

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; 10(6): 872-875
www.biochemjournal.com
Received: 13-03-2026
Accepted: 16-04-2026

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Diagnosis and therapeutic management of severe generalized demodicosis complicated by deep bacterial pyoderma in dog: A case report

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i6k.8782>

Abstract

A two-year-old male Lhasa apso dog weighing 7.3 kg was presented to the Veterinary Clinical Complex, College of Veterinary Science, Rajendranagar, Hyderabad with a history of progressive dermatological lesions of two months duration. Clinical examination revealed extensive alopecia, erythema, crusting, ulceration, hyper pigmentation and purulent exudation involving the periorcular region, muzzle, distal extremities and ventral abdomen. Deep skin scrapings demonstrated adult *Demodex canis*, while cytological examination revealed abundant degenerative neutrophils admixed with cocci, coccobacilli confirming severe secondary bacterial pyoderma. Based on clinical, parasitological and cytological findings, a diagnosis of generalized demodicosis complicated by deep pyoderma was established. The dog was treated with ivermectin, systemic antimicrobial therapy, antihistamines, medicated shampoo therapy and nutritional supplementation. Marked clinical improvement characterized by resolution of exudative dermatitis, reduction in inflammation and progressive hair regrowth was observed during follow-up. This report highlights the importance of combined parasitological and cytological evaluation in establishing a definitive diagnosis and emphasizes the necessity of integrated therapeutic management in severe generalized demodicosis.

Keywords: *Demodex canis*, pyoderma, Lhasa apso, skin cytology

Introduction

Canine demodicosis is a common parasitic dermatopathy caused by excessive proliferation of *Demodex* mites residing within hair follicles and sebaceous glands. Among the recognized canine species, *Demodex canis* is the principal etiological agent associated with generalized disease. Although low numbers of mites are considered normal inhabitants of canine skin, disruption of host immune mechanisms permits uncontrolled mite multiplication, resulting in folliculitis, furunculosis, alopecia and severe inflammatory skin disease (Mueller *et al.*, 2020) [4].

Generalized demodicosis represents the most severe manifestation of infestation and is characterized by widespread involvement of multiple body regions. Secondary bacterial infection is one of the most important complications, frequently leading to deep pyoderma, tissue destruction, pain and delayed recovery (Miller *et al.*, 2013) [3]. Rupture of mite-infested hair follicles facilitates invasion by opportunistic bacteria, initiating a severe inflammatory response that culminates in folliculitis, furunculosis, and ulcerative dermatitis (Gross *et al.*, 2005) [2]. The present report describes the diagnosis and successful therapeutic management of severe generalized demodicosis complicated by deep bacterial pyoderma in a Lhasa apso dog.

Case History

A two-year-old intact male Lhasa apso dog weighing 7.3 kg was presented to the Veterinary Clinical Complex, College of Veterinary Science, Rajendranagar, Hyderabad with a history of progressive dermatological lesions involving the face, distal limbs and ventral abdomen for approximately two months. The owner reported gradual worsening of lesions accompanied by purulent and occasionally blood-tinged discharge. Previous empirical treatment with antibiotics and corticosteroids had resulted in only temporary improvement. On clinical examination, the dog was alert and responsive with normal appetite and water intake.

Rectal temperature was recorded at 102.3°F. Dermatological examination revealed extensive bilateral periocular alopecia, thick crust formation, erythema, ulceration and purulent exudation (Fig. 1). Severe facial dermatitis involving the periocular region and muzzle was evident with marked follicular destruction and hyperpigmentation. The ventral abdomen exhibited diffuse alopecia, erythema, crusting and multifocal ulcerative lesions (Fig. 2, 3 and 4). Similar lesions were observed on the distal extremities, where severe dermatitis with exudation and crust formation was present. The overall lesion distribution, chronicity and severity suggested generalized follicular parasitic dermatitis complicated by secondary bacterial infection



Fig 1: Severe alopecia, crusting, ulceration, and secondary pyoderma in a dog with generalized demodicosis.



Fig 2: Lhasa Apso dog with severe generalized demodicosis alopecia, crusting, ulceration, hyperpigmentation, and secondary pyoderma involving the ventral abdomen, face and distal limbs.



Fig 3: Severe crusting, ulceration, hyperpigmentation, and mucopurulent exudation associated with generalized demodicosis and secondary pyoderma.



