Cutaneous Bacteriological Profile in Patients with Pemphigus

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Abstract

Background: Pemphigus is an autoimmune blistering disease. The common cause of death in pemphigus is septicemia which is usually secondary to cutaneous bacterial infection. Aim: The aim was to study the cutaneous bacteriological profile in patients with pemphigus. Materials and Methods: Pus for culture and sensitivity was collected from clinically infected lesions of pemphigus patients in the Department of Dermatology, St. John’s Medical College Hospital, Bengaluru, from June 2013 to June 2014. Results: Of the 49 patients included in the study, 44 were suffering from pemphigus vulgaris, 4 from pemphigus foliaceus and one had pemphigus vegetans. There were 31 male and 18 female patients. The mean age of the group was 35.51 year. Mean Autoimmune Bullous Disorder Intensity Score was 17.36. About 32.7% were diabetic. About 40.81% showed the growth of Staphylococcus aureus, 12.24% of Pseudomonas aeruginosa, 6.12% of Proteus mirabilis, 4.08% of β-hemolytic streptococci and nonfermenting Gram-negative bacilli, and 2.04% of Proteus vulgaris, Staphylococcus saprophyticus, Enterococcus species, and Klebsiella species. S. aureus showed 100% sensitivity to antibiotics - tetracycline, amikacin, chloramphenicol, and netilmicin; 90% resistance was found for penicillin and 55% resistance was found for ciprofloxacin and erythromycin. Methicillin-resistant S. aureus was 30%. P. aeruginosa showed 100% sensitivity to ciprofloxacin, amikacin, gentamicin, piperacillin, piperacillin + tazobactam, and netilmicin. Conclusion: S. aureus was the most common organism showing sensitivity to tetracycline, amikacin, chloramphenicol, and netilmicin and resistance to penicillin, ciprofloxacin, and erythromycin.

Key Words: Pemphigus, Pseudomonas aeruginosa, Staphylococcus aureus

Introduction

Pemphigus is an autoimmune blistering disease involving the skin and mucous membrane. The term pemphigus was derived from the Greek word “pemphix” meaning bubble.¹

Pemphigus caused substantial mortality before the advent of steroids and antibiotic therapy. Steroids, immunosuppressive agents, and antibiotics have improved the prognosis.² The common cause of death in pemphigus patients is septicemia and pneumonia. Septicemia is usually secondary to cutaneous Staphylococcus aureus infection.³ S. aureus was the most common cause of cutaneous bacterial infection in cases of pemphigus.⁴⁻⁷

In the present study we tried to look into the cutaneous bacterial infection profile in pemphigus in this part of the country.

Materials and Methods

The present study was conducted in the Department of Dermatology, St. John’s Medical College Hospital, Bengaluru, from June 2013 to June 2014 after due clearance from the Ethics Committee. A total of 49 patients of pemphigus confirmed by biopsy or immunofluorescence and/or Tzanck smear with clinically infected pemphigus lesions were selected. Informed consent was taken from all participants included in the study. All the patients in the study were subjected to pus for culture which were interpreted by the microbiologist. If there was growth of organism, then sensitivity pattern was conducted for the particular organism.

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**Statistical analysis**

Data were compiled, tabulated and analyzed using the statistical software SPSS version 18.0 (SPSS Inc., Chicago). *P*<0.05 was considered statistically significant.

**Results**

Of the 49 patients studied, 31 were male and 18 were female. The age distribution of the patients varied from 7 to 62 years, with a mean age of 35.51 year. Majority of the patients (53.06%) were found to be between 16 and 30 year age group. Among the 49 patients, 32.7% were diabetics. Pemphigus vulgaris (44; 89.79%) [Figures 1 and 2] was the predominant type followed by pemphigus foliaceus (4; 8.16%) and the remaining one (2.04%) had been suffering from pemphigus vegetans. About 61.22% of patients had disease duration less than a year. The average Autoimmune Bullous Skin Disorder Intensity Score (ABSIS)\[^4\] of the patients was 17.36. The number of patients with ABSIS of >10 was 39 and the rest 10 patients had ABSIS of ≤10.

Based on the culture report [Figure 3], *S. aureus* (40.81%) was the most common organism grown followed by *Pseudomonas aeruginosa* (12.24%), *Proteus mirabilis* (6.12%), β-hemolytic streptococci (4.08%), nonfermenting Gram-negative bacilli (GNB) (4.08%), *Proteus vulgaris* (2.04%), *Staphylococcus saprophyticus* (2.04%), *Enterococcus* species (2.04%), *Klebsiella* species (2.04%), skin commensals (10.2%), and no growth (18.36%). Culture from two patients grew two organisms each. Twenty patients whose pus culture grew *S. aureus* showed 100% sensitivity to antibiotics – tetracycline, amikacin, chloramphenicol, and netilmicin. 95% and 70% sensitivity was found to gentamicin and cloxacillin + methicillin, respectively [Table 1]. However, resistance was noted predominantly to penicillin (90%), ciprofloxacin (55%), and erythromycin (55%).

