

Original article

Assessment of Pattern of Antimicrobial Resistance among Primary Pyoderma Cases in Paediatric Patients: An Institution Based Study

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Abstract

Background: Staphylococcus aureus is one of the common causative agent causing primary pyoderma infection cases among paediatric patients. The incidence and prevalence of these organisms and infections is increasing with the passage of time despite the advent in the newer antibiotics. Hence, we assessed the various S.aureus caused primary pyodermas in paediatric patients in a tertiary health care centre.

Materials & Methods: The present study included assessment of the 180 paediatric patients that were suffering from primary pyodermas. Evaluation of the patients was done with primary skin infections followed by culturing and testing for antibiotic susceptibilities. Gram staining test was taken as the standard test for the assessment of the organisms present in the sample. Inoculation of all the samples was done in the blood agar plates and MacConkey agar plates. Recording of all the growth and culture characteristics was done and analyzed.

Results: Ecthyma was reported in 49.4 percent of the paediatric patients. Impetigo contagiosa was observed in 21.7 percent of the paediatric patients. Bullous impetigo was reported in 9.4 percent of the paediatric patients. Penicillin resistance was present in 90 percent of the subjects. Erythromycin and Methicillin resistance was observed in 78.9 and 11.1 percent of the paediatric subjects.

Conclusion: For controlling the increasingly spreading antimicrobial resistance, sensible and judicious use of antimicrobial agents is necessary.

Key words: Methicillin-resistant, Paediatric, Staphylococcus aureus

INTRODUCTION

One of the common causative agent causing primary pyoderma infection cases among paediatric patients is Staphylococcus aureus (S.aureus).¹ One of the primary nosocomial pathogen affecting the major proportion of the paediatric populations is the Methicillin-resistant Staphylococcus aureus (MRSA). The incidence and prevalence of these organisms and infections is increasing with the passage of time despite the advent in the newer antibiotics.² The pathogenicity of the S.aureus induced infections has been attributed to the increase in the capacity of the micro-organism along with the increase in its potential to colonize, produce a variety of virulent factors, acquire considerable amount of antimicrobial resistance and spread to a significant extent among various spectrum of patients.³

Although, the lists of nosocomial infections caused by S.aureus are of significant quantity, its role in causing various community-acquired infections is also well established. One of the prominent facts highlighted about the various S.aureus caused infections are the increasing trend of acquiring antimicrobial resistance. There has been emergence of community acquired methicillin-resistant S.aureus in the recent past among the

paediatric patients.⁴ Hence, we assessed the various S.aureus caused primary pyodermas in paediatric patients in a tertiary health care centre.

MATERIALS & METHODS

The present study was conducted in Department of Paediatrics, Santosh Medical College and Hospital, Ghaziabad, Uttar Pradesh(India) and included assessment of the paediatric patients that were suffering from primary pyodermas. A total of 180 paediatric patients were analyzed, who were affected with primary pyoderma caused by Streptococcus aureus (S.aureus). Inclusion criteria:

- Paediatric patients with less than 17 years of age
- Paediatric patients showing positivity for bacterial culture
- Paediatric patients giving history of untreated primary pyoderma from past one month
- Paediatric patients with negative history of any other systemic illness
- Paediatric patients without any known drug allergy

Procedure

Evaluation of the patients was done with primary skin infections followed by culturing and testing for antibiotic susceptibilities. Collection of the pus sample was done after the clinical

examination of the lesion areas of the paediatric subjects after completely disinfecting the site of collection of the sample by normal saline solution. Processing of the pus samples was done within first 60 minutes of the collection of the samples. Gram staining test was taken as the standard test for the assessment of the organisms present in the sample. Inoculation of all the samples was done in the blood agar plates and MacConkey agar plates. Incubation of the plates was done at 37 degree centigrade for one to two days followed by identification of the isolated bacteria using the standard procedures.⁵ Kirby–Bauer disk diffusion method was used for the identification of the antimicrobial sensitivity testing. All the results were analyzed by SPSS software. Univariate regression curve was used for the assessment of level of significance.

