

Clinical aspects, diagnosis and therapeutic management of otodectosis in dogs

Sarita Devi*, Shyma K. P.¹, A. R. Parikh, R.V. Salvi, M. P. Parmar, M.V. Bharai and J. R. Patel

Department of Medicine, ¹Department of Parasitology, College of Veterinary Science and Animal Husbandry, Kamdhenu University (KU), Sardarkrushinagar-385506, Gujarat, India

Abstract

The present study was undertaken to study clinical aspects, diagnose and manage otodectosis (otocariosis) in dogs. A total of 25 dogs of mainly mixed breed, aged between 1.5 and 7 years old showing clinical signs of otitis externa consistent with *Otodectes cynotis* (*O. cynotis*) infestation were included in the study. Parasitological examination of swabs collected from both the ears of each animal was performed for the presence or absence of mites. The prevalence of *Otodectes spp.* in the present study was found to be 48% (12/25). Significantly ($P < 0.01$) reduced Hb, TEC, and total protein values and, increased TLC count with neutrophilia and eosinophilia were the recorded in hemato-biochemical alterations in the affected dogs. Weekly twice topical application of amitraz solution (12.5 % w/v) in combination with systemic as well as otic antibacterial agents was the treatment followed. The response to the therapy was achieved two weeks post-treatment with the disappearance of clinical signs and microscopic absence of mites in the ear wax. It is concluded that topical application of acaricide along with systemic antibacterial therapy and instillation of auricular antibacterial preparations was found efficacious in managing otodectosis in dogs .

Keywords: Amitraz, Dogs, Ear mites, Otodectosis, *Otodectes cynotis*

Otodectes cynotis (*O. cynotis*) also known as ear mite or ear canker mite, having cosmopolitan distribution, inhabits the external ear canal of dogs, foxes, cats, ferrets and other carnivores (Wall and Shearer, 2001). Other than external auditory canal these mites have also been found on head, neck, shoulder blade, feet, and tail region of the body (Scott and Horn, 1987). The infestation with *O. cynotis* mite is termed as otodectic mange (Soulsby, 2005). It is a highly contagious mite and spreads through direct contact between affected animals. These mites are considered as the most important agent for the development of otitis externa in dogs (Curtis, 2004) having 5 to 10% of otitis externa cases related to it with no sex or breed predisposition (Rodriguez *et al.*, 2003). Discomfort, head shaking, intense pruritus provoking rubbing in the affected animals that might be leading to self mutilation of the base of ear pinnae and subsequent aural haematoma, and even hearing impairment, depending on the degree of parasitism are the recorded clinical manifestations (Arthur *et al.*, 2015 and Gotthelf, 2000). In spite of having a cosmopolitan distribution, reports on occurrence of otodectes is mainly focused in adult cats and kittens. Scarce information is available on otodectes from India, and it dates back to management of *O. canis* in two dogs (Sivajothi and Reddy, 2016) and the recent one in a Persian cat from Hisar (Punia *et al.*,

2021). Hence, the present communication describes the clinical aspects, diagnosis and therapeutic management of otodectosis in dogs.

Materials and Methods

Animal selection criteria

A total of 25 dogs (18 males, 7 females) of mainly mixed breed, aged between 1.5 and 7 years old presented at College Clinics, Sardarkrushinagar with otitis externa, clinically manifested as rubbing and pawing behind the ears and, head shaking were enrolled in the present study. Ten apparently healthy dogs brought for routine checkup and vaccination were kept as control.

Clinical examination and diagnosis

In all the presented dogs detailed clinical examinations were performed. Both the external ear canal of all the 25 dogs was examined using an otoscope in order to identify the presence of otodectes in the ear canal.. Further, ear swab samples from dog's upper portion of the vertical ear canal using separate sterile cotton swabs before performing the otoscopic examination were collected from all the dogs.

Microscopic examination of the collected ear swabs to determine the parasitism by *Otodectes spp.* mite using a microscope (10x and 40x objective) was performed. Identification of the mites was carried out according to the protocol of the identification of external

*Corresponding author: saritadevi@kamdhenuuni.edu.in

parasites (Scott *et al.*, 2001; Wall and Shearer, 2001 and Campbell, 2005). In confirmed cases of *Otodectes spp.* mite infestation, bacteriological cultural examination was performed as per the method described by Quinn *et al.* (1994).

