

# A Study on the Prevalence Isolation and Identification of the Secondary Bacterial Infections Complicating Psoriasis at the Tertiary Care Hospital, Chennai

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**Abstract:** ***Aims and Objectives:** The aim of the present study was to isolate and identify different types of bacterial pathogens commonly complicating psoriatic skin lesions from the various sites of the body and to test their antibiotic susceptibility pattern. **Introduction:** Psoriasis is an immune mediated disease with known genetic predisposition that causes redness, scaling and raised patches to appear on the skin [1]. The invasion of skin by normal skin commensals or other pathogenic organisms is prevented by the intact stratum corneum layer of the epidermis. The current study aims at the isolation and identification of different organisms causing secondary bacterial infections that commonly complicate psoriasis. **Methods and materials:** The samples were collected from a total of known 50 cases of psoriasis suspected to be complicated with some bacterial infections and were send for culture and sensitivity. **Results:** The most common microbial pathogen isolated was Staphyococcus aureus that accounts a total of 34.0% of the isolated organisms and from the antibiogram among the antimicrobial agents that were tested linezolid was most susceptible agent and cefazolin was most resistant to the isolated bacterial pathogens. The histopathological examination from the above patients with psoriasis also revealed numerous inflammatory infiltrates that was also suggestive of psoriasis with concurrent bacterial infection. **Conclusion:** Thus the study concludes that there is a high prevalence of secondary bacterial infections together with an increasing resistance pattern to various antimicrobial agents that can be attributed to poor personal hygiene and lack of awareness about the disease among the affected individuals. So, we highly recommend education and awareness related to the disease, maintenance of proper personal hygiene, timely identification of the pathogenic organisms and antimicrobial susceptibility testing to reduce the risks of morbidity and mortality among these patients.*

**Keywords:** Psoriasis, polymorphonuclear leukocytes, epidermis, acanthosis

## 1. Introduction

Psoriasis is a chronic lifelong immune mediated inflammatory disease with genetic predisposition of the skin and it has been estimated to affect 1-3% of the total population. Secondary bacterial invaders complicate such lesions [2]. Such infections can progress rapidly and can be seriously life-threatening. In this study the current prevalence of the secondary bacterial infections in psoriasis is highlight along with the emerging antibacterial resistance. So, that more emphasis is given to the early recognition of these bacterial pathogens causing the concurrent infection and timely medical treatment is provided to the patients to overcome the antibacterial resistance that will further decrease the burden due to the disease along with morbidity and mortality[4].



**Figure 1:** Psoriasis complicated with secondary bacterial infections.

## 2. Methods and Materials

The study was conducted in the Department of Microbiology, Central Laboratory, Sree Balaji Medical College And Hospital, SBMCH Chennai. The study population comprises of a total of 50 known cases of psoriasis who were suspected to be complicated with some bacterial infection. The duration of the study was six months from June 2016 to December 2016. Swabs were taken aseptically from the different sites. From the specimen the direct smear was examined and samples were cultured aerobically from the lesions with suppurative exudate of secondarily infected skin in psoriatic patients. Microbiological analysis was done and the organisms were identified by direct Gram staining, culture methods on Nutrient Agar, Blood Agar and Mac-Conkey agar aerobically at 37°C for 18-24 hours (figure 2). And different biochemical tests like catalase test, oxidase, indole, citrate, TSI, coagulase, voges-proskauer (VP), methyl red (MR), nitrate reduction test, oxidation-fermentation (OF) test, mannitol motility test and sugar fermentation tests were performed for the identification of the various bacterial pathogens after their isolation[3].



**Figure 2:** A) Blood Agar Plate showing bacterial growth B) Biochemical reactions

Antibiotic susceptibility tests were performed by Kirby-Bauer Disc Diffusion method in MHA plates for the same isolates. Susceptibility and Interpretation of results was done to the following commercially prepared discs 6 mm in diameter (Oxoid-England] according to CLSI guidelines [6]. Antibiotics that were tested for susceptibility are Gentamycin, Amikacin, Ciprofloxacin, cephalixin, cefazolin, cefoxitin, amoxycillin- clavulanic acid, Azithromycin, Erythromycin, Linezolid and clindamycin.

At the same time the histopathological study was also done from the biopsies of the same patients with psoriasis suspected with secondary bacterial infection.

### 3. Results

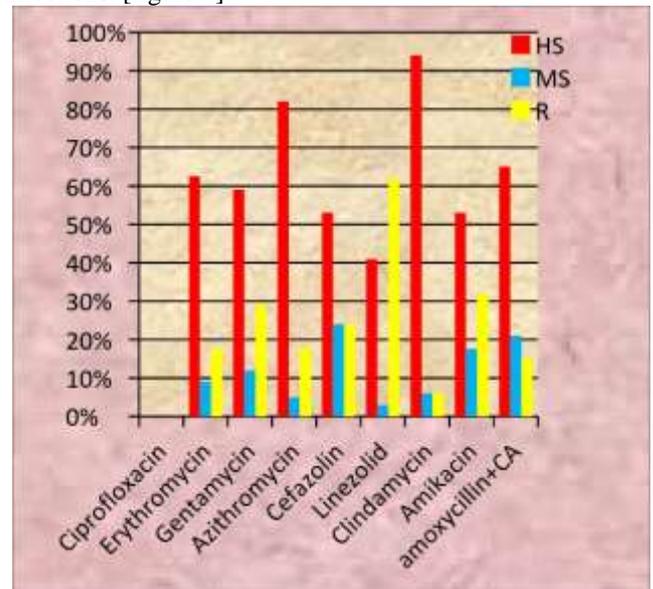
*Staphylococcus aureus* was the most common isolate 17(34%) of the total samples. followed by *Proteus species* 6(12%) and *Staphylococcus epidermidis* 5(10%). Other bacterial isolates like *Enterococcus species* 3 (6.0%), *Pseudomonas aeruginosa* 2(4.0%). *Escherichia coli* 1 (2.0%) and No growth was shown by 16 (32%) of the total isolates.[table1] .