Fig 4: Extensive ventral abdominal alopecia, erythema, hyperpigmentation, crusting, and ulcerative dermatitis associated with generalized demodicosis complicated by deep pyoderma.

Diagnosis

On the basis of the history and clinical manifestations, the animal was tentatively diagnosed with a parasitic dermatological infection. For confirmatory diagnosis, deep skin scrapings were collected using sterile scalpel blades from suspected crusted papular lesions and the adjacent affected skin. Excess hair around the sampling site was clipped to minimize contamination during slide preparation. A drop of liquid paraffin was applied to the selected area and gently spread over the skin surface. The skin was then firmly squeezed to increase the likelihood of recovering mites residing within the follicles and epidermal layers. Deep skin scrapings were obtained by scraping the area until slight capillary bleeding was observed. The collected material was transferred into a test tube containing 3-5 mL of 10% potassium hydroxide (KOH) solution and boiled for 3-4 minutes to digest keratinized tissue and hair, resulting in a homogeneous solution. After cooling, the suspension was centrifuged at 1500 rpm for 5 minutes. The supernatant was discarded, and a drop of the sediment was placed on a clean glass slide, covered with a cover slip, and examined microscopically under 10× and 40× objectives for the presence of mites.

Skin cytology was performed using impression smears collected from exudative lesions. Gently clean excessive debris from the lesion without removing exudate. Press a clean glass slide directly onto the lesion several times. Allow the smear to air dry before staining. Pass the air-dried slide quickly through a flame 2-3 times with the smear side facing upward. Allow the slide to cool. Flood the smear with crystal violet solution. Allow it to stand for 1 minute. Rinse gently with distilled water. Cover the smear with Gram's iodine solution. Leave for 1 minute. Wash gently with distilled water. Apply 95% ethanol dropwise for 15 seconds. Immediately rinse with water to stop decolorization. Flood the smear with safranin. Allow it to stand for 60 seconds. Rinse with distilled water then Air dried and observe under microscope 100x oil immersion for visualization of bacteria.

Results

Skin scraping examination revealed the presence of elongated, cylindrical, cigar-shaped mites, which were identified as *Demodex canis*. The mites exhibited a characteristic body morphology comprising a gnathosoma (head region), podosoma (thoracic region), and opisthosoma (abdominal region). They were characterized by four pairs

of short, stumpy, three-segmented legs attached to the thoracic region and a long, transversely striated abdomen, consistent with the typical morphology of *Demodex canis* according to Soulsby, 1982^[6].

Cytological examination revealed abundant degenerative neutrophils accounting for approximately 80% of inflammatory cells. Numerous cocci, coccobacilli and bacilli arranged in chains were observed along with necrotic epithelial debris and keratinaceous material.

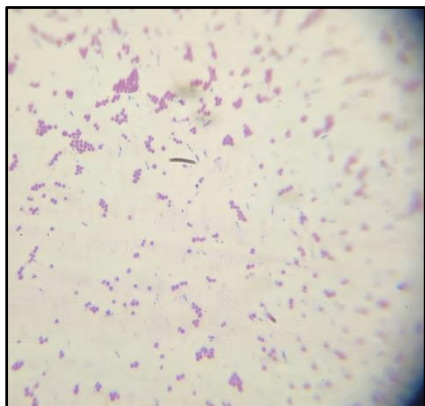


Fig 5: Skin cytology demonstrating abundant cocci and coccobacilli indicative of secondary bacterial pyoderma.



Fig 6: Photomicrograph of *Demodex* spp. recovered from a skin scraping.

Treatment and prognosis

The dog was managed using a comprehensive therapeutic protocol directed against both *Demodex canis* infestation and concurrent bacterial infection.

The treatment regimen consisted of:

1. Inj. Neomec (Ivermectin) @ 300 mcg/kg body weight administered subcutaneously as acaricidal therapy against demodectic mite infestation.
2. Inj. Histanil (Chlorpheniramine maleate) @ 10 mg administered intramuscularly to reduce inflammatory reactions and pruritic discomfort.
3. Inj. Toxol @ 1.0 ml administered intramuscularly as supportive systemic therapy.
4. Mectin-AZ medicated shampoo (Ivermectin + Amitraz) was prescribed for topical application twice weekly for two weeks and subsequently once weekly. The shampoo was allowed to remain in contact with the skin for approximately 10 minutes before rinsing. Topical therapy aided in reducing mite burden, removing crusts and follicular debris and promoting healing of affected skin.