Antimicrobial susceptibility test and hemato-biochemical examination

Further, isolated bacteria were used for antimicrobial susceptibility test to fix the rationale therapy. Following antibiotic discs were used in antimicrobial susceptibility test: amikacin (30 µg), amoxicillin/clavulanic acid (20/10 µg), ampicillin/cloxacillin (6.69/18.31 µg), ceftriaxone (30 µg), cephalothin (30 µg), chloramphenicol (30 µg), doxycycline (30 µg), enrofloxacin (5 µg), gentamicin (10 µg) and tobramycin (10 µg). Inhibition zone of all of antibiotics were interpreted according to Clinical and Laboratory Standards Institutes (CLST).

About three ml of blood sample was obtained from both healthy and diseased dogs following standard protocols from saphenous vein of confirmed cases of mite infested dogs of which one ml is transferred in the EDTA vials for hematological examination using automatic veterinary hematology analyzer (Exigo haematology analyzer, Boule Medical AB, Sweden) and rest was transferred in clot activator vial and, harvested serum was processed for estimation of total protein and albumin using specific ready to use test kits using biochemical analyzer (RANDOX-RX Monaco, United Kingdom).

Treatment protocol

Treatment was initiated with mechanical cleaning of debris and hairs from the affected ear canal and cleaning with 2% salicylic acid (ceruminolytic agent). After instillation of the solution into the ear, the vertical canal was gently massaged for one minute. External application of amitraz (12.5%) @4 mL of solution in 1 L of water all over the body was done twice weekly for three weeks. Otic preparation containing gentamicin (3 mg), betamethasone (1 mg) and clotrimazole (10mg) was instilled as ten drops daily for five days in dogs. Along with it Tab. amoxiciline @5mg/kg., b.wt., OD, for 5 days was given to control secondary bacterial infection systemically. The response to the treatment was assessed on the basis of disappearance of clinical signs and microscopic absence of mites in the ear wax which was achieved at around two weeks of treatment.

Statistical analysis

For statistical analysis, the data were tabulated and the mean scores of the control and diseased groups were compared using independent-samples T test. All analyses were performed with significance set at 5% ($p < 0.05$) (Snedecor and Cochran, 1994).

Results and Discussion

Out of the 25 dogs examined, 12 were found to be infected (48.00%) with *Otodectes spp.* mites. Bilateral infestations occurred in 75.00 % (9/12) and unilateral infestations in 30.76 % (3/12) of the positive dogs. Ear infections are one of the most frequent reasons for dogs to be presented to veterinarians affecting up to 20% of dogs (Cole, 2004). *O. cynotis* mite is considered a primary cause of 5.9% of otitis externa cases in dogs (Rosser, 2004). The prevalence of *O. cynotis* in dogs from different areas include 33.3% (34/102) from Brazil (da Silva *et al.*, 2020), 7.17% (16/223) from Egypt (Salib and Baraka, 2011) and 4.3% (25/581) from Greece (Lefkaditis *et al.*, 2021) with no detailed information on epidemiological aspect of *O. cynotis* in dogs from India. Detailed clinical examination of affected ears revealed presence of thick brownish waxy/ceruminous material inside the ear canal and canal erythema (Fig. 2) which is a characteristic feature of *O. cynotis* mite infestation. Clinical signs of otitis externa included head shaking, ear scratching and pain on palpation of ear. Malodorous smell due to pruritis was coming from the affected ears of canines. The clinical signs observed in the study were in agreement with the findings of Salib and Baraka (2011). *O. cynotis*, feed on superficial debris and cerumen, causes irritation of the ear canal, allergic reaction, erythema, pruritus and a dark brown ceruminous secretion (Miller *et al.*, 2013). The presence of the mites may lead to a higher activity of ceruminous glands (Taenzler *et al.*, 2017).

