

## Original Research Article

# Clinico, bacteriological study of pyodermas at a tertiary care hospital, Andhra Pradesh: one year study

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### ABSTRACT

**Background:** Most of the studies in India state that pyodermas constitute 17% of cases in regular practice. Pyodermas are classified as primary and secondary. Primary pyodermas account for infection on normal skin whereas secondary on preexisting skin disease. The spectrum of pathogens, are however changing constantly as such their resistance to antibiotics. Indiscriminate usage of antibiotics, topical or systemic has lead to the development of resistance among the pathogens, which is a big problem to the physicians. The present study was conducted to assess the magnitude of different types of pyodermas, clinical types, the causative agents and their antibiotic susceptibility pattern. The study also determines the prevalence of MRSA among pyodermas.

**Methods:** 375 newly diagnosed cases of pyodermas attending the OPD of department of Dermatology were enrolled in the study. A thorough clinical examination, demographic data, and relevant laboratory investigations were performed including culture and sensitivity.

**Results:** The incidence of pyoderma in our study was 1.55% with male preponderance and common in 21-30 years age group. Primary pyodermas (225 cases) outnumbered secondary pyodermas (150 cases). Lower limbs were the most common site of pyodermas. Furuncle followed by folliculitis was most common primary pyodermas. Infectious eczematoid dermatitis was the most common entity in secondary pyodermas. Staphylococcus was the most common isolate in the study followed by Coagulase negative staphylococcus. *Escherichia coli* were most common gram negative isolate. Among diabetics, furuncle was commonest with history of 100% recurrence. Incidence of MRSA in the study was 47%. Gram negative isolates were susceptible to Carbapenems, fluroquinolones and higher generation cephalosporins.

**Conclusions:** To conclude, our study highlighted the clinico epidemiological features of pyodermas attending our hospital. The common clinical types of primary and secondary pyodermas and associated risk factors were stated in the study. Etiological agents were identified in the study with antibiotic susceptibility, which especially assist the clinicians in selection of antibiotics in absence of culture and sensitivity.

**Keywords:** Primary pyoderma, Secondary pyoderma, MRSA, Furuncle, Folliculitis

### INTRODUCTION

Pyodermas defined as purulent infection of the skin constitutes one of the common clinical conditions encountered by dermatologists in regular practice. Most

of the studies in India state that pyodermas constitute 17% of cases in regular practice. Multiple factors like overcrowding, illiteracy, poor socio economic status, lack of hygienic practices account for personal factors in occurrence of pyodermas. Additional environmental

conditions like, excess humidity, moisture, are the reasons for more number of cases in hot and rainy seasons. Clinical conditions likely to cause immunosuppression like malignancy, diabetes, HIV are additional risk factors which predispose to increased risk of Pyodermas.<sup>1</sup>

Pyodermas are classified as primary and secondary. Primary pyodermas account for infection on normal skin whereas secondary on preexisting skin disease. The majority of these infections are caused by *Staphylococcus* and *Streptococcus*.<sup>2</sup> These are implicated in causing a wide range of infections, but the severity is dependable upon the immune status of the host, site of the lesion, age of the host etc. The spectrum of pathogens is however changing constantly as such their resistance to antibiotics. Indiscriminate usage of antibiotics, topical or systemic has led to the development of resistance among the pathogens, which is a big problem to the physicians.<sup>3</sup> So having knowledge of the pathogens in the area, their antibiotic susceptibility pattern helps and guides the physician in management and in prevention of further emergence of resistant strains.<sup>4</sup>

The present study was conducted to assess the magnitude of different types of pyodermas, clinical types, the causative agents and their antibiotic susceptibility pattern. The study also determines the prevalence of MRSA among pyodermas.

