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Epidemiology Investigation and Morphological Identification of *Otodectes cynotis* in Dogs at Baghdad City/Iraq

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Abstract

Otodectes cynotis is one of the common causes of otitis externa in companion animals; however, current epidemiological data are still rare in Iraqi pet dogs. The objective of this study was to determine the morphological description and prevalence of *O. cynotis* on privately owned dogs in Baghdad city, and to assess the relative risk factors involved. One hundred and eighty samples of dog ear wax were obtained from dogs taken to veterinary clinics during the period from November 2025 to April 2026. Microscopic observations were made from specimens to find and identify the developmental forms of mites. Morphological analysis established eggs, larvae, nymphs and adult mites indicating active life-cycle completion within the host. Diagnosis was based on smooth oval eggs, three-legged larvae, four-legged nymphs and sexually dimorphic adults with species-specific pedicel structure in females and a unique copulatory structure in males. The general prevalence was 26.11% (47/180). Age and body condition were associated significantly with infestation, which was most prevalent in dogs less than 6 months to 1 year of age and dogs that were in unhealthy body conditions. Sex, months and housing category did not significantly associate. The dogs that receiving regular viral vaccination and deworming showed a much lower infestation, than the non-medicated animals. The results reflect *O. cynotis* still as a clinically important ectoparasite in dogs from Baghdad city population. Combinations that include a young age, unhealthy body condition, and absent organized preventive care are significant predisposing factors.

Keywords: Otodectes cynotis, Ear mite, Otoacariasis, Canine, Otitis externa

I. INTRODUCTION

Otodectes cynotis is one of the most frequent ectoparasitic mite infestations in the external auditory canal of dogs and other carnivores, being considered a major etiological agent for parasitic otitis externa pathogenesis (**Bowman, 1999; Wall and Shearer, 2008**). It is a very contagious non-burrowing mite and also completes its entire life cycle on the host, thus passing from one animal to another via direct contact and as such allows rapid transmission (**Bowman *et al.*, 2002**).

In dogs, *otodectic* infestation is clinically manifested through head shaking, pruritus and erythema of the ear canal with presence of a dark ceruminous exudate that can provide an environment for secondary infections including bacterial and fungal infections in untreated cases (**Rosser, 2004**). Chronic infestations can lead to the development of chronic otitis externa in affected dogs and inflict significant animal welfare concerns, particularly when dealing with young or unhealthy controlled populations (**Miller *et al.*, 2013**).

Higher infestation rates have been commonly recorded in younger dogs because of the immaturity of immune responses and greater close contact, which favors higher levels of mite transference (**Sotiraki *et al.*, 2001; Silva *et al.*, 2020**).

Differences across seasons suggesting effect of climate type on mite survival and transmission dynamics have also been and widely studied (**Otranto *et al.*, 2004; Smith *et al.*, 1999)**

Various scientific evidence from different regions of the world pointed out that *otodectosis* remains a highly prevalent canine parasitic disease, particularly in densely populated or rural-urban continuum zones with

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limited veterinary access (**Ceylan *et al*., 2024; Taddesse *et al*., 2024).** The last available data regarding the presence of Otodectes cynotis in dogs and cats reported high prevalence values across a vast portion of Middle Eastern territories emphasizes the need for regional-specific epidemiological data (**Al-Khafaji and Al-Musawi, 2025**).

Diagnosis of *Otodectes cynotis* diagnosis is necessary for effective treatment and management. Although these methods are useful to confirm the diagnosis of otitis, classical diagnostic techniques (clinical examination, ear canal inspection using an otoscope and direct observation by light microscopy of swab samples) still represent the most practical and reliable procedures for daily practice in private veterinary clinical settings (**Combarros *et al*., 2019; Zajac and Conboy, 2012**).

Although *Otodectes cynotis* is clinically recognised as an important agent, information on its prevalence and diagnostic features in dogs in Baghdad city are rare. A clear knowledge of local infestation patterns is important to increase diagnostic awareness and introduce efficient control measures. Based on that, the objective of this work was to determine the prevalence of *Otodectes cynotis* infestation in dogs at Baghdad city and evaluate by conventional microscopic techniques.

II. MATERIALS AND METHODS

Ethical Approval

Ethical approval was provided by (Animal Ethics Committee, College of Veterinary Medicine, University of Baghdad) Approval No. P-G/22; (7 January 2026), and the work has been performed under the monitoring of Department of Parasitology.

Animals Examined

The study sample included a total of 180 owned dogs that presented to a number of small-animal veterinary clinics located within Baghdad city. Data was collected by communicating directly with the dog owners during a normal visit to the clinic, for example follow-up or checkup visit.