Dark brown ceruminous secretion examined microscopically revealed the presence of *Otodectes spp.* mite (Fig. 1). Direct otoscopic examination didn't revealed presence of mites but canal erythema and dark chocolate brown exudate as the clinical signs indicating presence of mite was able to be visualized more clearly. Examination of cerumen/exudate is considered to be the gold-standard diagnostic technique, demanding availability of a microscope for the diagnosis of *O. cynotis* infestations (Souza *et al.*, 2004). While, mites visualization by both otoscopic examination of the external

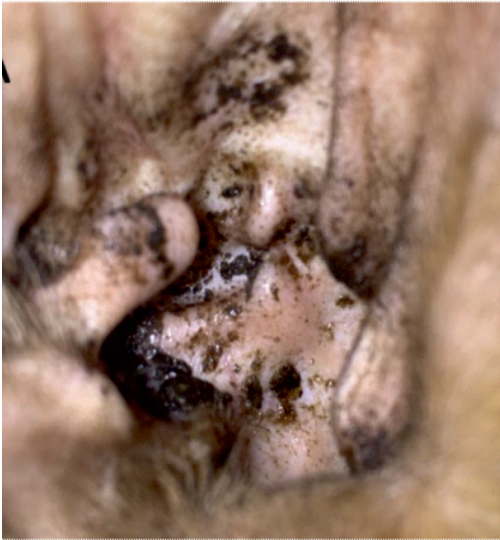


Fig. 1. *Otodectes spp.* found in the ear swab of an affected dog

ear canal and microscopic examination of exudate are the recommended techniques/procedures for the diagnosis of *O. cynotis* infestation (Rosychuk, 1994), otoscopic examination has been proved to have high specificity low sensitivity in diagnosing canine otoacariasis when compared with microscopic examination of cerumin/exudate (Souza *et al.*, 2004). The culture of ear swabs of 12 confirmed cases of otodectus yielded coagulase positive *Staphylococci spp.* (n=10) and *Escherichia coli* (n=2) in both the ears in the present study. Wide variety of pathogens is reported in otitis and in apparently healthy ear canals of dogs (Tang *et al.*, 2020). Park *et al.* (2017) reported that the most common species recovered from 60 dogs with chronic otitis externa were *Staphylococcus spp.* (51%), followed by *Pseudomonas spp.* (15%) and *Enterococcus spp.* (14%). Microorganisms associated with otitis externa are considered opportunist and not the primary pathogens, where any predisposing or primary cause will make them to participate in the disease process (Rosser, 2004 and Scott *et al.*, 2001).

Results of antimicrobial susceptibility testing showed sensitiveness to amoxicillin, ampicillin, gentamicin and amikacin in decreasing order by the isolated two bacteria in the present study. Near to similar antimicrobial susceptibility pattern is reported by Lyskova *et al.* (2007) and Malayeri *et al.* (2010) on bacteria and yeast isolated from dogs affected with otitis externa. The era of antibiotic resistance, necessitates antibiotic susceptibility tests to be done for the successful treatment and management of otitis externa associated with *Otodectes*. Bacterial and



Fig. 2. Presence of thick brownish waxy/ceruminous material inside the ear canal of a mite infested dog

yeast infections are important secondary, perpetuating factors that complicate and exacerbate the disease process (Bugden, 2013 and Bajwa, 2019) and hence, prevents resolution and triggers recrudescence.

Significantly ($P < 0.01$) reduced Hb, TEC, and protein values and, increased TLC count with neutrophilia and eosinophilia were the recorded in hemato-biochemical alterations in the affected dogs (Table 1). The reported hemato-biochemical alterations might be due to the presence of mites causing inflammation, allergic reactions and precipitation of secondary bacterial infection in the ear canal. Along with this anorexia and distress associated with mite infestation might also contribute to the found alterations. Almost similar alterations are reported in dogs affected with *Demodex spp.* and *Sarcoptes spp.* mite infestation due to the antigenic stimulation and hypersensitivity reaction (Sharma *et al.*, 2018 and Gupta and Prasad, 2001).

Weekly twice topical application of amitraz solution (12.5 % w/v) in combination with systemic as well as otic antibacterial agents was administered as the treatment. The successful treatment of the disease requires proper medications including anti-inflammatory drugs, antifungal agents and chemotherapeutics in relation to the sensitivity of the aetiological agents (Greene, 2006). Cleaning of the ear canal with cleaner having 0.2% salicylic acid was found effective. Besides the antiseptic action, the ceruminolytic effect helps to remove bacterial toxins, cell debris and free fatty acids that could serve as stimuli for further inflammation

Table 1: Mean values (+SE) of haemato-biochemical parameters in mange infested dogs (n=12) and healthy control dogs (n=10).

