Original Research Article

A clinico-bacteriological study of pyodermas in pediatric population

Guneet Awal*, Tanreet Kaur

Department of Dermatology, Venereology and Leprosy, Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar, Punjab, India

Received: 20 November 2017
Accepted: 08 December 2017

*Correspondence:
Dr. Guneet Awal,
E-mail: guneetawal@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Pyoderma is the bacterial infection of skin and its appendages.¹ It is highly prevalent in pediatric age group.² Multiple factors like malnutrition, hot–humid climatic conditions, poverty, overpopulation and poor personal hygiene are the main culprits for making pediatric population more prone to both primary and secondary pyodermas.¹ Primary pyodermas include superficial bacterial infections like impetigo, folliculitis, furuncle, carbuncle etc. Whereas secondary pyodermas in children occur in diseased skin such as atopic dermatitis, scabies, insect bites etc. The injudicious use of antibiotics has resulted in emergence of resistant pyodermas.⁴ Despite discoveries of many new antibiotics, it is becoming difficult to curb the menace of resistant pyodermas. Thus it is mandatory to study the clinical and antibiotic spectra of common causative organisms. With this perspective, the present study was conducted to identify the bacteriological profile of pyodermas and their current susceptibility pattern in pediatric age group.

METHODS

In this cross sectional study on pyodermas, we evaluated 456 cases of pyodermas in pediatric population attending dermatology outpatient department of Sri Guru Ram Das Medical College over the period of 8 months from February 2016- October 2016. All cases of primary and secondary pyodermas in age group <15 years were included. Cases with history of any antibiotic use within last 7 days were excluded from the study. After thorough clinical examination of the skin lesions, under strict
aseptic conditions, exudate from the lesions was collected with sterile swab and transported immediately to microbiology lab for further processing.

For isolation and antibiotic susceptibility of bacteria, following procedures were done on the sample:

1) Gram staining.
2) Culture on various media like – nutrient agar, blood agar and Mc Conkey agar.
3) Antibiotic susceptibility testing using Kirby-Bauer disc diffusion method.3

RESULTS

Out of 456 cases of pyodermas in children, most cases (31.7%) were seen in the age group of 4-7 years followed by 12-15 years of age (26.5%). Males outnumbered females (M:F=1:7). Higher proportions (60.6%) of pyodermas were present in children belonging to lower socio-economic status. History of overcrowding was present in (57.2%) of pyoderma cases (Table 1).

Table 1: Demographic profile of cases.

| Age group (years) | Number of cases | Percentage of total number of cases (%) |
|-------------------|-----------------|----------------------------------------|
| 0-3               | 106             | 23.2                                   |
| 4-7               | 145             | 31.7                                   |
| 8-11              | 84              | 18.4                                   |
| 12-15             | 121             | 26.5                                   |

| Gender            | Number of cases | Percentage of total number of cases (%) |
|-------------------|-----------------|----------------------------------------|
| Male              | 289             | 63.3                                   |
| Female            | 167             | 36.6                                   |

| Socio economic status* | Number of cases | Percentage of total number of cases (%) |
|------------------------|-----------------|----------------------------------------|
| Upper                  | 28              | 6.1                                    |
| Upper middle           | 40              | 8.7                                    |
| Lower middle           | 111             | 24.3                                   |
| Upper lower class      | 179             | 39.2                                   |
| Lower class            | 98              | 21.4                                   |

| Overcrowding** | Number of cases | Percentage of total number of cases (%) |
|----------------|-----------------|----------------------------------------|
| Present        | 261             | 57.2                                   |
| Absent         | 195             | 42.7                                   |

*Kuppuswami classification; **persons per bedroom > 2 persons.

Table 2: Layout of different pyodermas.

| Type of pyoderma                  | Number of cases | Percentage of total number of cases (%) |
|-----------------------------------|-----------------|----------------------------------------|
| Primary pyoderma                  | 275             | 60.3                                   |
| Periporitis                       | 27              | 5.9                                    |
| Furuncle                          | 51              | 11.1                                   |
| Impetigo                          | 109             | 23.9                                   |
| Ecthyma                           | 11              | 2.4                                    |
| Cellulitis                        | 24              | 5.2                                    |
| Erysipelas                        | 13              | 2.8                                    |
| Folliculitis                      | 31              | 6.7                                    |
| Abscess                           | 9               | 1.9                                    |

| Total                             | 181             | 39.6                                   |
| Infected scabies                  | 68              | 14.9                                   |
| Infected atopic dermatitis        | 41              | 8.9                                    |
| Infected molluscum contagiosum    | 34              | 7.4                                    |
| Infected acne                     | 13              | 2.8                                    |
| Infected SJS                      | 8               | 1.7                                    |
| Infected exfoliative dermatitis   | 7               | 1.5                                    |
On categorisation of different pyodermas, primary pyodermas (60.3%) were more prevalent than secondary pyodermas (39.6%). Out of the primary pyodermas, impetigo was the most common (23.9%) followed by furunculosis (11.1%). Infected scabies (14.9%) was most frequently encountered cause of secondary pyoderma followed by infected atopic dermatitis (8.9%) (Table 2). Staphylococcus aureus (49.5%) was the most common organism isolated from these cases followed by Streptococcus (29.8%) (Table 3).