**Table 1:** Prevalence of bacterial isolates in psoriatic lesions

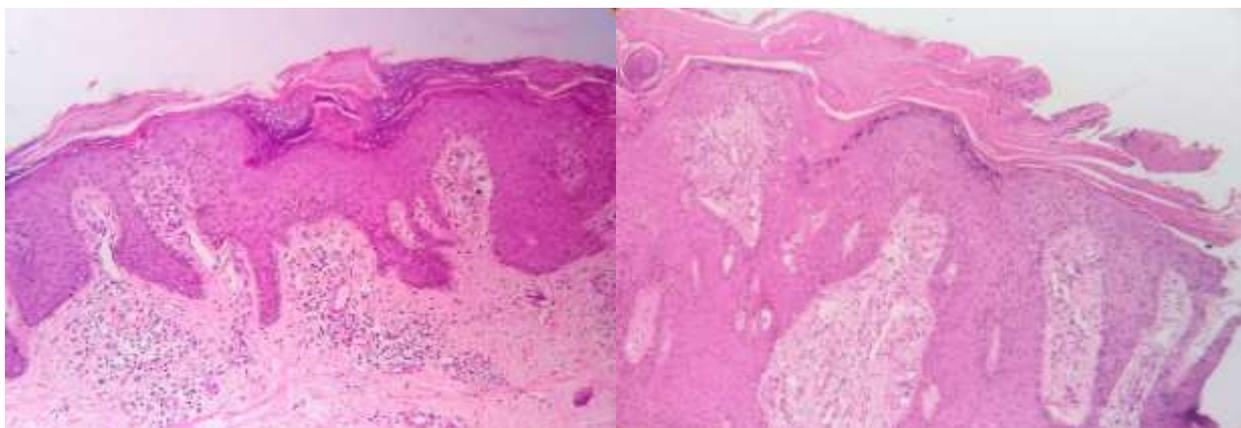
S.No	Organism	Total	Percentage%
1.	Staphylococcus aureus	17	34%
2	Proteus species	6	12%
3	Staphylococcus epidermidis	5	10%
4	Enterococcus species	3	6%
5	Pseudomonas aeruginosa	2	4%
6	Escherichia coli	1	2%
	No Growth	16	32%

Among the antibacterial agents the bacterial pathogens were more sensitive to *linezolid* (94%) that is followed by amoxyclavulanic acid 88%, gentamicin 88%, ciprofloxacin 85.2%, amikacin 85.2%, azithromycin 76.4%, clindamycin 70.5%, erythromycin 70.5% and cefazolin 44% respectively [figure 3].

Histopathological examination revealed varied findings in which most of the sections under microscope showed hyperkeratotic and hyperplastic epidermis with acanthosis, elongation of club shaped rete ridges and parakeratosis. Munro's micro-abscesses and Inflammatory cell infiltrates predominantly of polymorphonuclear leucocytes are seen. So, these findings were also suggestive of bacterial infections. [figure 4]



**Figure 3:** Antibiotic susceptibility pattern of bacterial pathogens complicating psoriasis



**Figure 4:** Microscopic picture of Psoriasis showing munro's microabscess, acanthosis , rete ridges elongation and acute inflammation of dermis.

#### 4. Discussion

The bacterial isolation from lesions of different sites in Psoriatic patients, *Staphylococcus aureus* was the predominantly isolated bacteria among all pathogens and this might be attributed to the antiphagocytic effect of protein A, that is a virulence factor of *Staphylococcus aureus*. And also an important factor contributing to Staphylococcal infection in these patients is due to the inhibitory effect of the serum exuding from the affected area on linoleic acid. Isolation of opportunistic pathogens from psoriatic lesions like *Proteus spp* and *Staph epidermidis* was due to the reduced local defence factors in lesion due to local and systemic immune suppressant drugs like cytotoxic and cortisones used for the treatment of psoriasis. As a result of the steroids that is used locally for the treatment of psoriasis the immune system is suppressed that masks the inflammation and thus it further complicates the secondary bacterial infection by the pathogenic organisms [5]. Antibiotics that generally provide coverage for gram positive bacteria especially *Staphylococcus aureus* infections are cefoxitin, clindamycin, linezolid and a combination of  $\beta$ -lactamase inhibitors (clavulanic-acid, sulbactam) plus penicillins [9]. However agents that are effective against gram negative organisms are aminoglycosides, quinolones and fourth-generation cephalosporin [11]. So, all these patients must be treated with proper antimicrobials according to the sensitivity pattern that will prevent morbidity and mortality.[10] [12]

#### 5. Conclusion

This study concluded that psoriatic lesions on different sites of the body are complicated with different bacterial pathogens and *Staphylococcus aureus* being the most prevalent pathogen among the isolated organisms and it accounts for 32% of the total isolates. It may cause purulent super-infection as well as the induction of inflammatory processes by super-antigen mediated T-cell activation [8]. Among the antibacterial agents linezolid is the most sensitive and cefazolin being the most resistant to the isolated organisms. Therefore for the management of the complications caused by these bacterial pathogens proper identification and antimicrobial susceptibility testing are essential that will help the clinician to a greater extent. So, we recommended the regular follow up of the patients along with the education regarding maintenance of a proper personal hygiene, perfect sanitation, disinfection and treatment with the suitable antimicrobial regimen to reduce infection hazards in patients with psoriasis.

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