



## CANINE DEMODICOSIS WITH *STAPHYLOCOCCUS* INFECTION IN A SIX-MONTH-OLD LHASA APSO DOG: A CASE REPORT

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### ABSTRACT

A 6-month-old male Lhasa Apso puppy weighing 10.5kg was presented to the Small Animal Clinic Unit of the Veterinary Teaching Hospital (VTH), University of Jos, Plateau State, Nigeria. The client complained of generalised wounds on the body and face accompanied with skin itching by the dog. History revealed that the condition was first noticed as skin itching a month ago and was managed for about two weeks prior to presentation without any significant improvement. The puppy had received the first dose of DHLPP (Distemper, Hepatitis, Leptospirosis, Parvovirus, and Parainfluenza) vaccination. On clinical examination, the vital parameters were: temperature: 39.9°C; pulse rate: 160 beats per minute; and respiration rate: rapid. The clinical signs were pyrexia, congested mucous membrane, enlarged superficial lymph nodes, lethargy, pustular skin lesions, and sanguinous exudates with an unpleasant smell from the skin erosions. Also, there were areas of alopecia, erythema, and erosion on the face, neck, forelimbs, and dorsum and concomitant nibbling. Blood sample, skin scrapings, and skin swabs were collected and sent to the Clinical Pathology, Parasitology, and Microbiology Laboratories respectively for analyses. Diagnosis was made based on history, clinical signs, and laboratory results. The dog was treated with antiparasitic, antibacterial, anti-inflammatory, anti-allergic, and supportive therapy and it recovered post-therapy.

**Keywords:** Demodicosis, Ivermectin, Laboratory examination, Lhasa Apso, Skin itch

### INTRODUCTION

Canine demodicosis, also known as demodectic ascariasis, follicular mange or red mange of dogs, is a disease caused by *Demodex canis* (*D. canis*), *D. injai*, and *D. cornei*, but *Demodex canis* are more commonly found in dogs (Wirawan *et al.*, 2019). Demodicosis in dogs is mainly caused by *Demodex canis* and it is characterized by alopecia, crusted lesions, erythema, and inflammatory skin disorder (Ogbaje *et al.*, 2014; Ambica *et al.*, 2020; Akpan *et al.*, 2023). The *Demodex* mite is considered a normal mammalian skin

commensal, but when there is overpopulation on the host with specific follicular mites of various *Demodex* species, then an infested animal experiences the disease (demodicosis) (Shrestha *et al.*, 2015). The disease is also associated with immune suppression and lymphocyte blastogenesis due to undetermined factor(s) in the serum of dogs (Pence & Ueckermann, 2002; Taylor *et al.*, 2016) and the development of patches of hair loss or mild to severe dermatitis in dogs (Chávez, 2016). These emerge as a manifestation of the disease which could be transmitted from bitch to puppies in

the first few days after birth (Taylor *et al.*, 2016). Demodicosis is the most common skin disease of dogs of all ages and breeds, including puppies in contact with an infected bitch via suckling (Taylor *et al.*, 2016). Canine demodicosis maybe localized or generalized. Localized demodicosis is characterized by one or several areas of alopecia that are restricted to a specific part of the body, with a circular shape, and may be 3 to 5 cm in diameter. The face and all four legs are usually affected and are accompanied by erythema (redness of the skin), scaling, and hyperpigmentation (Taylor *et al.*, 2016). In generalized demodicosis lesions are present almost on the entire body, including the legs, often accompanied by secondary bacterial infections. The lesions are generally similar to localized ones but are more severe and widespread throughout the body (Taylor *et al.*, 2016).

Microscopic analysis of skin scrapings is the simplest and fastest, diagnostic technique available, as they are able to identify the mite at every stage of its development (Zajac & Conboy, 2012; Taylor *et al.*, 2016). It is frequently necessary to take cutaneous scrapings from multiple locations in order to rule out demodicosis as diagnosis of skin lesions. Historically, skin scraping has been the sole proven, gold standard diagnostic technique to detect demodicosis (Zajac & Conboy, 2012).

A clinical case of *Demodex canis* infestation with *Staphylococcus* species infection, its diagnosis and treatment in a 6-month-old Lhasa Apso with complete clinical, parasitological, and haematological examinations is hereby presented.

## CASE PRESENTATION

### CASE HISTORY

A 6-month-old male Lhasa Apso puppy was brought to the small animal clinic of the Veterinary Teaching Hospital, University of Jos, on the 22nd of September 2022. The owner reported that the puppy had skin itch a month before presentation, and the puppy now has wounds all over its body with a foul odour.

#### Clinical Examination

On clinical examination, the dog weighed 10 kg, with the following vital parameters: Rectal temperature: 39.9 °C; Pulse rates: 160 beats per minute; and Respiration rates: rapid. The clinical signs were pyrexia, congested mucous membrane, enlarged superficial lymph nodes, lethargy, pustular skin lesions, and sanguinous exudates with an unpleasant smell from the skin erosions. The erosion was on the face, neck, forelimbs, and dorsum, and there were also areas of alopecia, erythema, and concomitant nibbling (Figure IA) and pustules and facial skin erosion (Figure IB) on the day of presentation.