Parameters	Healthy Control (n=6)	Diseased (n=12)
Hb (g/dl)	12.69±0.20	11.47±0.17**
TEC (×10 ⁶ /μl)	5.80±0.10	5.05±0.04**
TLC (×10 ³ /μl)	6.63±0.26	14.02±0.42**
Lymphocytes (%)	27.50±0.02	23.00±0.07**
Monocytes (%)	1.00±0.09	1.00±0.02
Neutrophils (%)	69.00±0.02	73.00±0.13**
Eosinophils (%)	2.40±0.00	3.00±0.04**
Basophils (%)	0.10±0.02	0.10±0.03
Total protein (gm/dl)	6.90±0.13	5.60±0.23**
Albumin (gm/dl)	2.07±0.11	1.23±0.21**

** Highly Significant (P<0.01)

(Nuttall and Cole, 2004). Cleaning of ears at regular, but not frequent intervals is needed to control ear mite infestation in canines. Ear cleaners containing 0.1% salicylic acid have reported to have good activity against *S. intermedius*, *P. aeruginosa*, *Proteus* spp. and *M. pachydermatis* pathogens in vitro and in vivo (Reme *et al.*, 2006). The presence of exudates impairs otoscopic examination and, prevents efficacy of given therapy due to inactivity of some medications in the presence of pus/exudates and incomplete contact with the epithelial lining of the ear (Nuttall, 2016) and favours secondary infections (Taylor *et al.*, 2015). Otic preparation (antibacterial+anti-inflammatory+antifungal) used in the present study were reported to be efficacious in the management of otocariasis in dogs which is in agreement with Engelen and Anthonissens (2000) whom reported that auricular preparations with such combinations will reduce the inflammation and load of secondary microorganisms and, in-turn will speed up the recovery process. Weekly twice topical application of amitraz solution (12.5 % w/v) was pivotal in treating otocariosis. The concurrent use of a topical insecticide on the body of affected and other in-contact animals is frequently recommended in the treatment of *O. cynotis* infestations (Grant, 1985; Gram *et al.*, 1994 and Rosychuk, 1994). Topical medication is reported as the first line therapy for otitis externa with requirement of systemic medications including antibiotics in chronic cases (Jacobson, 2002). Even though this ear mite infestation is most frequently diagnosed in cats, the trend of keeping dogs as pets more commonly in India and the infrequent but possible occurrence of this mite

in humans (Wiwanitkit, 2011) emphasizes the screening of this mite in every case presented. The response to the therapy was achieved two weeks post-treatment with the disappearance of clinical signs (Fig. 3) and microscopic absence of mites in the ear wax. Despite the importance of mites as causative agents of otitis externa in majority of dogs, information regarding their prevalence and the factors affecting their survival is lacking (Gram *et al.* 1994 and Sotiraki *et al.*, 2001). Hence, it is recommended to examine the ears of dogs at intervals and to further carry out more studies with larger sample size to define the precipitating factors involved. Also, it was concluded that treatment of ear mite with topical application of acaricide along with systemic antibacterial therapy and otic preparations was found effective.

References

- Arther, R., Davis, W., Jacobsen, J., Lewis, V. and Settje, T. 2015. Clinical evaluation of the safety and efficacy of 10% imidacloprid + 2.5% moxidectin topical solution for the treatment of ear mite (*Otodectes cynotis*) infestations in dogs. *Vet. Parasitol.* **210**(1-2): 64-68.
- Bajwa, J. 2019. Canine otitis externa-treatment and complications. *Can. Vet. J.* **60**(1): 97-99.
- Bugden, D.L. 2013. Identification and antibiotic susceptibility of bacterial isolates from dogs with otitis externa in Australia. *Aust. Vet. J.* **91**:43-46.
- Campbell, K. 2005. Other external parasites. In: Ettinger SJ, Feldman EC, editors. Textbook of veterinary internal medicine, 6th ed., Vol. 1. Saunders Elsevier, St. Louis, Missouri. pp. 66-67.
- Cole, L.K. 2004. Ooscopic evaluation of the ear canal. *Veterinary*

