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Clinico-microbiological study of pyodermas and abscesses

Microbiology

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ABSTRACT

Pyodermas are bacterial infections of the skin infection mostly caused by Staphylococcus aureus.. Various factors like poverty, malnutrition, overcrowding, and poor hygiene have been stated to be responsible for its higher incidence in the lower socio-economic class. Changing trends are being noted in the epidemiological aspect of pyodermas and the problem of emergence of increased drug resistant strains is being observed recently. One hundred and sixteen patients were studied to find out the pattern of pyodermas and their antibiotic sensitivity pattern in this geographic region. The most common isolated organism was S. aureus. Vancomycin, amikacin, ceftriaxone, sulbactum, nitrofurantoin, gentamicin, and amoxyclav showed higher sensitivity as compared to cefixime, ciprofloxacin, cefuroxime, doxycyclin, erythromycin, co-trimoxazole, and amoxycillin. It would be ideal to do culture and sensitivity tests before prescribing antibiotics, but as this is not always feasible, studies should be conducted to determine the changing trends in etiological agents and antibiotic resistance.

KEYWORDS:

Introduction

Pyoderma, both primary and secondary, are quite common bacterial infections seen in India. They are mostly caused by staphylococcus aureus, streptococci pyogenes or both. Staph aureus pyodermas occur mostly in individuals who are nasal carriers of the organisms, which when translocated onto the skin, is able to gain infections. Group A streptococcal pyodermas occur following colonization of the skin either from the skin of another individual colonized with group A streptococci or less likely from the patient's nasopharynx. Both superficial or invasive soft tissue infections may occur depending on the virulence of the organisms and various host immune factors. Various factors like poverty, malnutrition, overcrowding, and poor hygiene have been stated to be responsible for its higher incidence in the lower socio-economic class. Climatic conditions also play a major role.[1] Changing trends are being noted in the etiological aspects of primary pyoderma, and the problem of emergence of drug resistance strains is an even increasing one. The present study was planned to study the bacterial infections of skin in the patients from this part of country and find out the antibiotic sensitivity profile of pathogenic bacteria in pyoderma.

Materials and Method

A total of 116 clinically diagnosed cases of bacterial infection including folliculitis, abscess, and ulcers who were not on any topical or systemic antibiotics therapy in the preceding 10 days were included in the study. A detailed history of the disease especially about skin lesions including their duration and distribution over the body was noted in each patient. Open skin lesions or lesion from which crust was removed were selected for pus culture examination. All the samples were collected aseptically with two sterile cotton swabs for each sample from the lesion, which were processed for isolation and identification of bacterial pathogens, according to the standard microbiological techniques.[2] Gram stain preparations were made from one swab, and culture plates were inoculated from another swab. The plates were incubated at 37°C for 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 according to the standard biochemical tests.[2] Anti-microbial susceptibility test was carried out on isolated and identified colonies by the disk diffusion method, according to the Central Laboratory Standards Institute (CLSI) guidelines.[3,4]

Observation

There were 68 males and 48 females. The age of the patients ranged from 4 years to 66 years with the mean age of 25.67 yrs. A maximum of 44% patients belonged to 1-15 years of age followed by 22% patients in 16-30 years of age group. The duration of disease ranged from 2 days to 4 months. Out of 116 cases of pyoderma, Folliculitis constituted 37 (31.9%) cases, ulcers 34 (29.3%) cases, impetigo 22 (18.9%) cases, furunculosis 14 (12%) cases, and carbuncle 4 (3.4%) cases, respectively [Table 1].

Majority (78%) of the patients presented within 15 days of onset of disease. 84 (72.4%) patients were from urban area while 32 (27.6%) patients belonged to rural area. 78 (67.2%) of our patients belonged to low socio-economic group, followed by 32 (27.6%) patients in middle socio economic group and only 6 (5.2%) of upper economic group. Face (46%) & extremities (45%) were the most commonly affected areas followed by trunk (36%), scalp (16%) and neck (4%) of the cases. 82 (71%) patients had primary pyoderma while only 29% patients had secondary pyoderma.

A positive culture of the organisms was obtained in 107 patients. The most common isolated organism was S. aureus in 101 cases (94.39%), β hemolytic streptococci in 8 cases (7.47%), Klebsiella sp. In 18 cases (16.8%), E. coli in 9 cases (8.4%), and P. aeruginosa in 5 cases (4.7%). There was no growth in 9 (7.7%) samples. Group A streptococci was seen in only 8 (7.47%) smears and gram negative rods were present in 32 (29.9%) patients [Table 2]. A single infecting organism was isolated from 93 (86.5%) cases, more than one type of organism from 14 cases (13.5%). Coagulase positive methicillin-sensitive (MS) Staphylococcus was isolated from 52 (48.6%) cases, coagulase positive methicillin resistant (MR) Staphylococcus in 14 (13.1%) cases, coagulase negative MS Staphylococcus in nine 25 (23.4%) cases, coagulase negative MR Staphylococcus in 2 (1.87%) case.

The S. aureus was found sensitive to vancomycin (97%) followed by amikacin (95%), ceftriaxone (89%), sulbactum (87%), nitrofurantoin (86%) gentamicin (86%), amoxyclav (84%), cefixime (73%), ciprofloxacin (71%), cefuroxime (68%), doxycyclin (65%), erythromycin (64%), co-trimoxazole (56%), oxy-tetracycline (52%) and amoxycillin (45%), respectively. Among the gram-negative bacteria, most isolates showed resistance to amoxycillin (68%), and cotrimoxazole (46%).

