. In a study by Singh A et al., strains of Staphylococcus aureus showed susceptibility to amikacin (75%), co-trimoxazole (72%) and clindamycin (61%) [14].

Findings of a study done by Ruturaj MK et al., where E. coli was highly susceptible (100%) to amikacin and piperacillin-tazobactam [15,16].

Conclusion:

Staphylococcus aureus was the primary pathogen causing pyodermas in this study. The antibiotic susceptibility pattern of the organisms isolated must be taken into account before starting therapeutic treatment. Emergence of drug resistant

strain such as MRSA is an alarming sign for the community, which in turn demands for strict antibiotics policies which can reduce the incidence of drug resistant organisms in this region.

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