



Original Research Article

Bacteriological profile of pyoderma and its antibiotic sensitivity pattern in a tertiary care hospital in North Karnataka

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ABSTRACT

Introduction: Pyoderma is one of the common skin condition seen in dermatological OPD. Pyoderma are purulent infections of skin and its appendages mainly caused by various bacteria. Pyoderma could be primary or secondary to other conditions such as impetigo, carbuncle, folliculitis & others.

Materials and Methods: Two sterile swabs collected from the lesions each for Gram staining and culture. Culture done on sheep blood agar and MacConkey agar & incubated at 37°C. Identification done by colony morphology, repeat gram staining & biochemical tests. Antibiotic sensitivity testing of Isolates done by Kirby bauer disc diffusion testing following CLSI guidelines.

Results & Discussion: Of 315 cases diagnosed clinically as Pyoderma only 295 were culture positive. 59% of cases were primary type and impetigo was the most common type. Males were affected more than females in ratio 1.56:1. *Staphylococcus aureus* was found to be the most common cause of Pyoderma followed by *CoNS* and streptococcus pyogenes in gram positive bacteria. In gram negative bacteria *E.coli* is most common followed by *Klebsiella pneumoniae*, *pseudomonas aeruginosa* & *citrobacter species*. The major associated risk factors for causation of Pyoderma were found to be Malnutrition (35%) followed by Diabetes (16.5%), Hypertension (6.3%) & multiple comorbidities found in 12.6% of cases. However in 94 cases (30%) no associated factors detected.

Conclusion: Pyoderma mainly affects males than females with 10-30yrs being the most common age group affected. *Staphylococcus aureus* is the most common causative agent. Antibiotic sensitivity testing is mandatory to treat effectively & control drug resistance.

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1. Introduction

The most common skin condition seen in dermatological OPDs is Pyoderma. Pyoderma are purulent infections of skin and its appendages mainly caused by pyogenic bacteria such as *staphylococcus aureus*, *streptococcus species*, *CoNS*, *Enterococcus*, and gram negative bacteria such as *E.coli*, *Klebsiella* and *pseudomonas*.¹

Primary pyoderma is involvement of normal skin and its infection by pyogenic bacteria directly affecting the

normal tissue, whereas secondary pyoderma is involvement of skin with a condition predisposing to infection. Primary pyoderma is of various types such as impetigo, carbuncle, furuncle, folliculitis, cellulitis, and other purulent conditions of skin.^{1,2}

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.^{2,3}

With emergence of drug resistant bacteria and changing in antibiotic sensitivity pattern it has become a challenge

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to the clinician to treat pyoderma without proper microbiological reports. The rampant use of antibiotics both topical and systemic and lack of proper antibiotic policies at hospital level lead to the development of drug resistance globally.^{4,5}

Present study was conducted to know the bacteriological profile of pyoderma in this region and to determine its antibiotic sensitivity pattern along with special reference to MRSA.

2. Materials and Methods^{6,7}

A Retrospective study was conducted for a period of one year starting from June 2018 to May 2019 in a tertiary care hospital attached to MR Medical College, Kalaburagi in North Karnataka. Present study was conducted by Dept of Microbiology and Skin and VD dept Of MR medical college. Total samples collected were from 315 clinically diagnosed cases of pyoderma.

2.1. Inclusion criteria

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

2.2. Exclusion criteria

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

2.3. 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 37⁰c for 24-28hrs. 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. HiMedia antibiotic discs used for gram positive cocci included, Penicillin(10units), gentamicin (10 µg), amikacin (30µg), ciprofloxacin (5 µg), cefazolin(30 µg), cefuroxime(30 µg), erythromycin (15 µg), co-trimoxazole (25 µg), tetracycline(30 µg), and vancomycin (30 µg), clindamycin (2 µg) and the antibiotics discs used for gram negative bacilli included Ampicillin (10 µg),

gentamicin (10 µg), amikacin (30 µg), ciprofloxacin (5 µg), piperacillin(100 µg), ceftazidime(30µg), ceftazidime + clavulanic acid(30 + 10 µg), piperacillin+tazobactam (100+10 µg), co-trimoxazole (1.25+23.75 µg), tetracycline(30 µg), imipenem (10 µg). MRSA was detected using Cefoxitin disc method.