## METHODS

A hospital based, prospective cross sectional study was conducted by Department of Dermatology at Narayana Medical College and General Hospital, a tertiary care hospital for a period of one year from January 2015 to December 2015. The study was approved by the institutional ethical committee and all the procedures were done as per ethical guidelines. Written informed consent was obtained from all the participants after clear explanation of the study details. The demographic data, clinical history, duration of the disease, family history of disease, associated co morbidities (diabetes, immunosuppression, Malignancy etc.) were noted in a separate predesigned questionnaire sheet.

Patients of all ages and gender with a clinical diagnosis of pyoderma were included in the study. Patients with skin erosions and exudative or serous discharge were included in the study and patients who were on topical or systemic antibiotics were excluded from the study. All the relevant laboratory examinations including complete blood count, blood glucose levels and HIV status, Thyroid profile were performed as and when indicated and necessary. The results were noted in a separate proforma.

Discharge from the site was collected after cleaning with 70% alcohol using sterile swab and transported to the laboratory for culture and sensitivity. All the swabs were collected before starting of antibiotics. Gram staining was

performed and observed under microscope and results were noted. The growth on the culture plates were identified by standard CLSI guidelines and antibiogram was performed on Muller Hinton agar by using Kirby-Bauer disc diffusion method. The antibiotic sensitivity was interpreted as per CLSI guidelines.<sup>5,6</sup>

## Statistical analysis

All the data was entered in a Microsoft excel spread sheet and analyzed for variables. The mean of the age was calculated, and any variable with significance was observed. P value <0.005 was considered significant.

## RESULTS

Out of 24,286 patients who attended the dermatology OPD, 375 newly diagnosed cases, which fulfilled the inclusion criteria were enrolled in the study. The incidence of the condition was 1.55%. Out of 375 cases, males were 236 (62.9%) and females 138 (37.1%). The mean age of the study population was 34.67 years. Male to female ratio was 1.7:1. The most common age group in the study population was 11-20 years (35.2%) followed by 21-30 years (24%). Males were more common in the study and in all the age groups; however the difference was not statistically significant. 68.8% of the cases belonged to Class-III socioeconomic status as per B.G Prasad's classification (Table 1).<sup>7</sup>

**Table 1: Demographic characters of cases in the study.**

|                              | Male       | Female     | Total (%)   |
|------------------------------|------------|------------|-------------|
| <b>Age</b>                   |            |            |             |
| 1-10 years                   | 28         | 17         | 45 (12)     |
| 11-20 years                  | 82         | 50         | 132 (35.2)  |
| 21-30 years                  | 55         | 35         | 90 (24)     |
| 31-40 years                  | 36         | 18         | 54 (14.4)   |
| 41-50 years                  | 21         | 12         | 33 (8.8)    |
| >50 years                    | 14         | 7          | 21 (5.6)    |
| Total                        | 236 (62.9) | 139 (37.1) | 375         |
| <b>Socio economic status</b> |            |            |             |
| Upper class                  | 10         | 7          | 17 (4.53)   |
| Middle class                 | 62         | 38         | 100 (26.67) |
| Lower Class                  | 164        | 94         | 258 (68.8)  |
| <b>Comorbidities</b>         |            |            |             |
| Diabetics                    | 44         | 34         | 78 (20.8)   |
| HIV                          | 7          | 4          | 11 (2.93)   |
| Anaemia                      | 38         | 54         | 92 (24.53)  |
| Hypothyroidism               | 9          | 29         | 38 (10.13)  |

The different types of clinical presentation and characteristics are noted in Table 2. Most of the lesions were distributed on the lower limb (37.9%) followed by face and neck (23.2%). Pustule was the commonest type of lesion (50.1%) followed in order by nodule (24.5%).

Patients presented with multiple symptoms but discharge was the predominant associated feature (85.3%) followed by pain (66.1%).