5. Syp. Zipvit was administered orally at 5 ml twice daily as nutritional support to enhance tissue repair and improve overall skin health.
6. Tab. Okacet 10 mg, half tablet orally once daily for 10 days.
7. Tab. Toxomox 250 mg, half tablet orally twice daily for 10 days to control secondary bacterial pyoderma.

The owner was advised regarding strict treatment compliance, maintenance of environmental hygiene, regular medicated bathing and periodic follow-up examinations. Repeat skin scrapings were recommended to monitor reduction in mite burden and evaluate treatment efficacy, in accordance with established clinical guidelines for canine demodicosis (Mueller *et al.*, 2020)^[4].

Marked clinical improvement was observed during subsequent follow-up evaluations. Purulent discharge decreased substantially and extensive facial inflammation showed progressive resolution. Crusts gradually detached from affected regions, revealing healthy granulation tissue and epithelialization beneath. Significant reduction in erythema, ulceration and exudation was evident over the periocular region, muzzle, distal limbs and ventral abdomen. Progressive healing of ulcerative lesions was accompanied by restoration of skin integrity and visible hair regrowth over previously alopecic areas. The reduction in inflammatory lesions and improvement in coat quality indicated successful control of both mite infestation and secondary bacterial infection. The favourable response observed following combined acaricidal, antimicrobial, topical, and supportive therapy confirmed the effectiveness of the therapeutic protocol employed.

Discussion

Generalized demodicosis is considered a multifactorial disease resulting from uncontrolled proliferation of *Demodex* mites secondary to impaired cell-mediated immunity. The extensive facial involvement, severe periocular dermatitis, ulceration and ventral abdominal lesions observed in the present case are characteristic of advanced generalized disease (Scott *et al.*, 2001)^[5].

Secondary bacterial infection is recognized as a major determinant of disease severity. Mite-induced follicular damage promotes follicular rupture, releasing keratin, mites, and bacterial organisms into the surrounding dermis, thereby inducing severe suppurative inflammation and furunculosis (Gross *et al.*, 2005)^[2]. The abundance of degenerative neutrophils and mixed bacterial populations observed in the present case strongly supported the diagnosis of deep pyoderma.

Deep skin scraping remains the diagnostic gold standard for canine demodicosis because mites inhabit hair follicles and sebaceous glands. Demonstration of numerous developmental stages in multiple lesions confirmed active generalized infestation. Concurrent cytological evaluation was particularly valuable in identifying the severity of bacterial involvement and guiding antimicrobial therapy.

The history of previous corticosteroid administration may have contributed to progression of the disease by suppressing cell-mediated immune responses and facilitating uncontrolled mite proliferation. Similar observations have been reported in dogs with generalized demodicosis following immunosuppressive therapy (Mueller *et al.*, 2020)^[4].

Successful management of generalized demodicosis requires simultaneous treatment of mite infestation and secondary bacterial infection. In the present case, the combination of ivermectin therapy, systemic antibiotics, topical antimicrobial bathing and supportive therapy resulted in substantial clinical recovery. Similar treatment outcomes have been documented in previous studies evaluating integrated therapeutic approaches for severe demodicosis complicated by pyoderma (Tater *et al.*, 2003; Fourie *et al.*, 2015)^[7, 1].

Conclusion

A severe case of generalized demodicosis complicated by deep bacterial pyoderma was successfully diagnosed in a Lhasa apso dog based on characteristic clinical manifestations, deep skin scraping examination and cytological evaluation. The disease was characterized by extensive alopecia, ulceration, crusting, erythema, and purulent dermatitis involving the face, limbs and ventral abdomen. Combined therapy consisting of ivermectin, systemic antimicrobial agents, medicated shampoo therapy and supportive care resulted in marked clinical improvement and progressive hair regrowth. Early diagnosis, identification of secondary bacterial infection and implementation of an integrated treatment protocol remain essential for successful management of severe canine demodicosis.

Acknowledgement

We acknowledge the Head, Department of Veterinary Clinical Complex and the Associate Dean, College of Veterinary Science, Rajendranagar, Hyderabad, for all the facilities for disease diagnosis.

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