RESULTS

Table 1 shows various types of pyoderma. Ecthyma was reported in 49.4 percent of the paediatric patients. Impetigo contagiosa was observed in 21.7 percent of the paediatric patients. Bullous impetigo was reported in 9.4 percent of the paediatric patients. Table 2 shows the pyoderma isolates pattern. S.aureus was detected in 160 paediatric patients while remaining 180 patients showed presence of

S.aureus admixed with Beta-hemolytic streptococci. Table 3 shows antibiotic resistance pattern of S.aureus from pyoderma. Penicillin resistance was present in 90 percent of the subjects. Erythromycin and Methicillin resistance was observed in 78.9 and 11.1 percent of the paediatric subjects.

DISCUSSION

One of the wide spectrums of cutaneous diseases in paediatric patients is constituted by pyodermas. Pyodermas comprises of vast group of diseases including include impetigo, folliculitis, furuncle, carbuncle etc. etiological aspects of the primary pyoderma cases is being noted due to current trends of emerging antimicrobial resistance.⁶ S.aureus is the most commonly isolated micro-organism from pyoderma. These S.aureus causing pyoderma can be methicillin-sensitive S. aureus (MSSA) or methicillin-resistant S. aureus (MRSA).⁷ Hence, we assessed the various S.aureus caused primary pyodermas in paediatric patients in a tertiary health care centre.

In the present study, we observed in cases of commonly used antibiotics, a high rate of antimicrobial resistance occurs (Table 2, Table 3). This resistance occurred against agents such as penicillin including MRSA isolates. Our results were in correlation with the results obtained by Sardana et

al.⁸Nagaraju et al assessed the rate of occurrence of MRSA in community acquired pyoderma patients. They analyzed 250 patients who were affected with community acquired pyoderma who reported in the camps from 2000 to 2001. They collected the skin swabs from those patients followed by their inoculation into the blood agar plates. They observed that out of 250 subjects they studied, in more than 80 percent of the patients, S. aureus was isolated. More than 10 percent of the subjects had methicillin resistant S.aureus. From the results, they concluded that in the community, emergence of MRSA is an alarming signal. Recurrent pyoderma might occur due to high nasal carriage rate.⁹Patil et al evaluated the frequency of occurrence of MRSA infection in primary pyoderma cases. They conducted this prospective survey in a tertiary health care centre by analyzing 86 patients who were suffering from primary pyoderma. They did sensitivity testing for vancomycin, sisomicin, gentamicin and various other agents. For MRSA positive strains, they did phage typing. They observed that in more than 80 percent of the patients, culture was positive. Except for two cases, they isolated Staphylococcus aureus in all the subjects. From the results, they concluded that in cases of community acquired primary pyoderma cases;

treatment with MRSA active antibacterial agents is probably unwarranted.¹⁰Chen et al assessed the clinical manifestations of community acquired MRSA in paediatric patients in Taiwan. They evaluated 191 paediatric patients from 2000 to 2001 who received 198 episodes of S.aureus infection. They retrospectively analyzed medical records of these paediatric subjects. They observed that in more than 45 percent of the patients out of 114 community acquired subjects, MRSA was the etiological agents. From the results, they concluded that among paediatric patients with community acquired infections in Taiwan, MRSA was commonly present.¹¹Gubbay et al analyzed the data on the paediatric patients affected by gentamicin-susceptible methicillin-resistant Staphylococcus aureus (GS-MRSA). They retrospectively assessed patients with GS-MRSA from 2001 to 2002 and with the help of Vitek 2 system, did susceptibility testing. Confirmation of MRSA was done by polymerisation chain reaction. They also performed phage typing. They observed that during the early period of the study, MRSA was isolated in 85 percent of the subjects with S.aureus. They identified 100 MRSA infections in 98 paediatric patients. Non-multidrug resistance was observed in 99 isolates. They detected Enterotoxin genes in one