*P. aeruginosa* showed 100% sensitivity to ciprofloxacin, amikacin, gentamicin, piperacillin + tazobactam,
ceftazidine, and netilmicin [Table 2]. Three patients whose culture grew *P. mirabilis* showed 100% sensitivity to ampicillin/amoxicillin, amikacin, gentamicin, ceftazidine, cefotaxime, and pipercillin. Patients with β-hemolytic streptococci growth were highly sensitive to penicillin, and cephalaxin, however, was found to be resistant to erythromycin.

Nonfermenting GNB (e.g., *Acinetobacter*, *Bordetella*, *Moraxella*, *Burkholderia*, *Legionella*, or *Stenotrophomonas*) and *Klebsiella* species showed 100% resistance to ampicillin/amoxicillin, ciprofloxacin, amikacin, gentamicin, pipercillin, pipercillin + tazobactam, ceftazidine, cefotaxime, and netilmicin, whereas *P. aeruginosa* was found to be sensitive to above-mentioned antibiotics.

*S. saprophyticus* was sensitive to cloxacillin + methicillin, tetracycline, co-trimoxazole, gentamicin, vancomycin, and netilmicin but resistant to penicillin, ciprofloxacin, erythromycin, amikacin, and chloramphenicol. *Enterococcus* species was sensitive to penicillin, ampicillin, gentamicin, vancomycin, and teicoplanin.

Percentage of patients on >15 mg of prednisolone or its equivalent harboring Gram-negative organisms (53.84%) was high when compared with the total patients (34.69%); however, this difference was not significant (*P* = 0.17).

There was a higher percentage of Gram-negative organism growth when the ABSIS was above 10 (30.76%) when compared to ABSIS ≤10 (10%), which is again not statistically significant (*P* = 0.25).

**Discussion**

This study showed male predominance among pemphigus patients, with a male-to-female ratio of 1.72:1, which is comparable with previous studies. Sehgal[9] and Singh et al.[10] reported male predominance in their studies in a ratio of 3:1 and 3:2, respectively.

The average age of pemphigus in this study was 35.61 year. This was in contrast to the world literature where initial manifestation was found to be more common in an age group ranging from 40 to 60 years.[11,12]

However, it was in accordance with the Indian literature, where a significant number of pemphigus patients were <40 year of age.[13,14]

In this study, pemphigus vulgaris was the most common type (89.79%), followed by pemphigus foliaceus (8.16%) and pemphigus vegetans (2.04%). Huda and Afzar[15] and Wilson et al.[11] studied Indian patients and reported that pemphigus vulgaris to be the most common type which was comparable with this study. However, Wilson et al.[11] reported that the prevalence of pemphigus vulgaris and foliaceus to be the same among Oxford, UK patients.

According to this study, among 49 patients, 33 (67.3%) patients were nondiabetic and 16 (32.7%) were diabetic.

In this study, *S. aureus* was the most common offender being found in 20 (40.81%) out of 49 patients. There were many studies that reported *S. aureus* as the most common organism to be encountered among pemphigus patients.[6-7] Solanki et al.[4] and Abdullah et al.[6] found the growth of *S. aureus* to be 72% and 92.85%, respectively, whereas the growth was 82.9% and 93.7% in the study conducted by Qadim et al.[4] and Esmail et al.[7] Hence, in this study, percentage of patients with *S. aureus* growth was less compared to these studies.

According to Abdullah et al.[6] *Enterobacteriaceae* (35.71%) family was the most common organism after *S. aureus*. In this study, *P. aeruginosa* (12.24%) was the next most common organism after *S. aureus* followed by *Enterobacteriaceae* (10.2%), β-hemolytic streptococci (4.08%), nonfermenting GNB (4.08%), *S. saprophyticus* (2.04%), and *Enterococcus* species (2.04%).