### Sample Collection and Laboratory Investigations

Five (5) ml of blood was obtained into Ethylenediaminetetraacetic acid (EDTA)-coated vacutainer, 3 ml was sent to the Clinical Pathology Laboratory for hematological analysis. The remaining 2 ml of blood and a scoop of fecal sample from the rectum were sent to Parasitology Laboratory for haemoparasite and helminth egg/ova screening. Skin swabs were sent to the Microbiology Laboratory for microbial culture. Skin scrapings were collected and processed according to the methods of Doering & Jensen (1973).

#### Results of laboratory examinations

The results from clinical pathology laboratory showed severe leukocytosis occasioned with severe regenerative left shift and eosinophilia (Table I). Results from the Parasitology Laboratory revealed the absence of haemoparasite(s) and helminth eggs/ova. *Demodex canis* was detected in skin scraping as it is presented in Figure II. From the Microbiology Laboratory, reports showed the presence of *Staphylococcus* species.

#### Diagnosis

Based on history, clinical signs, and laboratory examinations, canine demodicosis and *Staphylococcus* species infection were diagnosed.

## CASE MANAGEMENT

The management was done with antiparasitic, antibacterial, anti-inflammatory, anti-allergic, and supportive therapy. The dog was treated with penicillin (22000 IU/kg) + streptomycin (15mg/kg) (Penstep®, Heibei New Century Pharmaceutical Co. Ltd. No: 189 Taihang Street, Chaina), IM x5/7. Piroxicam 10mg (Tianyao Pharm. Co. Ltd, Hanjiang, Bai Road, Xiangyang, Hubei) was administered at 0.3mg/kg IM SID. Also, 10mg of ivermectin (Atermectin 1% solution Holland) was administered at 0.6mg/kg SC on the day of presentation and on days 3, 7, 14, 21, and 28. Dexamethasone at 0.25mg/kg IM SID and Vitamin C (1.5 mL) IM x 3/7 were also administered. Whitefield ointment (benzyl benzoate + salicylic acid) (New Health Way Co Ltd Ajangbadi, Lagos, Nigeria) was applied topically x3/52. The dog was bathed with acaricide (12.5% amitraz @ 0.05% dilution) on days 4 and 8.

## FOLLOW-UP TREATMENT AND OBSERVATION

The prognosis was very good after the treatment regimen. Blood samples were taken 2 months post-therapy for clinical pathology examination. The result showed that all the haematological parameters had greatly improved and assumed the normal range (Table II). Clinical examination of the puppy revealed that the puppy was active, hairy, and no area of alopecia was observed on the skin around the face, forelimb, and dorsum (Figure III). The client was advised to ensure the puppy's cage and surroundings are fumigated often and kept

clean always, and to always seek the services of a competent veterinarian whenever the need arises.

antibiotic administration (a broad-spectrum antibiotic) for several weeks is required in addition to acaricidal treatment

**Table I: Haematological parameters of the Lhasa Apso puppy on the first day of its presentation to the VTH of University of Jos.**

Haematological parameters	Patient value	Reference value
PCV (%)	49	27–45
Total WBC ( $\times 10^3/\mu\text{L}$ )	30,200	5000-14000
Seg Neutrophils ( $\times 10^3/\mu\text{L}$ )	21,140	2900-12000
Band neutrophils ( $\times 10^3/\mu\text{L}$ )	3624	0-450
Lymphocytes ( $\times 10^3/\mu\text{L}$ )	2718	400-2900
Monocytes ( $\times 10^3/\mu\text{L}$ )	906	100-1400
Eosinophils ( $\times 10^3/\mu\text{L}$ )	1,812	0-1300
Basophils ( $\times 10^3/\mu\text{L}$ )	00	0-140

**Table II: Haematological parameters of the Lhasa Apso puppy after 21 days of treatment at the VTH of University of Jos.**

Haematological parameters	Patient value	Reference value
PCV (%)	44	27–45
Total WBC ( $\times 10^3/\mu\text{L}$ )	10,100	5000-14000
Seg Neutrophils ( $\times 10^3/\mu\text{L}$ )	8,200	2900-12000
Band neutrophils ( $\times 10^3/\mu\text{L}$ )	00	0-450
Lymphocytes ( $\times 10^3/\mu\text{L}$ )	1,500	400-2900
Monocytes ( $\times 10^3/\mu\text{L}$ )	100	100-1400
Eosinophils ( $\times 10^3/\mu\text{L}$ )	300	0-1300
Basophils ( $\times 10^3/\mu\text{L}$ )	00	0-140