**Table 2: Clinical characteristics of the lesions.**

| Site of the lesion | No  | %    |
|--------------------|-----|------|
| Face & neck        | 87  | 23.2 |
| Upperlimb          | 55  | 14.7 |
| Trunk              | 56  | 14.9 |
| Lower limb         | 142 | 37.9 |
| Genitalia          | 8   | 2.1  |
| Multiple           | 27  | 7.2  |
| Type of lesion     |     |      |
| Pustule            | 188 | 50.1 |
| Nodule             | 92  | 24.5 |
| Crusting & erosion | 61  | 16.3 |
| Abscess            | 22  | 5.9  |
| ulcer              | 12  | 3.2  |
| Symptoms           |     |      |
| Pain               | 248 | 66.1 |
| Itching            | 146 | 38.9 |
| Discharge          | 320 | 85.3 |
| Fever              | 128 | 34.1 |
| Multiple           | 215 | 57.3 |

The incidence of Primary pyodermas were seen more commonly (225 cases, 60%) than secondary pyodermas (150, 40%). Primary pyodermas were seen most frequently in the 21-30 years age group with 63 cases and

Secondary pyodermas were equally distributed with 33 & 34 cases in age group of >50 years and 11-20 years. Among primary pyodermas, furuncle was the commonest (102 cases, 45.3%) followed in order by folliculitis (56 cases, 24.9%), impetigo (29 cases, 12.9%) and less common were Abscess (8%), carbuncle (5.3%), cellulitis and ecthyma (1.8%). Impetigo was noticed most commonly among children <10 years of age. Among the secondary pyodermas, infectious eczematoid dermatitis was the most common entity (68 cases, 45.3%) followed by infected contact dermatitis (30 cases, 20%) and Non-healing ulcer (17.3%). Less commonly noticed cases were Infected scabies, which was seen more commonly in children <10 years (Table 3).

In our study, 78 cases (20.8%) were diabetics and 11 cases were HIV positive. None of the cases were observed with immunosuppressive conditions like malignancy, corticosteroid treatment in the study. 38 of the cases in the study were hypothyroid and on treatment. Estimation of Hb% revealed that 54 females and 38 males were suffering with anemia. Among 128 diabetics in the study, furuncle was the commonest pyoderma (28/78) followed by folliculitis (22/78). 44 of the diabetics gave history of recurrence of folliculitis and furuncle with 100% recurrence. Among HIV cases, 4 were in stage-1, 3 in stage-2 and 4 in stage-3. In cases of HIV furuncle and folliculitis were most common entities. Cellulitis was observed in 2 cases of anemia followed by furuncle and folliculitis.

**Table 3: Distribution of pyodermas in relation to age.**

| Entity                     | Age group in years |       |       |       |       |     | Total |      |
|----------------------------|--------------------|-------|-------|-------|-------|-----|-------|------|
|                            | 1-10               | 11-20 | 21-30 | 31-40 | 41-50 | >50 | No    | %    |
| <b>Primary pyodermas</b>   |                    |       |       |       |       |     |       |      |
| Furuncle                   | 6                  | 21    | 31    | 11    | 16    | 17  | 102   | 45.3 |
| Folliculitis               | 2                  | 2     | 22    | 16    | 8     | 6   | 56    | 24.9 |
| Impetigo                   | 13                 | 2     | 5     | 5     | 4     |     | 29    | 12.9 |
| Abscess                    |                    |       | 3     | 3     | 6     | 6   | 18    | 8.0  |
| carbuncle                  |                    |       | 2     | 4     | 4     | 2   | 12    | 5.3  |
| Cellulitis                 |                    |       |       | 2     | 1     | 1   | 4     | 1.8  |
| Ecthyma                    |                    |       |       | 1     | 1     | 2   | 4     | 1.8  |
| Sub Total                  | 21                 | 25    | 63    | 42    | 40    | 34  | 225   | 60   |
| <b>Secondary pyodermas</b> |                    |       |       |       |       |     |       |      |
| IED                        | 4                  | 9     | 11    | 8     | 14    | 22  | 68    | 45.3 |
| ICD                        | 2                  | 12    | 4     | 4     | 3     | 5   | 30    | 20   |
| Non healing ulcer          |                    | 9     | 7     | 4     | 4     | 2   | 26    | 17.3 |
| Infected scabies           | 6                  | 3     | 1     |       | 1     | 2   | 13    | 8.7  |
| Miscellaneous              | 1                  | 1     | 4     | 4     | 1     | 2   | 13    | 8.7  |
| Sub total                  | 13                 | 34    | 27    | 20    | 23    | 33  | 150   | 40   |
| Total                      | 34                 | 59    | 90    | 62    | 63    | 67  | 375   | 100  |

\*IED= Infectious eczematoid dermatitis, \*ICD= Infected contact dermatitis.