Discussion

Pyoderma has become a significant cause of skin infections, specially in immunocompromised persons, after trauma, invasive procedures or chemotherapy. Impetigo was more commonly seen in school going children while folliculitis was more common in young adults. Cruickshank[5] reported that 75% of cases of non-bullous impetigo occur amongst children aged 5-9 yrs. The overall incidence of pyoderma was maximum in the children in 1-15 years of age group constituting (62.8%) of all the cases. Dajani et al[6] and Tan et al[7] also observed a higher incidence rate of pyodermas in children as compare to adult and elderly. Low socio economic status associated with poor hygiene as a pre-disposing factor was seen in 67.2% of cases in the present study has also been observed by Masawe et al[8] & Kaker et al.[9]

Our study showed that the overall incidence of folliculitis and 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. Maximum cases (53%) were of superficial folliculitis (31.93%) followed by ulcer (29.3%), impetigo (18.96%), furunculosis (12.06%), and carbuncle (3.44%) respectively. These findings are almost similar to Bhaskaran et al[10] who also found that superficial folliculitis (25.9%) was the most common pyoderma followed by impetigo (16.36%) and furunculosis (4%). Ghadage et al,[11] however, showed that the maximum cases included in their study were of impetigo (39%) followed by superficial folliculitis (13%), and carbuncle (1.5%), respectively. Mathew et al[12] also concluded the same findings. In contrast, 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 15 years. Lawrence et al.[13] also observed in their study that children less than 5 years age had the greatest prevalence of lesions. Recently, many authors also reported pyoderma to be more common in the first decade of life.[14,15]

Face (46%) & extremities (45%) were the most commonly affected areas followed by trunk (36%), scalp (16%) and neck (4%) of cases, in the present study. Gandhi et al[16] also found that the lower extremities were involved in 60% cases followed by head (47.5%), upper extremities (21.5%), and trunk (12.5%) respectively. These results follow the trends seen in the older studies.[17,18] Dajani[6] and Masawe et al[8] also observed that extremities were the most commonly affected sites, however head & face was affected in 5% & 12 % cases, respectively.

S. aureus and Streptococci are considered to be the main etiological agents of cutaneous bacterial infections[19] and these have been isolated in different proportions of cases in studies in India and abroad.[12,20, 21, 22] Dillon et a1[23] in their studies of pyodermas in children found streptococci to be the major cause of impetigo. However, later studies[24,25] as well as this study indicate that Staphylococcus aureus is the predominant causative organism in most types of pyodermas. S. aureus (94.4%) was the most common causative agent in all types of primary pyoderma in this study. Bhaskaran et al[10] also reported 48.6% incidence of S. aureus. Ghadage et al[11] and Parikh et al[25] found S. aureus in 67% and 97% cases, respectively. Coagulase positive methicillin-sensitive (MS) Staphylococcus was isolated from 52 (48.6%) cases, coagulase positive methicillin resistant (MR) Staphylococcus in 14 (13.1%) cases, coagulase negative MS Staphylococcus in nine 25 (23.4%) cases, coagulase negative MR Staphylococcus in 2 (1.87%) cases in the present study. A high incidence of coagulase positive Staphylococcus in pyoderma has been reported by several workers.[12,26] Coagulase negative strains have also been reported to be etiological agents.[27,28]

S. aureus was sensitive to vancomycin in 97 cases (96.03%) followed by ceftriaxone (94 cases, 93.06%), sulbactum (93 cases, 92.07%), gentamicin (91 cases, 90.09%), amoxyclav (88 cases, 87.12%), doxycyclin (86 cases, 85.14%), ciprofloxacin (77 cases, 76.23%), cefixime (67 cases, 66.33%), erythromycin (64 cases, 63.36%), co-trimoxazole (56 cases, 55.44%), and amoxycillin (52 cases, 51.48%), respectively. Thus, overall, it has been found to be more sensitive to vancomycin, gentamicin, sulbactum, and amoxyclav. Widespread amoxycillin and cefixime resistance have emerged due to their extensive use and the emergence of penicillinase producing strains. Ramana et al[29] also reported that S. aureus was 100% sensitive to vancomycin, gentamicin, ciprofloxacin, and 81% and 8% sensitive to cefdinir and ampicillin, respectively. Most of the strains were found to be resistant to one or more antibiotics. Penicillin resistance of coagulase positive staphylococci has been reported by several workers.[12,18] Most of organisms were highly sensitive to the newer antibiotics while showing low susceptability or resistance to the conventional antibiotics.[17,30,31]

Conclusion

In conclusion, this study gives an indication of the present state of pyodermas in this part of the world. Most of the strains were found to be resistant to one or more antibiotics. Penicillin resistance of coagulase positive staphylococci has been reported by several workers. Multidrug resistance has become a clinical challenge. It is probably due to indiscriminate use of antibiotics which must be avoided. Newer antibiotics must always be kept in reserve for use only against strains resistant to common antibiotics.

Table 1. The clinical types of pyoderma lesions.

Disease	Number of patients	Percentage
Impetigo	22	18.96
Folliculitis	37	31.93
Furuncle	14	12.06
Carbuncle	4	3.44
Abscess	5	4.31
Ulcer	34	29.3
Total	116	100

Table 2. The distribution of patients according to the presence of various micro-organisms in culture.

S.No.	Micro-organism	Number of patients		Percentage
		Males	Females	
1	Staphylococcus aureus	47	31	72.89
2	S. aureus + Gram negative bacilli	12	9	19.62
3	Gram negative bacilli	5	4	8.41
4	Group A streptococci	3	3	5.60
5	S. aureus + Gram negative bacilli + Streptococci	1	1	1.86
		68	48	

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