- Clinics of North America: Small Anim. Pract.* **34**(2): 397-410.
- Curtis, C.F. 2004. Current trends in the treatment of Sarcoptes, Cheyletiella and Otodectes mite infestations in dogs and cats. *Vet. Dermatol.* **15**(2):108-114.
- Engelen, M.A. and Anthonissens E. 2000. Efficacy of non-acaricidal containing otic preparations in the treatment of otoacariasis in dogs and cats. *Vet. Rec.* **147**(20):567-569.
- Salib, F.A. and Baraka, T.A. 2011. Epidemiology, genetic divergence and acaricides of *Otodectes cynotis* in cats and dogs. *Vet. World.* **4**(3): 109-112.
- Gotthelf, L. 2000. Primary causes of ear disease. Small animal ear diseases. 1st ed. Philadelphia: WB Saunders. pp. 88-90.
- Gram, D., Payton, A.J., Gerig, T.M., Bevier, D.E. 1994. Treating ear mites in cats: a comparison of subcutaneous and topical ivermectin. *Veterinary Medicine.* **89**(2):1122-1125.
- Greene, C.E. 2006. Otitis Externa. In: Infectious diseases of the dog and cat, Greene CE (ed), 3rd ed., Saunders, Missouri. pp. 815-823.
- Gupta, N. and Prasad, B. 2001. Clinico diagnosis and therapeutic management of acariasis in dogs. *Indian J. Vet. Medici.* **21**(2):73-75.
- Jacobson, L.S. 2002. Diagnosis and Medical Treatment of Otitis Externa in the Dog and Cat: Review Article. *J. South Afric. Vet. Assoc.* **73**(4):162-170.
- Jenzler, J., De Vos, C., Roepke, R.K., Frénais, R., Heckerth, A.R. 2017. Efficacy of fluralaner against *Otodectes cynotis* infestations in dogs and cats. *Parasites & Vectors.* **10**:30.
- Lefkaditis, M.A., Koukeri, S.E., Mihalca, A.D. 2009. Prevalence and intensity of *Otodectes cynotis* in kittens from Thessaloniki area, Greece. *Vet. Parasitol.* **163**:374-375.
- Lyskova, P., Vydralova, M. and Mazurova, J. 2007. Identification and antimicrobial susceptibility of bacteria and yeasts isolated from healthy dogs and dogs with otitis externa. *Journal of veterinary medicine. A, Physiology, pathology, clinical medicine.* **54**(10):559-563.
- Malayeri, H. Z., Jamshidi, S., Salehi, T.Z. 2010. Identification and antimicrobial susceptibility patterns of bacteria causing otitis externa in dogs. *Vet. Res. Commun.* **34**(5):435-444.
- Miller, J.R., Griffin, C.E., Campbell, K.L. 2013. Muller & Kirk's Small Animal Dermatology, 7th ed., St Louis: Elsevier. pp. 938.
- Nuttall, T. 2016. Successful management of otitis externa. *Practice.* **38**:17-21.
- Nuttall, T. and Cole, L.K. 2004. Ear cleaning: The UK and US perspective. *Vet. Dermatol.* **15**:127-136.
- Park, S., Bae, S., Juntaek, Kim. and Taeho, Oh. 2017. Identification and Antimicrobial Susceptibility of Bacteria Isolated from Dogs with Chronic Otitis Externa. *J. Vet. Clin.* **34**(1):23-26.
- Punia, S., Kumar, T., Sharma, M. and Agnihotri, D. 2021. Ear mite (*Otodectes cynotis*) induced otitis externa complicated by secondary bacterial infection in Persian cats. *The Pharma Innovation J.* **10**(11):956-959.
- Quinn, P.J., Carter, M.E. and Markey, B. 1994. Clinical Veterinary Microbiology. Mosby, Spain.
- Rème, C., Pin, D., Collinot, C., Cadiergues, M., Joyce J. and Fontaine, J. 2006. The efficacy of an antiseptic and microbial anti-adhesive ear cleanser in dogs with otitis externa. *Veterinary Therapeutics.* **7**(1):15-26.
- Rodriguez, V.R.I., Ortega-Pacheco, A., Rosado-Aguilar, J.A. and Bolio, G.M. 2003. Factors affecting the prevalence of mange-mite infestation in stray dogs of Yucatán, Mexico. *Vet. Parasitol.* **115**(1):61-65.
- Rosser, E.J. 2004. Causes of Otitis Externa. *Vet Clin N Am Small Anim Pract.* **34**:459-468.
- Rosychuk, R.A.W. 1994. Management of otitis externa. In: Rosychuk, R.A. W., Merchant, S.R. (Eds.), Ear, Nose, and Throat. *Vet. Clin. North Am. Small Anim. Pract.* **24**(5): 921-952.
- Salib, F.A. and Baraka, T.A. 2011. Epidemiology, genetic divergence and acaricides of *Otodectes cynotis* in cats and dogs. *Vet. World.* **4**(3):109-112.
- Scott, D., Miller, W. and Griffin, C. 2001. Parasitic skin diseases. In Muller & Kirk's small animal dermatology. 6th ed., Philadelphia (Pennsylvania): W. B. Saunders Company. pp. 476-484.
- Scott, D.W. and Horn Jr, R.T. 1987. Zoonotic dermatoses of dogs and cats. *Vet. Clin. North Am. Small Anim. Pract.* **17**: 117-144.
- Sharma, P., Wadhwa, D.R., Katoch, A. and Sharma, K. 2018. Epidemiological, clinic haematological and therapeutic studies on canine demodicosis. *J. Dairy Vet. Anim. Res.* **7**(3): 109-113.
- daSilva, J.T., Ferreira, L.C. and Fernandes, M. M. 2020. Prevalence and Clinical Aspects of *Otodectes cynotis* Infestation in Dogs and Cats in the Semi-arid Region of Paraíba, Brazil. *Acta Sci. Vet.* **48**:1725.
- Sivajothi, S. and Reddy, B. S. 2016. Ear mite infestation in two dogs and its therapy. *Journal of Parasitic Diseases: Diagnosis and Therapy.* **1**(1).
- Snedecor, G.W. and Cochram, W.G. 1994. Statistical Methods. 8th ed., Iowa State University Press, USA.
- Sotiraki, S.T., Koutinas, A.F., Leontides, L.S., Adamama-Moraitou, K.K. and Himonas, C.A. 2001. Factors affecting the frequency of ear canal and face infestation by *Otodectes cynotis* in the cat. *Vet. Parasitol.* **96**: 309-315.
- Soulsby, E.J.L. 2005. Helminths, Arthropods and Protozoa of domestic animals. 7th ed., Reed Elsevier Pvt. Ltd. India. pp. 491.
- Souza, C.P., Scott, F.B. and Pereira, M.J.S. 2004. Validity and reproducibility of otoscopy and pinnal pedal reflex on the diagnosis of *Otodectes cynotis* infestation in dogs. *Revista Brasileira de Parasitologia Veterinária.* **13**(3):111-114.
- Taenzler, J., De Vos, C., Roeke, R.K., Frenais, R., and Heckerth, A.R. 2017. Efficacy of fluralaner against *Otodectes cynotis*

