EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

CLINICO-BACTERIOLOGICAL PROFILE AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF PYODERMA IN A TERTIARY CARE HOSPITAL

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ABSTRACT
Pyoderma is one of the commonest clinical, caused by gram positive cocci and gram negative organisms. The objective of the study was conducted to analyse the clinical and bacteriological aspects clinical types, the causative agents and their antibiotic susceptibility pattern. A total of 200 pus samples were included in this study and preceded for isolation and identification of bacterial pathogens. The antimicrobial susceptibility testing was performed. Out of the 200 cases, impetigo constituted 53%, superficial folliculitis 40%, furuncle 6%, and carbuncle 1% cases respectively. The frequency of cases in relation to age were found to be maximum in the age group of less than 10 years. The prevalence rate was higher in male. We found, scabies was seen to be commonest. The low socio-economic class was seen to be very commonly affected and most common isolated organism was *Staphylococcus aureus* and *Klebsiella* species, which were most sensitive to vancomycin and ciprofloxacin respectively. Therefore, a correct antibiotic policy and the avoidance of inappropriate anti-microbial usage are mandatory.

KEYWORDS: Pyoderma, Antibiotic susceptibility testing, prevalence, sex, age.

INTRODUCTION
Pyoderma is one of the commonest clinical conditions encountered in dermatological in regular practices.[1] Prodermas are the purulent skin conditions caused by bacterial infections. Pyodermas are classified as primary and secondary. Primary pyoderma is a pyogenic infection of the normal skin and its appendages. It constitutes impetigo contagiosma, bullos impetigo, ecthyma, superficial follicultis, furunculosis and carbuncle. Secondary proderma includes infected scabies, infectious excematoid dermatitis etc. Various factors like poverty, malnutrition, overcrowding, and poor hygiene have been recorded to be responsible for its higher incidence in the lower socioeconomic class.[2] Climatic conditions also play a major role. Changing trends are being noted in the etiological aspects of primary pyodema, and the problem of emergence of drug resistance strains is an even increasing one. The majority of these infections are caused by gram positive cocci and less commonly by gram negative organisms.

These are implicated in causing a wide range of infections, but severity is dependable upon the immune status of the host, site of lesion, age of host etc. The spectrum of pathogens is 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 spectrum of pathogens is however changing constantly as their resistance to antibiotics. Indiscriminate usage of antibiotics, topical or systemic had lead to the development of resistant among the pathogens, which is a big problem to the physicians. So having 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.[3] It would be ideal to do culture and antibiotic sensitivity tests before prescribing antibiotics, but this is not always feasible, studies should be conducted to determine the etiological agents and antibiotic resistance. The present study was conducted to analyse the clinical and bacteriological aspects clinical types, the causative agents and their antibiotic susceptibility pattern. The study also determines the prevalence of MRSA among prodermas.

MATERIALS AND METHODS
A retrospective study was conducted at department of microbiology and skin VD for the period of one year. A total of 200 pus samples were obtained from department of Skin and VD. Comprehensive history was taken

alongwith physical and the dermatological examination of the all the patients. Patients with skin lesion with formation of pus were included and patients with lesion without pus were excluded from the study. All the samples were collected aseptically with two no growth cotton swabs for each sample from the lesion, which were proceeded for isolation and identification of bacterial pathogens, according to the standard microbiological techniques. Gram stain preparation was made from one swab, and culture plate was inoculated from another swab. Each sample was inoculated on blood agar, MacConkey agar and mannitol salt agar. On the above media and reagents obtained from Himedia, Mumbai, India. The media were prepared according to manufacture instructions. The culture plates were incubated at 37°C for 18-24 hours in an incubator. The plates were observed for growth the following day but incubation was extended to 48 hours if there was no bacterial growth within 24 hours. Isolated colonies were subjected to gram staining and biochemical tests for identification. Identification was carried out by standard biochemical tests.[4] The antimicrobial susceptibility testing was performed on muller hinton agar by Kirby disc diffusion method as per Central Laboratory Standards Institute (CLSI) guidelines.[5]

Detection of methicillin resistant *Staphylococcus aureus*
The methicillin resistance in *Staphylococcus aureus* isolates was tested according to CLSI guidelines. [5] Disc diffusion test for the antibiotics cefoxitin -30 μg was performed. The zone diameter of less than 22 mm was taken as resistant and a zone of more than 23mm was taken as sensitive.