## DISCUSSION

The clinical signs of generalized dermatitis, erythema, and alopecia on the dorsum, forelimbs, and neck region as observed in this case agree with manifestations of generalized mange in dogs as reported by Kaplaywar *et al.* (2017). Comedones, papules, pustules, follicular casts, plaques, crusts, edema, deep folliculitis, and furunculosis are examples of cutaneous alterations seen in both younger dogs, older dogs, and even on humans affected by demodicosis (Mueller, 2004; Mueller *et al.*, 2020). The severe leucocytosis occasioned with severe regenerative left shift and eosinophilia detected from the clinical pathological examination is suggestive of both parasitic and bacterial infections (Heukelbach *et al.*, 2006). *Demodex* species live in the sebaceous glands and hair follicles, where they feed on sebum, cells, and epidermal detritus (Miller *et al.*, 1993). Previous reports of canine demodicosis suggest that a variety of predisposing factors, including poor health, starvation, and an aberrant environment that promotes mite growth and the development of skin diseases, maybe responsible for the clinical signs and lesions of the disease (Shrestha *et al.*, 2015). Since most cases of canine generalized demodicosis involve a secondary bacterial skin infection, as was also observed in this case where *Staphylococcus* species was isolated, systemic

(such as the use of amitraz), as amitraz is a very successful treatment for generalized demodectic mange (Taylor *et al.*, 2016; Mueller *et al.*, 2020). Amitraz acts as an alpha2-adrenergic receptor agonist, which disrupts the nervous system of invertebrates like mites and ticks, causing them to detach from their host. It also affects octopamine receptors in insects, and inhibits prostaglandin synthesis and monoamine oxidase, contributing to its insecticidal and acaricidal properties (del Pino *et al.*, 2015). The administration of corticosteroids was helpful in the management of canine demodicosis, especially when the animal is given enough nutritional supplements (Yatoo *et al.*, 2014; Arsenovic *et al.*, 2015). Corticosteroids are used to reduce inflammation, suppress the immune system, and treat severe allergic reactions. The genomic mechanism of action is mediated through the glucocorticoid receptor, leading to most anti-inflammatory and immunosuppressive effects (Liu *et al.*, 2013; Cain & Cidlowski, 2017). This action leads to a reduction in proinflammatory cytokines, chemokines, cell adhesion molecules, and other enzymes involved in the inflammatory response (Liu *et al.*, 2013).



Figure I: The dog on the day of presentation showing erythema and alopecia on the dorsum, forelimbs and neck region (A); pustules and facial skin erosion (B).

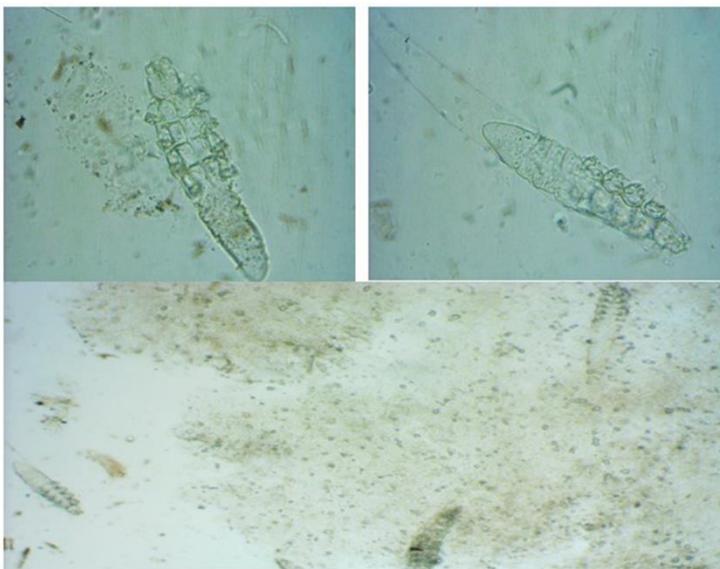


Figure II: *Demodex canis* (mag.: X400) seen in the skin scrapings of the dog.



Figure III: The Lhasa Apso dog represented (A) on the 21st day of therapy; (Bi and Bii) 2 months from the onset of therapy.

The non-genomic mechanism occurs more rapidly and is mediated through interactions between the intracellular glucocorticoid receptor and a membrane-bound glucocorticoid receptor (Ericson-Neilsen & Kaye, 2014). Within seconds to minutes of receptor activation, a cascade of effects is set off, including inhibition of phospholipase A2, which is critical for producing inflammatory cytokines, impairing release of arachidonic acid, and regulation of apoptosis in thymocytes (Streeten, 1975; Ericson-Neilsen & Kaye, 2014).

## CONCLUSION

In summary, the treatment was favorable. Thus, it was determined that a therapeutic regimen necessitates a calculated approach that counteracts the harm that mites and bacteria cause to the animal's skin and body.

## ETHICAL CONSIDERATIONS

The animal (dog) handling and procedures followed the guidelines of the ethics committee on the use of animals in experiments. It is pertinent to acknowledge that a verbal consent for this study was given by the client.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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