Sample Collection

Dogs were gently restrained to avoid unnecessary movement enabling visual and when possible otoscopic examination of the external ear canals. Sterile cotton-tipped swabs were introduced into the vertical ear canal and rotated to obtain ceruminous debris as recommended in the routine diagnostic method for small-animal otitis (**Combarros *et al*., 2019; Tyler *et al*., 2020, Coelho *et al*., 2024**). Each ear was sampled independently to prevent contamination between ears. Swabs were then inserted into labeled sterile tubes, transported in cooled conditions, and stored at +4°C until analysis.

Microscopic Diagnosis

Glycerin Wet Mount Technique

A fragmented piece of ear wax was taken off the swab onto a clean glass slide with a sterile dissecting needle. One or two drops of glycerine were incorporated into the specimen in order to obtain softening and partial clearing of cerumen which would aid in spreading parasitic elements throughout the preparation. The material was gently teased apart so that it would spread evenly before cover-slipping. Slides were viewed with the use of a light microscope at 10× and 40× magnification for the presence of eggs, larva, nymphal stages and adult mites. *Otodectes cynotis* was identified according to routine morphological criteria described in acarological texts (**Rataj *et al*., 2004; Campbell, 2005; Salib and Baraka, 2011**). When mites were encountered, some of the representative specimens were gently separated with a fine needle and placed in a new drop of glycerin on another slide for inspection and description of their detailed morphology and life stages based on methods described in recent otoacariasis studies (**El-Dakhly, 2024**).

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Statistical Analysis

All data collected were analyzed using IBM SPSS Statistics version 26.0. The analysed factors were included age, sex, month, housing category, body condition score and viral vaccination and deworming status. The prevalence expressed the number of positive dogs as a proportion of the total of examined dogs. The infestation and potential risk factors of *Otodectes cynotis* were calculated using Pearson's chi-square (χ^2) test as commonly used method in the typical epidemiological methodology of parasitological studies (**Salib & Baraka, 2011; Silva *et al*., 2020**). Values of P less than 0.05 were considered to be statistically significant. All study variables were categorical, so parametric tests could not be performed.

III. RESULTS

Microscopical and Morphological Characterization of *Otodectes cynotis*

Eggs

Eggs of *O. cynotis* were commonly found in positive ear-wax samples and were generally associated with ceruminous material, attached to desquamated epithelial cells or imbedded in keratinous debris lining the external auditory canal (**Fig. 3-1**). The eggs were ovoid and slightly flattened with a thin, smooth, transparent chitinous shell through which the embryonic content was observable under light microscope. The eggs shape was similar to those described in Iraqi dogs and Egyptian cats (**Salib and Baraka, 2011; Aljabory *et al*., 2025; El-Dakhly, 2024**). The eggs were typically found in the ear canal in masses (**Fig. 3-2**) similar to sub-regional studies (**Hussein *et al*., 2024**) and typical morphological descriptions (**Rataj *et al*. 2004**) Diagnostics from *Psoroptes cuniculi* were based on the smooth shell and relatively flattened shape the acari (**Bowman, 1999; Campbell, 2005**).

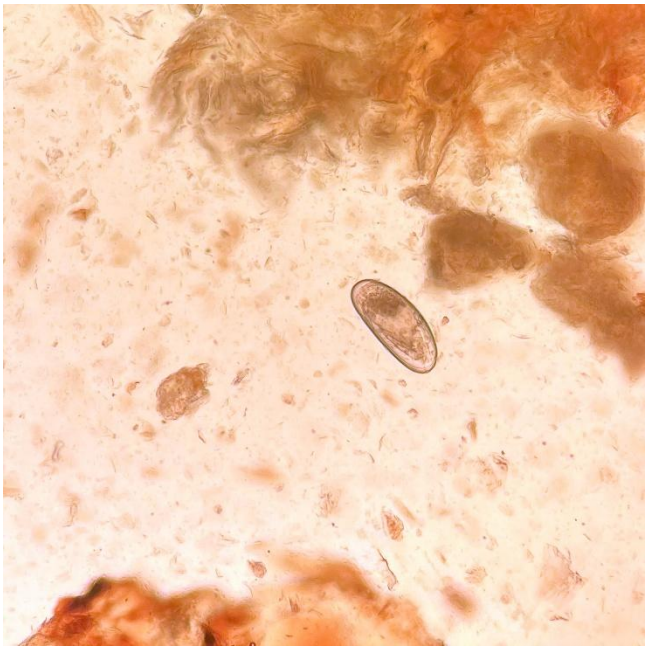

Figure 3-1 Egg of *Otodectes cynotis* (×10).