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

RESULT
Out of the 200 cases of pyoderma, impetigo constituted 106 (53%) cases, superficial folliculitis 80 (40%) cases, furuncle 12 (6%) cases, and carbuncle 2 (1%) cases respectively [Table 1]. The frequency of cases in relation to age is shown in Table 2. The number of cases were maximum in the age group of less than 10 years (58%), followed by the age group of 11−20 years (19%), 21-30 years (13%), 31-40 years (06%), 51-60 years (2%), 41-50 years (1%), and > 60 years (0.5%) respectively. We also correlated the relationship between pyoderma and sex. The prevalence rate was higher in male (61%) patients compared with females (39%). Among the various diseases that were found to be associated with primary pyoderma, scabies was seen to be commonest in 22 (11%) cases. The other diseases in descending order of cases were dermatophytosis 4 (2%), diabetes mellitus 3 (1.5%), vitiligo 2 (1%), acne 1 (1%), and molluscum contagiosum 1 (0.5) [Table 3].

The low socio-economic class was seen to be very commonly affected in 131 (65.5%) cases. The middle class was affected in only 60 (30%) while 9 (4.5%) cases belonged to the upper class. Out of 200 specimens, most common isolated organism was *Staphylococcus aureus* (145, 74.5%), followed by β-hemolytic *Steptococci* (8, 4%), *Klebsiella* species (9, 4.5%), *Escherichia coli* (7, 3.5%), *Psuedomonas aeruginosa* (5, 2.5%) and Citrobacter species (4, 2%) respectively. There was no growth in 22 (11%) samples [Table 4].

The study of the individual pyoderma in relation to the causative organisms revealed that impetigo (106 cases) was found to be caused by *Staphylococcus aureus* (82) followed by β-hemolytic *Steptococci* (06), *Klebsiella* species (02), *Escherichia coli (02), Pseudomonas aeruginosa* (01), *Citrobacter* species (01) and no growth (12). Superficial follicultis (80 cases) was found to be caused by *Staphylococcus aureus* (53) followed by β-hemolytic *Steptococci* (02), *Klebsiella* species (06), *Escherichia coli (05), Psuedomonas aeruginosa* (03), *Citrobacter* species (02) and 9 samples showed no growth. Furuncle (12 cases) was found to be caused by *Staphylococcus aureus* (08) followed by *Klebsiella* species (01), *Psuedomonas aeruginosa* (01), *Citrobacter* species (01) and only 01 sample showed no growth. All the 02 cases of carbuncle showed yield of *S. aureus.* Antibiotic susceptibility testing was performed for the isolates. We found that, *S. aureus* was sensitive to vancomycin (95.25%) followed by ceftriaxone (92.45%), cefoperzone/sulbactum (92.20), gentamicin (91.10%), amoxyclav (89.45%), doxycyclin (82.5%), ciprofloxacin (70.5%), cefuroxime (56%), erythromycin (52.10%), co-trimoxazole (46.22%), amoxicillin (28.10%), and cefixime (28%) respectively.

Among the gram negative bacteria, most isolates showed resistance to cefepime (78%), amoxicillin (72%), and co-trimoxazole (47%). A total of 67% of isolates were sensitive to ciprofloxacin and doxycycline. Out of 145 isolates of *S. aureus,* 98 (67.58%) were methicillin sensitive (MSSA) and 47 (32.42%) were methicillin resistant (MRSA). When comparing the different types of pyoderma and their association with MRSA, it was seen that out of 82 impetigo cases, 48 (58.54%) were MSSA and 34 (41.46%) isolates were MRSA, whereas out of 53 isolates of superficial folliculitis, MSSA found in 40 (75.47%) and MRSA in 13 (25.53%), 08 isolates of furunculosis, MSSA found in 5 (62.5%) and MRSA in 3 (37.5%), and all the isolates (02) of carbuncles were MSSA. This data clearly indicates the increasing incidence of MRSA in cases from impetigo to furuncle i.e. 41.46%, 25.53%, and 37.5% respectively.

Table 1: Sex Distribution of the Primary Pyoderma.

