

## Comparative Efficacy, Superiority and Clinical benefits of Cefopodoxime Proxetil over Cephalexin in Canine Pyoderma - A Clinical Study of 60 Dogs

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### Abstract

A study was carried out to evaluate comparatively efficacy and clinical benefits of Cefopodoxime proxetil and Cephalexin in the management of canine pyoderma. Both drugs exhibited almost similar response among the treatment group. However clinical benefits following use of Cefopodoxime proxetil were found to be superior in terms of dosing convenience, recovery time, safety margin, administration ease and cost effectiveness.

**Keywords:** Canine pyoderma; cefopodoxime proxetil; cephalexin

### Introduction

Canine pyoderma, common pyogenic bacterial dermatoses of dog's skin associated with more or less pruritis. Accounting to its origin and/ or immune status of animal, pyoderma is classified as superficial or deep and as localized or general. The causative depends upon age of dog (young /adult). Complex approach pyoderma or recurrent pyoderma are secondary to underlying cause which needs to be identified for successful elimination. Recurrent pyoderma is common in adult dogs than in puppies and is always secondary to some allergic conditions. *Staphylococcus pseudintermedius* the resident flora of dog's skin, becomes pathogenic with disturbances in equilibrium of cutaneous layers of skin (Hillier *et al.*, 2014). Diagnosis of canine pyoderma is based upon clinical signs such as papules, pustules, epidermal collarette and crusts of various thickness (Beco *et al.*, 2013). Therapy requires topical antiseptic combined with systemic antibiotics. Recurrence owe to inappropriate selection, dose and duration (too short) of antibiotic therapy. Cephalosporins are often used to treat canine skin infections due to broad spectrum antimicrobial property, safety margin and reasonable cost. Cefopodoxime proxetil is a third generation cephalosporin with broad spectrum of antibacterial

activity is the prodrug of Cefopodoxime, is readily absorbed readily from gut on oral administration. Cefopodoxime is extensively distributed in body fluids and tissues with essentially 100% penetration of skin blister or inflammatory fluid (Borin *et al.*, 1990). No adverse reactions observed in infant and adult dogs when given at 100 mg/kg/day and 400 mg/kg/day respectively (Lui *et al.*, 2002) and concentration of Cefopodoxime remained in tissues longer than Cephalexin. This study was conducted to evaluate the efficacy and clinical benefits of Cefopodoxime proxetil and Cephalexin in treating canine pyoderma.

### Material and Method

This study was carried out in privately owned dogs brought for treatment. Inclusion criteria were adopted based on clinical diagnosis of bacterial pyoderma caused by *Staphylococcus intermedius* in dogs, characterized with moderate to severe lesions presented with papular eruptions, erythema, pustules, ulceration/ erosion, purulent discharge and epidermal collarette. Confirmation of pathogenic bacteria was done by culturing sample collected at infection site. Changes in clinical signs during the period were recorded to appreciate the efficacy for treatment.

Examination of impression smears, tape impressions, skin scrapings and hair plucks were performed to identify other concurrent dermatoses. Whole blood and serum sampling for haematology and serum biochemical studies in order to identify underlying factors was done.

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1a: Before treatment



1b: After treatment

**Fig. 1: Epidermal collarette**



2a: Before treatment



2b: After treatment

**Fig. 2: Interdigital pyoderma**



3a: Before treatment



3b: After treatment

**Fig. 3: Moth eaten appearance is pyoderma in a Labrador**

Exclusion criteria were dogs weighing less than 10 kgs, less than eight weeks of age, intended for breeding, sarcoptic/ demodectic mange, Malassezia,

undergoing treatment with topical or systemic antibiotics, corticosteroids administration with one week of enrollment (Cherni *et al.*, 2006). Use of

disinfectants, antiseptic or antimicrobials (other than Exclusion criteria were dogs weighing less than 10 kgs, less than 8 weeks of age, intended for breeding, sarcoptic/ demodectic mange, Malassezia, undergoing treatment with topical or systemic antibiotics, corticosteroids administration within one week of enrollment (Cherni *et al.*, 2006). Use of disinfectants, antiseptic or antimicrobials and other concomitant treatment (other than Cefpodoxime proxetil or Cephalexin). Dogs were randomly assigned into treatment groups the drugs were dispensed to owner based on body weight of respective dogs. Dogs in group A received Cefpodoxime proxetil at the dose rate of 5mg/kg b. wt. (Cefpet<sup>a</sup>) once daily, orally (Papich *et al.*, 2010) and dogs in group B received Cephalexin (Lixen tab<sup>b</sup>) at the dose rate of 30 mg/kg b. wt. twice daily, orally for 28 days. Clinical observations were made on 0, 14, 21 and 28 days. Efficacy was determined based on changes in clinical signs from 0 day of initial treatment to day 28. Absence of clinical signs in these cases were considered as treatment success. Efficacy was assessed based on duration for disappearance of symptoms and clinical recovery. The response to therapy was graded as excellent, good, fair and poor by assessing the clinical symptoms and lesions (Reddy *et al.*, 2014).