A total of 335 swabs (218 from primary pyoderma and 117 from secondary pyodermas) were collected and sent to microbiology laboratory for culture and sensitivity. 298 isolates were isolated from the swabs with 248 gram

positive organisms (83.22%) and 50 gram negative isolates (16.78%). No growth was observed from 24 swabs from primary pyodermas and 13 swabs of secondary pyodermas. Growth was observed in 194 cases

of primary pyodermas with 188 single isolate and 6 cases with two isolates. 104 swabs from secondary pyodermas were growth positive with 88 showing single isolate and 6 with two isolates.

Gram positive isolates were predominant in the study with staphylococcus aureus as the major isolate (55.70%) followed in order by coagulase negative *Staphylococcus* (12.75%). Less common gram positive isolates were

*Streptococcus hemolyticus* (9.4%) and *Enterococcus sps* (5.37%). *Escherichia coli* (8.72%), *Klebsiella pneumoniae* (4.03%), *Pseudomonas aeruginosa* (2.68%) and *Citrobacter* (1.34%) were gram negative isolates. In our study gram negative isolates were more common in secondary pyodermas than primary pyodermas whereas gram positive were predominant in primary pyodermas (Table 4).

**Table 4: Distribution of isolates from cases in the study.**

| Organism                                 | Primary pyoderma |              | Secondary pyoderma |              | Total cases |            |
|------------------------------------------|------------------|--------------|--------------------|--------------|-------------|------------|
|                                          | No               | %            | No                 | %            | No          | %          |
| <i>Staphylococcus aureus</i>             | 130              | 67.01        | 36                 | 34.62        | 166         | 55.70      |
| <i>Streptococcus hemolyticus</i>         | 20               | 10.31        | 8                  | 7.69         | 28          | 9.40       |
| <i>Enterococcus</i>                      | 8                | 4.12         | 8                  | 7.69         | 16          | 5.37       |
| <i>Coagulase negative staphylococcus</i> | 18               | 9.28         | 20                 | 19.23        | 38          | 12.75      |
| <i>Escherichia coli</i>                  | 10               | 5.15         | 16                 | 15.38        | 26          | 8.72       |
| <i>Klebsiella pneumoniae</i>             | 5                | 2.58         | 7                  | 6.73         | 12          | 4.03       |
| <i>Pseudomonas aeruginosa</i>            | 2                | 1.03         | 6                  | 5.77         | 8           | 2.68       |
| <i>Citrobacter SP</i>                    | 1                | 0.52         | 3                  | 2.88         | 4           | 1.34       |
| <b>Total</b>                             | <b>194</b>       | <b>65.10</b> | <b>104</b>         | <b>34.90</b> | <b>298</b>  | <b>100</b> |

Antibiotic sensitivity was performed for all the isolates in the study. *Staphylococcus aureus* was tested for methicillin resistance by cefoxitin disk and among 166 isolates in the study 78 (47%) were methicillin resistant isolates. None of them were resistant to vancomycin and linezolid. Antibiogram of gram negative isolates exhibited sensitivity to higher generation cephalosporins, fluoroquinolones and carbapenems.