Majority of these gram positive organisms were sensitive to antibiotics like amoxiclav, ampicillin and linezolid. Whereas, amikacin, ceftriaxone and tobramycin remained antibiotic of choice for gram negative pyodermas caused by Escherichia coli (E. coli) and enterococcus (Table 4).

**DISCUSSION**

Pyoderma is a common presenting complaint for most dermatological consultations in pediatric age group. Different patterns of primary pyodermas encountered include impetigo, folliculitis, furuncle, carbuncle, abscess, periporitis etc. Out of these, impetigo (23.9%) outnumbered all other entities in the present study. This finding is in concordance to various other studies where incidence of impetigo was (19.67% - 24.2%). Whereas, in another study done on adult population commonest pattern observed was folliculitis. Scabies, molluscum contagiosum, atopic dermatitis with secondary infection are the common secondary pyodermas encountered in children. Incidence of secondary pyodermas was higher (39.6%) in the present study as compared to other studies.

---

**Table 3: Bacteriological analysis of pyodermas.**

| Gram status | Organism                  | Primary pyoderma | Secondary pyoderma | Total cases | Percentage of total isolate |
|-------------|---------------------------|------------------|-------------------|-------------|-----------------------------|
| Gram positive | Staphylococcus aureus     | 129              | 97                | 226         | 49.5                        |
|             | Coagulase negative        | 33               | 11                | 44          | 9.6                         |
|             | Staphylococcus            | 83               | 53                | 136         | 29.8                        |
|             | Streptococcus +           | 10               | 4                 | 14          | 3.0                         |
|             | Staphylococcus + streptococcus | 10       | 4                 | 14          | 3.0                         |
|             | Enterococcus              | 3                | 2                 | 5           | 1.0                         |
|             | Micrococcus               | 2                | 1                 | 3           | 0.6                         |
| Gram negative | Klebsiella               | 2                | 2                 | 4           | 0.9                         |
|             | Escherichia coli          | 3                | 3                 | 6           | 1.4                         |
|             | Pseudomonas aeruginosa    | 2                | 1                 | 3           | 0.6                         |
|             | Citrobacter               | 1                | 2                 | 3           | 0.6                         |
|             | Proteus                   | 1                | -                 | 3           | 0.6                         |
|             | No organism isolated      | 6                | 5                 | 11          | 2.4                         |
|             |                           | 275              | 181               | 456         | 100                         |