- infestations in dogs and cats. *Parasites & Vectors*. **10**:30.
- Tang S., Prem, A., Tjokrosurjo, J., Sary, M., Van Bel, M.A., Rodrigues-Hoffmann A., Kavanagh M., Wu G., Van Eden M.E., Krumbeck J.A, et al.2020. The canine skin and ear microbiome: A comprehensive survey of pathogens implicated in canine skin and ear infections using a novel next-generation-sequencing-based assay. *Vet. Microbiol.* 247:108764.
- Taylor, M., Coop, R.L., Wall, R.L. 2015. *Veterinary Parasitology*. 4th ed., Oxford: Wiley Blackwell. pp. 665-666.
- Wall, R. and Shearer, D. 2001. *Veterinary ectoparasites: biology, pathology and control*, 2nd ed., Oxford (London): USA Blackwell Sciences, Iowa State University. pp. 262.
- Wiwanitkit, V. 2011. Dog ear mite infestation: a possible problem in public health system. *Iranian J. Arthropod-Borne Dis.* **5**(2):1.
- Malayeri, Z.H., Jamshidi, S. and Salehi, T.Z. 2010. Identification and antimicrobial susceptibility patterns of bacteria causing otitis externa in dogs. *Vet. Res. Commun.* **34**(5): 435-444.

Received : 15.11.2022

Accepted : 19.04.2023