**DISCUSSION**

Many of the studies conducted globally and in India have reported variable incidences of pyodermas, their risk factors and causative agents, indiscriminate usage of antibiotics have lead to the emergence of resistant strains and hence a detailed knowledge about the condition is necessary. In our study, the incidence was 1.55% which is lower than many studies, however comparable with the incidence of Singh et al who reported as 2.5% in his study.<sup>8</sup>

As reported by many studies, male preponderance was observed and the common age group was 21-30 years age group. These findings suggest males are more exposed to outside conditions with a relatively more risk for pyodermas and more number of cases in second decade may be due to more active life with games, work etc. Similar findings were reported by Bhaskaran et al and Khare et al in their studies.<sup>9,10</sup> Consistent with reports of many studies, in our study also primary pyodermas are more common than secondary.<sup>11</sup> Pyodermas were commonly observed in lower socio economic status in our study (68.8%) which is on par with findings of Gandhi et al.<sup>12</sup> Lower limb was the most common affected site in our study which may be due to increased risk of trauma during working conditions and while

playing in children. Jayaraj et al also reported the same in his study.<sup>13</sup>

Clinical types of primary and secondary pyodermas are variable in different studies. In our study, furuncle was the most common entity followed by folliculitis. Some of the studies have reported impetigo as the most common entity and findings of Patil et al reported furuncle as most common entity in his study.<sup>14</sup> Impetigo was observed most commonly in the first decade of life in our study as mentioned in the studies of Park et al and Parikh.<sup>15,16</sup>

Among the secondary pyodermas infectious eczematoid dermatitis was commonest clinical type, (45.3%) followed by infected contact dermatitis (20%). Findings of our study were in par with findings of Ahmed et al who also reported similar incidence and clinical types in his study.<sup>17</sup> However some of the studies reported Infected scabies and non-healing ulcers as common clinical types of secondary pyodermas in their study. In 20.8% of diabetics in the study, furuncle was the commonest type followed by folliculitis, and had history of recurrences. Mathews et al in his study mentioned the similar findings with recurrences in diabetics.<sup>18</sup> Anemia was the commonest co morbidity in our study (24.53%) and furuncle and folliculitis were observed as common clinical types which correlates with the findings of Lee et al in their study.<sup>19</sup>

In bacteriological analysis, most of the studies reported gram positive organisms as the common causative agents of pyoderma, while only few studies reported gram negative organisms as most common. Among the gram positive organisms earlier reports stated, *Streptococcus* as the most common pathogens, changing trends in the isolates now report *Staphylococcus aureus* as the most

common isolate of pyodermas. There has been an increasing trend in isolation of *Staphylococcus aureus* as etiological agent of pyodermas; our study also documented the same finding with *S. aureus* as the most common isolate in our study in both primary and secondary pyodermas. Our findings are on par with findings of Sachdev et al, Kandhari et al and Baslas et al, who reported *S. aureus* as the most common isolate in their studies with prevalence rates of 56%, 67% and 59% in pyodermas.<sup>20-22</sup> In our study, an increased incidence of MRSA was identified (77.10%), which signifies the increasing trend of MRSA in causing pyodermas. However most of the studies report an alarming rise of MRSA in causing pyodermas.<sup>23</sup> No resistance was observed to vancomycin and linezolid in the study. Coagulase negative *Staphylococcus* was the next most common isolate with 12.75% in our study which is similar to many studies.

*Escherichia coli* was the most common gram negative isolate with 8.72%, mostly isolated from cases of secondary pyodermas, reports from various studies confirms the same findings of our study. *Pseudomonas aeruginosa* was isolated from abscesses from cases of HIV indicating that as a common causative agent in cases of immune suppression. Gram negative isolates were highly susceptible amikacin, ceftriaxone, cefotaxime and carbapenems in our study.

To conclude, our study highlighted the clinico epidemiological features of pyodermas attending our hospital. The common clinical types of primary and secondary pyodermas and associated risk factors were stated in the study. Etiological agents were identified in the study with antibiotic susceptibility, which especially assist the clinicians in selection of antibiotics in absence of culture and sensitivity. The constant change of etiological agents their antibiogram requires constant supervision in near future also.

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