In this study, *S. aureus* recovered from the patients of pemphigus showed maximal sensitivity to tetracycline, amikacin, chloramphenicol, and netilmicin all 100% sensitive while gentamicin was 95% sensitive. According to Solanki et al., *S. aureus* showed maximal sensitivity to cloxacillin, cefotaxime, and lincomycin.[2]

According to this study, *S. aureus* was highly resistant to penicillin (90%), erythromycin (55%), and ciprofloxacin (55%). A study, conducted by Esmail et al., found the following resistance pattern: penicillin (60%), cefazolin (40%), cephalaxin (26.7%), ampicillin (20%), clindamycin (20%), vancomycin (13.3%), ceftriaxone (13.3%), and cefotaxime (6.7%).[7]

The sensitivity pattern for *P. aeruginosa* to ciprofloxacin, amikacin, gentamicin, ceftazidine, netilmicin, pipercillin, and pipercillin + tazobactam was 100%. Solanki et al. found *P. aeruginosa* to be very sensitive to ciprofloxacin and sensitive to gentamicin, ceftazidine, and pefloxacin.[2]
β-hemolytic streptococci showed 100% sensitivity to penicillin and cephalaxin and showed 100% resistance to erythromycin. According to Solanki et al., β-hemolytic streptococci showed sensitivity to cephaloridine, gentamicin, amikacin, cloxacillin, lincomycin, cefotaxime, and quinolones.²

_P. mirabilis_ and _P. vulgaris_ showed 100% sensitivity to the following antibiotics: ampicillin, amoxicillin, ciprofloxacin, amikacin, gentamicin, ceftazidime, cefotaxime, cefuroxime, piperacillin, piperacillin + tazobactam, and netilmicin, whereas nonfermenting GNB and _Klebsiella_ species were found resistant to above-mentioned antibiotics.

### Conclusion

Even with the advancement in the effective treatment of pemphigus, infections and septicemia are the leading cause of morbidity and mortality. Changing bacterial profile and its antibiotic sensitivity need periodic updates. _S. aureus_ was the most common organism showing sensitivity to tetracycline, amikacin, chloramphenicol, and netilmicin and resistance to penicillin, ciprofloxacin, and erythromycin. The next common offender was _P. aeruginosa_ which was sensitive to ciprofloxacin, amikacin, gentamicin, ceftazidime, netilmicin, piperacillin, and piperacillin+tazobactam.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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**What is new?**

_Pseudomonas aeruginosa_ is the second most common cause of cutaneous bacterial infection in pemphigus cases after _Staphylococcus aureus_. _Staphylococcus aureus_ is highly resistant to penicillin and sensitive to tetracycline, amikacin, chloramphenicol and netilmicin.

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### References

1. Korman N. Pemphigus. J Am Acad Dermatol 1988;18:1219-38.
2. Solanki RB, Shah YB, Shah AN, Jain V. Bacterial culture and sensitivity in pemphigus. Indian J Dermatol Venereol Leprol 1997;63:89-90.
3. Ahmed AR, Moy R. Death in pemphigus. J Am Acad Dermatol 1982;7:221-8.
4. Abdullah M, Zaki SM, El-Sayed A, Erfan A. Evaluation of secondary bacterial infection of skin diseases in- and outpatient and their sensitivity to antimicrobials. Egypt Dermatol Online J 2007;3:1-15.
5. Asati DP, Sharma VK, Khandpur S, Khilnani GC, Kapil A. Clinical and bacteriological profile and outcome of sepsis in dermatology ward in tertiary care center in New Delhi. Indian J Dermatol Venereol Leprol 2011;77:141-7.
6. Qadim HH, Hasani A, Zinus BM, Orang N3, Hasani A. Etiology of pyrexia in pemphigus patients: A dermatologist’s enigma. Indian J Dermatol Venereol Leprol 2012;78:774.
7. Esmaili N, Mortazavi H, Noormohammadpour P, Boreir M, Soori T, Vasheghani Farahani I, et al. Pemphigus vulgaris and infections: A retrospective study on 155 patients. Autoimmune Dis 2013;2013:834295.
8. Daniel BS, Hertl M, Werth VP, Eming R, Murrell DF. Severity score indexes for blistering diseases. Clin Dermatol 2003;21:413-4.
9. Sehgal VN. Pemphigus in India. A note. Indian J Dermatol 1972;18:5-7.
10. Singh R, Pandhi RK, Pal D, Kalla G. A clinicopathological study of pemphigus. Indian J Dermatol Venereol 1973;39:126-32.
11. Wilson C, Wojnarowska F, Mehra NK, Pasricha JS. Pemphigus in oxford, UK, and New Delhi, India: A comparative study of disease characteristics and HLA antigens. Dermatology 1994;189 Suppl 1:108-10.
12. Meyer N, Misery L. Geoepidemiologic considerations of auto-immune pemphigus. Autoimmun Rev 2010;9:A379-82.
13. Kanwar AJ, De D. Pemphigus in India. Indian J Dermatol Venereol Leprol 2011;77:439-49.
14. Kanwar AJ, Vinay K. Treatment of pemphigus: An Indian perspective. Indian J Dermatol Venereol Leprol 2014;80:285-6.
15. Huda MM, Af sar ML. A clinicopathological study of pemphigus. Indian J Dermatol 2001;46:75-9.