**Table 4: Antibiotic sensitivity pattern of isolated organisms.**

| Antibiotic tested | Staphylococcus aureus (%) | Coagulase negative staphylococcus (%) | Streptococcus (%) | Enterococcus (%) | E. coli (%) |
|-------------------|---------------------------|--------------------------------------|-------------------|------------------|-------------|
| Ampicillin+sulbactum | 92                        | 79                                   | 100               | 55               | 45          |
| Levofloxacin      | 18                        | 31                                   | 40                | 65               | 78          |
| Amoxiclav         | 85                        | 82                                   | 99                | 12               | 19          |
| Azithromycin      | 56                        | 33                                   | 63                | 34               | 49          |
| Linezolid         | 78                        | 79                                   | 66                | 65               | 56          |
| Ofloxacin         | 10                        | 12                                   | 30                | 44               | 43          |
| Vancomycin        | 71                        | 65                                   | 32                | 34               | 55          |
| Amikacin          | 65                        | 55                                   | 20                | 76               | 87          |
| Tobramycin        | 67                        | 43                                   | 24                | 80               | 79          |
| Cefotaxime        | 81                        | 52                                   | 62                | 81               | 77          |
| Ceftriaxone       | 80                        | 78                                   | 58                | 88               | 91          |
| Erythromycin      | 65                        | 56                                   | 43                | 50               | 51          |
| Ciprofloxacin     | 34                        | 41                                   | 52                | 61               | 69          |
| Clindamycin       | 67                        | 65                                   | 45                | 60               | 65          |
Pyodermas are seen more frequently in first decade of life as reported in many studies. Similarly, most cases in this study (31.7%) were seen in children belonging to age group 4-7 years followed by 12-15 years. In this study, males were affected more frequently than females as reported by others. Recurrent pyodermas in children is becoming troublesome day by day due to increased antimicrobial resistance and changing pattern of microbiology of pyodermas. Hence it is important to perform culture and susceptibility tests and treat accordingly with adequate dosage and duration of appropriate antibiotic. In present study, all cases were subjected to gram staining and culture before starting any empirical treatment with antibiotics. On gram staining majority of organisms (93.3%) were gram positive with S. aureus as most common isolate (49.5%) followed by Streptococcus. These finding were in concordance with other studies where Staphylococcus was isolated in (40%) cases. Thus, currently there is a shift from streptococcus to S. aureus as the leading cause of pyoderma. Among gram negative organisms (6.7%) most cases were due to E. coli (3.1%). This finding is similar to other studies. Culture results were negative in 11 patients which is similar to other studies. Over the counter availability of antibiotics and their inadvertent use facilitates development of resistance. In this study, strains of coagulase positive S. aureus and streptococcus were susceptible to ampicillin, amoxiclav, linezolid, ceftriaxone and cefotaxime whereas low susceptibility was observed to ofloxacin and levofloxacin. Coagulase negative strains of S. aureus were largely susceptible to penicillin group of antibiotics. On the other hand, gram negative isolates were highly susceptible to ceftriaxone and newer aminoglycoside group of antibiotics like tobramycin and amikacin. To conclude, knowledge regarding the causative organisms of various pyodermas and their susceptibility pattern helps in avoiding injudicious use of antibiotics.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Wolff K, Goldsmith LA, Katz SI. Fitzpatrick’s Dermatology in General Medicine. 8th ed. New York: McGraw Hill; 2012.
2. Bhat RM. Recurrent pyoderma in children. Indian J Paediatr Dermatol. 2012;13:53-4.
3. Vayalumkal JV, Jadavji T. Children hospitalized with skin and soft tissue infections. A guide to antibacterial selection and treatment. Pediatr Drugs. 2006;8:99-111.
4. Nagaraju U, Bhat G, Kuruvi S, Pai GS, Jayalakshmi, Babu RP. Methicillin-resistant Staphylococcus aureus in community-acquired pyoderma. Int J Dermatol. 2004;43:412-4.
5. Furtado S, Bhat RM, Rekha B, Sukumar D, Kamath GH, Martis J, et al. The clinical spectrum and antibiotic sensitivity patterns of staphylococcal pyoderma in the community and hospital. Indian J Dermatol. 2014;59:143-50.
6. Malhotra SK, Malhotra S, Dhaliwal GS, Thakur A. Bacteriological study of pyodermas in a tertiary care dermatological center. Indian J Dermatol. 2012;57:358-61.
7. Patil R, Baveja S, Nataraj G, Khopkar U. Prevalence of methicillin-resistant Staphylococcus aureus (MRSA) in community-acquired primary pyoderma. Indian J Dermatol Venereol Leprol. 2006;72:126-8.
8. Khare AK, Bansal NK, Dhruv AK, A clinical and bacteriological study of pyodermas. Indian J Dermatol Venereol Leprol. 1988;54:192-5.
9. Chen AE, Goldstein M, Carroll K, Song X, Perl TM, Siberry GK. Evolving epidemiology of pediatric Staphylococcus aureus cutaneous infections in a Baltimore hospital. Pediatr Emerg Care. 2006;22:717-23.
10. Thind P, Prakash SK, Wadhwa A, Garg VK, Pati B. Bacteriological profile of community-acquired pyoderma with special reference to methicillin resistant Staphylococcus aureus. Indian J Dermatol Venereol Leprol. 2010;76:572-4.
11. Alabi AS, Frielinghaus L, Kaba H, Kösters K, Huson MA, Kahl BC, et al. Retrospective analysis of antimicrobial resistance and bacterial spectrum of infection in Gabon, Central Africa. BMC Infect Dis. 2013;13:455.
12. Mathew SM, Garg BR, Kanungo R. A clinico-bacteriological study of primary pyodermas of children in Pondicherry. Indian J Dermatol Venereol Leprol. 1992;58:183-7.
13. Ray GT, Suaya JA, Baxter R. Microbiology of skin and soft tissue infections in the age of community-acquired methicillin-resistant Staphylococcus aureus. Diagn Microbiol Infect Dis. 2013;76:24-30.
14. Baslas RG, Arora SK, Mukhiya RD, Mohan L, Singh UK. Organisms causing pyoderma and their susceptibility patterns. Indian J Dermatol Venereol Leprol. 1990;56:127-9.
15. Sachdev D, Amladi S, Natraj G, Baveja S, Kharkar V, Mahajan S, et al. An outbreak of methicillin-resistant Staphylococcus aureus (MRSA) infection in dermatology indoor patients. Indian J Dermatol Venereol Leprol. 2003;69:377-80.

Cite this article as: Awal G, Kaur T. A clinico-bacteriological study of pyodermas in pediatric population. Int J Res Dermatol 2018;4:29-32.