3. Results

Total of 315 cases diagnosed as pyoderma clinically were included in the study. Of 315 cases, 295 were culture positive and 20 culture negatives. (Table 1)

Table 1:

Total number of clinically diagnosed cases pyoderma	Culture positive	Culture negative
315	295	20

Around 59% of pyoderma cases were primary and 41% cases were secondary to contact dermatitis, scabies, skin ulcers & eczema.

Impetigo found to be the most common type followed by furunculosis, folliculitis, ecthyma and carbuncle.

Table 2: Primary and secondary pyoderma

Primary pyoderma	Numbers of cases	Secondary pyoderma	Number of cases
Impetigo	48	Contact dermatitis	39
Furunculosis	43	Scabies	35
Folliculitis	39	Skin ulcers	30
Ecthyma	31	Eczema	21
Carbuncle	9	Dermatophytic infection	4
Cellulitis	4		
Abscess	8		
Acute paronychia	4		
Total	186(59.05%)		129(40.95%)

Table 3: Case distribution in male and female

Total cases	Male	Female
315	192(60.96%)	123(39.04%)

The incidence of pyoderma in Males is higher than females with ratio of 1.56:1.

Pyoderma is found all age groups mainly affecting 11-30 yrs age group constituting 45% of cases.

The major associated risk factors for causation of Pyoderma was Malnutrition (35%) followed by Diabetes (16.5%), Hypertension (6.3%) & multiple comorbidities found in 12.6% of cases. However, in 94 cases (30%) no associated risk factors were detected.

Staphylococcus aureus was found to be the most common cause of Pyoderma followed by *CoNS* and

Table 4: Age wise distribution of cases

Age group	Numbers of cases	Percentage (%)
Less than 10yrs	35	11.1
11-20yrs	76	24.1
21-30yrs	66	20.9
31-40yrs	53	16.8
41-50yrs	45	14.2
51-60yrs	21	6.6
61-70yrs	14	4.4
Above 70yrs	5	1.5
Total	315	

Table 5: Distribution of cases with respect to co morbidities

Co morbidities	Number of cases	Percentage
1. Malnutrition	109	34.6%
2. Diabetes	52	16.5%
3. Hypertension	20	6.3%
4. Multiple co morbidities	40	12.6%
5. None	94	29.8%
Total	315	

streptococcus pyogenes in gram positive bacteria.

In gram negative bacteria *E. Coli* is most common followed by *Klebsiella pneumoniae*, *pseudomonas aeruginosa* & *citrobacter species*.

Table 6: Bacteriological profile of isolated bacteria

Type of organism isolated	Number of isolates	Percentage
1. <i>Staphylococcus aureus</i>	195	66.10%
2. <i>CoNS</i>	36	12.20%
3. <i>Streptococcus pyogenes</i>	30	10.16%
4. <i>Escherichia coli</i>	14	4.74%
5. <i>Klebsiellapneumoniae</i>	9	3.05%
6. <i>Pseudomonas aeruginosa</i>	8	2.71%
7. <i>Citrobacterspecies</i>	3	1.01%
Total	295	100%

Antibiotic sensitivity pattern of staphylococcus aureus was analysed to find the Penicillin G as the least resistant and Linezolid & Vancomycin as completely sensitive for all isolates.

Out of 195 *Staphylococcus aureus* isolated 23(11.7%) were Methicillin Resistant *Staphylococcus Aureus (MRSA)* by cefoxitin disc method.

4. Discussion

Present study was conducted for period of one year at hospital attached to MR Medical college, Kalaburagi in north Karnataka to study the bacteriological profile of pyoderma with its antibiogram.