fourth of the isolates. From the results, they concluded that in New South Wales; GS-MRSA is a significant problem among children.¹² King et al evaluated the proportion of infections caused by MRSA among patients with various skin infections. They analyzed 384 patients in which microbiological confirmation of the S.aureus skin infections was done. They used pulsed-field gel electrophoresis and antimicrobial susceptibility patterns to classify the patients with S.aureus infections epidemiologically. They reported that in 389 patients, S.aureus causing skin infection was present. They

reported that in more than 70 percent of the patients, MRSA was present. They identified MRSA among more than 60 percent of the S.aureus positive patients. From the results, they concluded that community onset S.aureus infection was caused predominantly by CAMRSA USA clone 300.¹³

CONCLUSION

From the above results, the authors concluded that for controlling the increasingly spreading antimicrobial resistance, sensible and judicious use of antimicrobial agents is necessary. However, future studies are recommended.

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Table 1: Various types of pyoderma

Type	Number of paediatric subjects	Percentage
Ecthyma	89	49.4
Impetigo contagiosa	39	21.7
Folliculitis	35	19.5
Impetigo	17	9.4
Total	180	100

Graph 1: Various types of pyoderma

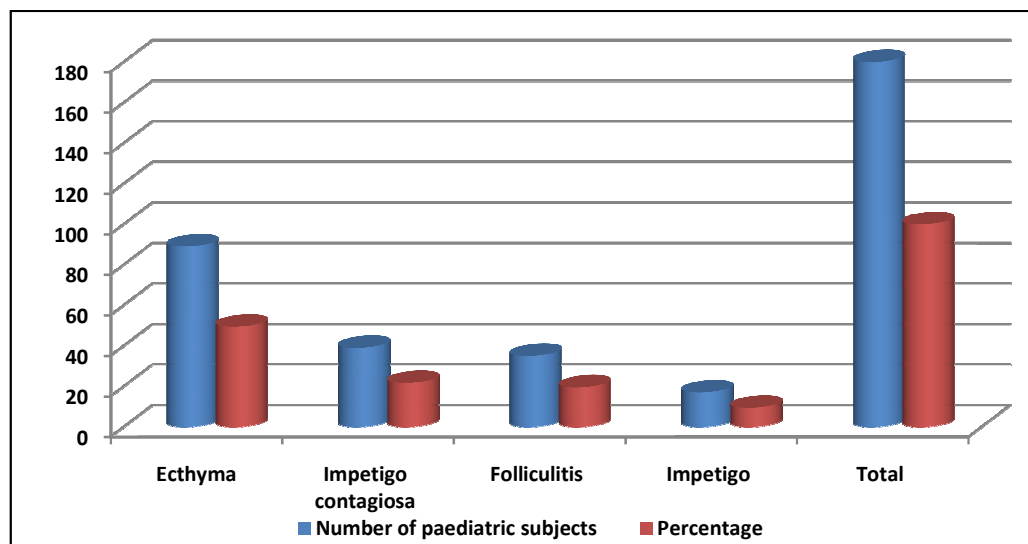


Table 2:Pyoderma isolates pattern

Number of isolates	Number of paediatric patients	Percentage
S.aureus	160	88.9
S.aureus with Beta-hemolytic streptococci	20	11.1
Total	180	100