#### Statistical Analysis

The results thus obtained were statistically analysed using Chi square test

#### Result and Discussion

Cephalosporins are often used to treat canine skin infections because of their broad antimicrobial spectrum, safety profile and reasonable cost. Cephalosporins are active against gram-positive aerobes and anaerobes, penicillinase-producing staphylococci and some gram-negative anaerobes. Cephalosporins are recommended for treating canine pyoderma (Mason and Keitzmann, 1990).

Among 89 pyoderma dogs examined, 60 dogs had pyoderma due to *Staphylococcus intermedius*, followed by 24 dogs with *Streptococcus* sp and 5 dogs with *Pseudomonas* sp. All 60 dogs that had pyoderma due to *S. intermedius* alone were taken for study.

In the present study, 40 cases (20 in each group)

a - Brand of Intas Animal Health, Ahmedabad

b - Brand of Virbac Animal Health, Mumbai

with superficial pyoderma comprised of allergic dermatitis, pyotraumatic dermatitis, acral lick dermatitis and interdigital pyoderma, while 20 mucosal fold dermatitis cases were taken for surface pyoderma (10 cases in each group) (Fig 1a, 2a, 3a). Two treatment groups, group A and group B, 30 dogs in each, were subjected to treatment with Cefpodoxime proxetil (5mg/kg b. wt. once daily, orally) and Cephalexin (30 mg/kg b. wt. twice daily, orally), respectively, for 28 days. Both Cefpodoxime proxetil and Cephalexin were found to be effective in treating canine pyoderma due to *Staphylococcus intermedius* (Fig. 1b, 2b, 3b). 5 cases in group B were having diarrhea with Cephalexin. Some owners of dogs in group B expressed difficulty in administering the drug twice a day. Cephalexin at dose of 30 mg/kg, twice daily requires multiple tablets each day, while Cefpodoxime proxetil 5mg/kg b. wt., once daily favors the use of Cefpodoxime over the oral use other Cephalosporins.

On statistical analysis, it was observed that, there was no significant difference noticed among the Cephalexin and Cefpodoxime treatment group. Cefpodoxime proxetil possessed a strong rationale for once a day dosing in management of *S. intermedius*-associated canine pyoderma. The plasma concentration ( $C_{max}$ ) obtained upon oral administration of 100mg Cefpodoxime tablet was 17.8 (+ 0.402) ug/mL. The plasma concentration after 24 hours was 0.893 ( $\pm$  0.402) ug/mL (Brown *et al.*, 2007). Cherni *et al.* (2006) demonstrated the level of Cefpodoxime upon single oral administration (5mg/kg) above 1 ug/mL around 3 hours after dosing and fell below 1 ug/mL approximately 7 hours after dosing. The concentration fell below 0.5 ug/mL at 9 hours in interstitial fluid hours after dosing in interstitial fluid using microdialysis technique. The concentration in interstitial fluid after 9 hours of dosing fell below 0.5 ug/mL. These concentrations of Cefpodoxime in interstitial fluid suggest that it would be effective for treatment of *S. intermedius* superficial pyoderma as the minimal inhibitory concentration ( $MIC_{90}$ ) value of *S. intermedius* isolates from a field efficacy study was 0.5 ug/mL.

When equivalent efficacy is noticed between two medications, choosing the drug with simplest dosing regime is more preferred by pet owners and hence Cefpodoxime treatment once daily is more desired when compared to Cephalexin which requires multiple dosing in a day.

Cephalexin (Lixen<sup>b</sup>) at the dose 30 mg/kg q12h was given to group B, while Cefpodoxime (Cefpet<sup>a</sup>) at the dose of 5 mg/ kg q24h was given to group A. Lixen Pet (600 mg), 7 tablets is priced at 230 INR and Sihil Pharma manufactures Cephalexin tablets under the name Phexil<sup>c</sup> 600 (600 mg), 10 tablets at 300 INR, whereas Cefpet (100 mg), 10 tablets cost 150 INR. Therefore the cost of treatment using Cefpodoxime (Cefpet<sup>a</sup>) is comparatively lesser and is convenient to the owner as it needs to be administered only once a day, while the cost of Cephalexin is higher compared to Cefpodoxime and requires multiple doses in a day. While Cephalexin is dosed as per the literature given by Virbac or as suggested by Toma *et al.* (2008), Cephalexin 600 mg tablets should be used per day for 20 kg b. wt. dog, 7 tablets of 600mg costs 230 INR, whereas 10 tablets of Cefpodoxime costs only 150 INR. Thus Cefpodoxime proxetil (Cefpet<sup>a</sup>) was inferred to be more economical. Time taken for recovery from clinical signs using Cefpodoxime was between 14-22 days, whereas Cephalexin took 20-28 days.

In conclusion, though both drugs were showing good response in the treatment of canine pyoderma, while Cefpodoxime had many benefits over Cephalexin in terms of no adverse effect, convenience once a day administration, lower cost and faster healing.

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