Cases	Male (No./Percentage)	Female (No./Percentage)	Total
Impetigo	62 (58.49)	44 (41.51)	106
Superficial folliculitis	48 (60)	32 (40)	80
Furuncle	10 (83.33)	02 (16.67)	12
Carbuncle	02 (100)	0	02
Total	122	78	200

Table 2: Age Distribution of The Primary Pyoderma

Age (years)	No. of cases	Percentage
0-10	116	58
11-20	38	19
21-30	26	13
31-40	12	06
41-50	02	01
51-60	04	02
61-70	01	0.5
71-80	01	0.5
Total	200	100

Table 3: Distributions of Associated Diseases With Pyoderma.

Diseases	No. of cases	Percentage
Scabies	22	11
Vitiligo	02	01
Diabetes mellitus	03	1.5
Dermatophytes	04	02
Acne	02	01
Molluscus contagiosum	01	0.5
Total	34	17

Table 4: Bacteriological Analysis of The Primary Pyoderma.

Organisms	Impetigo	Superficial folliculitis	Furuncle	Carbuncle
Staphylococcus aureus	82	53	08	02
Beta-hemolytic *Streptococcus*	06	02	-	-
Klebsiella species	02	06	01	-
Escherichia coli	02	05	-	-
Pseudomonas aeruginosa	01	03	01	-
Citrobacter species	01	02	01	-
No growth	12	09	01	-

DISCUSSION

Many of the studies conducted globally have reported variable incidences of pyoderma, their risk factors and causative agents, indiscriminate usage of antibiotics, which has lead to the emergence of resistant strains.[1,2] Therefore, the extensive knowledge about the condition is necessary. Our study showed that the overall incidence of impetigo was maximum among pyoderma. Impetigo was mainly seen in first decade of life while the lesion of superficial folliculitis were found more in 2nd and 3rd decade of life. *S. aureus* was the most common causative agent in all types of primary pyoderma in this study. Maximum cases (53%) were of impetigo followed by superficial folliculitis (40%), furunculosis (6%), and carbuncle (1%) respectively. Our findings are almost similar to Ghadage DP *et al*, who showed that the maximum cases included in their study were of impetigo (39%) followed by superficial folliculitis (13%), and carbuncle (1.5%), respectively.[6] Although, Bhaskaran *et al*. found that superficial folliculitis (25.9%) was the most common pyoderma followed by impetigo (16.36%) and furunculosis (4%).[7] When factors such as age and sex of the patient were considered, we found the occurrence of pyoderma to be higher in males and in patients in the age group below 10 years. Which is similar to another study done by Andrews RM et al.[8] In our study, culture showed growth of *S. aureus* (72.5%) followed by β-hemolytic *Streptococi* (4%)*, Klebsiella*

spp (4.5%)*, E. coli* (3.5%)*, P. aeruginosa* (2.5%), *Citrobacter* species (2%) and 11% were no growth. Bhaskaran *et al*. also reported 48.6% incidence of *S. aureus*.[7] Ghadage *et al*. and Parikh *et al*. found *S. aureus* in 67% and 97% cases, respectively.[6,9] *S. aureus* was sensitive to vancomycin (95.25%) followed by ceftriaxone (92.45%), cefoperzone/sulbactum (92.20%), gentamicin (91.10%), amoxyclav (89.45%), doxycyclin (82.45%), ciprofloxacin (70.5%), cefuroxime (56%), erythromycin (52.10%), co-trimoxazole (46.22%), amoxicillin (28.22%), and cefixime (28%) respectively. Thus, overall, it has been found to be more sensitive to vancomycin, gentamicin, ceftriaxone, and amoxyclav. Widespread amoxicillin and cefixime resistance have emerged due to their extensive use and the emergence of penicillinase producing strains. Ramana *et al*. also reported that *S. aureus* was 100% sensitive to vancomycin, gentamicin, ciprofloxacin, and 81% and 8% sensitive to cefdinir and ampicillin, respectively.[10] Many reports from India and Asia have highlighted the prevalence of MRSA in the hospital as well as community acquired pyoderma. In our study, MSSA and MRSA were found in 67.58% and 32.42% cases, respectively, of *S. aureus* isolates. Nagaraja *et al*. reported an isolation rate of MRSA as 10.9% from community acquired infection in India.[1,2,7,10,11]

CONCLUSION

Primary pyoderma the most commonly affected in children in their first decade of life, and males were more affected than females. The cases were commonly from the lower socio-economic strata of society. *S. aureus* was the commonest causative agent, and the emergence of MRSA in the community is a warning. A correct antibiotic policy and the avoidance of inappropriate anti-microbial usage are mandatory to reduce the spread of MRSA in the community.

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