Graph 2:Pyoderma isolates pattern

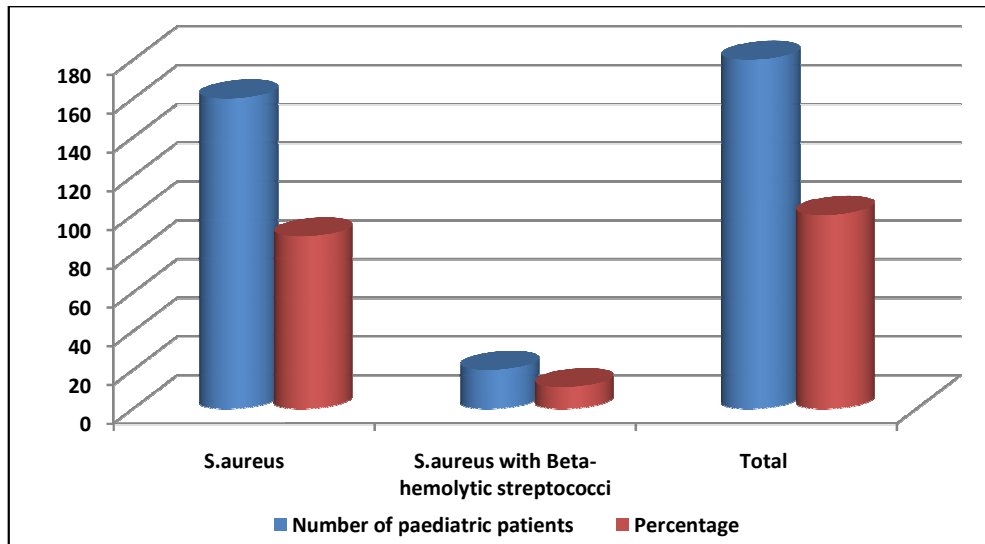
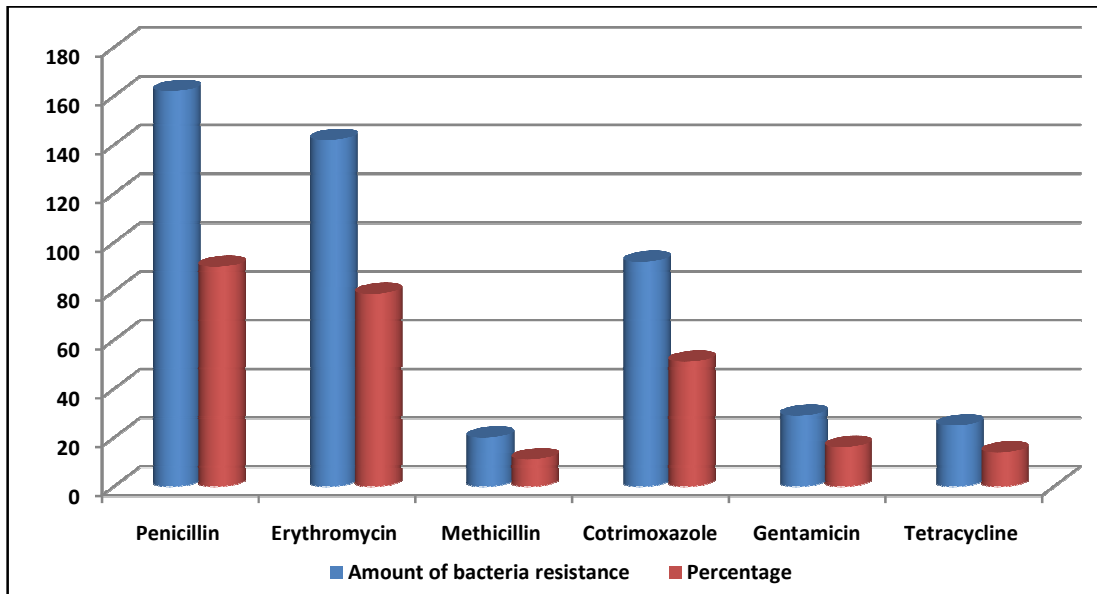


Table 3: Antibiotic resistance pattern of S.aureus from pyoderma

Antibiotic	Amount of bacteria resistance	Percentage
Penicillin	162	90
Erythromycin	142	78.9
Methicillin	20	11.1
Cotrimoxazole	92	51.1
Gentamicin	29	16.1
Tetracycline	25	13.9

Graph 3: Antibiotic resistance pattern of S.aureus from pyoderma



This original research work was conducted by Dr. SujataTalan, Assistant Professor, Department of Paediatrics, Santosh Medical College and Hospital, Ghaziabad, UP and Dr. Anupam Sharma, Assistant Professor, Department of Medicine, Shri Ram MurtiSmarak Institute of Medical Sciences, Bareilly, UP.

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