Out of total 315 cases of pyoderma, Primary Pyoderma cases were 186(59%) and secondary pyoderma cases

Table 7: Antibiotic sensitivity pattern of Staphylococcus aureus

Antibiotics	Number of isolates sensitive	Percentage
1. Penicillin G	24	12.30%
2. Gentamicin	141	87.69%
3. Amikacin	156	80.0%
4. Erythromycin	99	50.7%
5. Ciprofloxacin	97	49.7%
6. Clindamycin	136	69.7%
7. Doxycycline	175	89.7%
8. Cotrimoxazole	107	54.8%
9. Linezolid	195	100%
10. Vancomycin	195	100%

were 129(41%) which was in accordance with the study conducted by Shanker Venkatesh BM et al.⁸ and Paudel et al.⁹ North Karnataka being a region with extremes of temperature, low socioeconomic status and overcrowded places may be reason for more secondary infections causing secondary pyoderma.

According to our study there was male preponderance with 60.96% compared to females with 39.04% and with Male to female ratio 1.56:1 which was in accordance with the study done by Shanker Venkatesh BM et al.⁸ Ghadage DP et al,¹⁰ Paudel et al.⁹ This could be due to comparatively more exposure and outdoor physical activities in males compared to females.

The most common age group seen in this study was 11 to 20yrs and 21 to 30 years which is in line with other studies such as Hulmani M et al.,¹¹ Ashokan C et al.,¹² Raturaj M K et al,¹³ and Nipa Singh et al.¹¹

Co-morbidities in the present study were found in 221 cases, Malnutrition being most common followed by diabetes which was comparable with study done by Singh A et al¹⁴ and Nipa Singh et al.¹¹ Hypertension was found in 20 cases only, but may not be associated directly in causing the pyoderma.

Of 315 cases, 295 cases showed growth of bacteria and 20 cases were culture negative. The negative cultures may be attributed to the factors such as inadequate sample or patient may be on antibiotics in near past and unable to recall the history which was also seen in study conducted by Shanker Venkatesh BM et al.⁸ Overall culture found be positive in 94% of cases making it necessary for all cases of pyoderma.

The most common organism isolated was *Staphylococcus aureus* 195(66.10%), followed by *CoNS* 36(12.20%), *Streptococcus pyogenes* 30(10.16%), *Escherichia Coli*14(4.74%), *Klebsiella pneumoniae* 09(3.05%), *Pseudomonas aeruginosa* 8(2.71%), *Citrobacter species* 3(1.01%). This finding was in line with studies done by Badabagni P et al,¹⁵ Haibati S et al,¹⁶ and Nipa Singh et al.¹¹ Gram positive bacteria were etiologic agent in 90% of pyoderma cases.

The antibiotic sensitivity pattern of *Staphylococcus aureus* with vancomycin and linezolid being 100% sensitive was in accordance with studies such as Ashulmani M et al.,¹⁷ Ashokan C et al.,¹² Raturaj M K et al.,¹³ and Nipa Singh et al.¹¹ Doxycycline and gentamicin sensitivity was found to be more when compared to other studies Singh A et al.¹⁴ but in line with Haibati S,¹⁶ Nipa Singh et al.¹¹ Overall most isolates of *S.aureus* were sensitive to vancomycin, linezolid, gentamicin, doxycycline and least sensitive to penicillin G.

Out of 195 *Staphylococcus aureus* isolated 23(11.7%) were MRSA by cefoxitin disc method which was slightly more than Malhotra SK et al.,¹⁸ and Nipa Singh et al.¹¹ and not comparable and differs from study done by Jayaraj YM et al.¹⁹ with 38.9%.

5. Conclusion

Pyoderma is an important public health issue and commonly seen in age group of 11-30 years with male preponderance. *Staphylococcus aureus* is most common organism causing pyoderma. Impetigo was found to be the most common type followed by furunculosis, folliculitis & ecthyma. 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.

6. Source of Funding

None.

7. Conflict of Interest

None.

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