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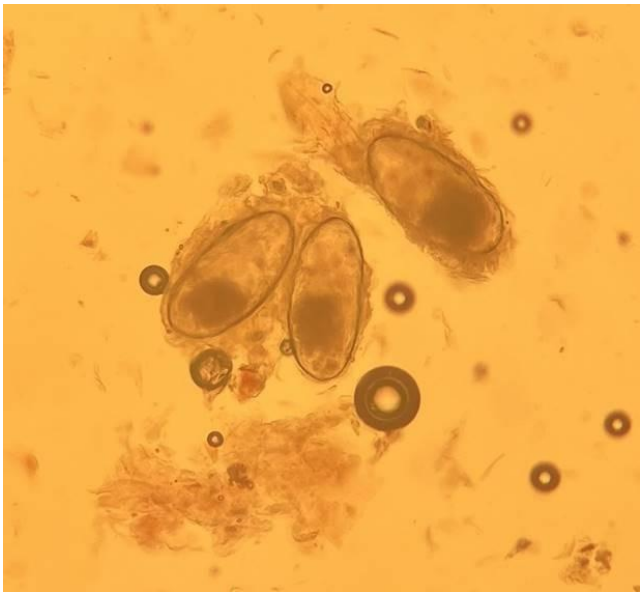

Figure 3-2 Clustered eggs of *Otodectes cynotis* (×10).

Larvae

Larval were development easily recognized by bloated oval shape of idiosoma and the possession of three pairs of legs (**Fig. 3-3**). The larvae were smaller than both the nymphs and adults, and were frequently recorded from wet ceruminous debris or clusters of epithelial cells. The larval cuticle seemed to be thin and poorly sclerotized. These characteristics are consistent with earlier works in Iraq and some areas (**Acar, 2016; Hussein *et al.*, 2020**). Observation of the immature stages was improved by glycerin clarification (**Kocoń and Nowak-Chmura, 2017**).

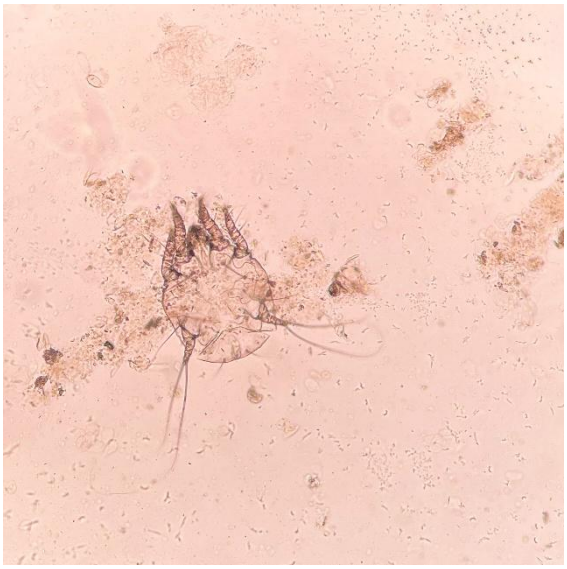

Figure 3-3: Larvae of *Otodectes cynotis* (×10).

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Nymphs (Protonymphs and Tritonymphs)

Nymphs were a large part of recovered mites. Protonymphs and tritonymphs could be excluded from the larva because they had four pairs of legs, larger body size, and undeveloped matured adult genitalia (**Wall and Shearer, 2001; Bochkov, 2010**). Tritonymphs morphology was more similar to adult-like features compared to protonymphs as described elsewhere (**Bowman, 2002**). Progressive development of dorsal and ventral setation patterns were also seen with nymphal stage (**Fig. 3-4**) (**Bochkov, 2010**).

Figure 3-4: (A) Protonymph. (B) Deutonymph female with paired copulatory tubercles (blue arrow) (×10).

Adult Females

Adult females were more frequently collected (**Fig. 3-6**) and exhibited robust, ovoid body form. The gnathosoma was conical in shape, the basal capitulum-type supported pedipalps and chelicerae (**Fig. 3-5**). A distinguishing feature was short 4th pairs of legs which had long setae (**Campbell, 2005; Rataj *et al.*, 2004**) on elongated usually incompletely segmented pedicels (**Bowman 1999; Acar, 2016**). Such findings were in corroborate on with Iraq (**El-Dakhly, 2024)** published records from Egypt (**Aljabory *et al.*, 2025**).

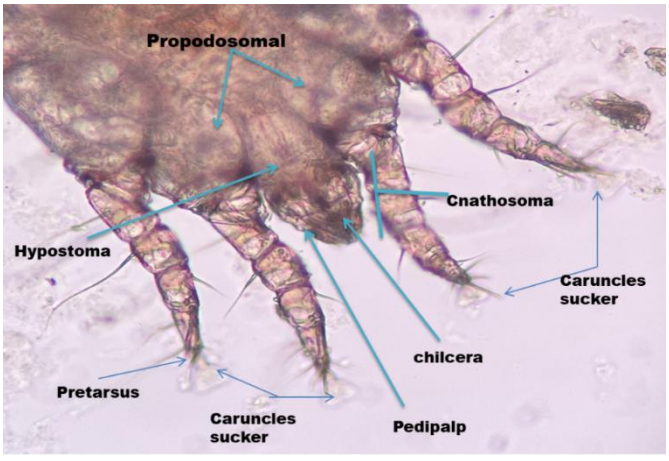

Figure 3-5 Anterior end of adult *Otodectes cynotis* (×10).

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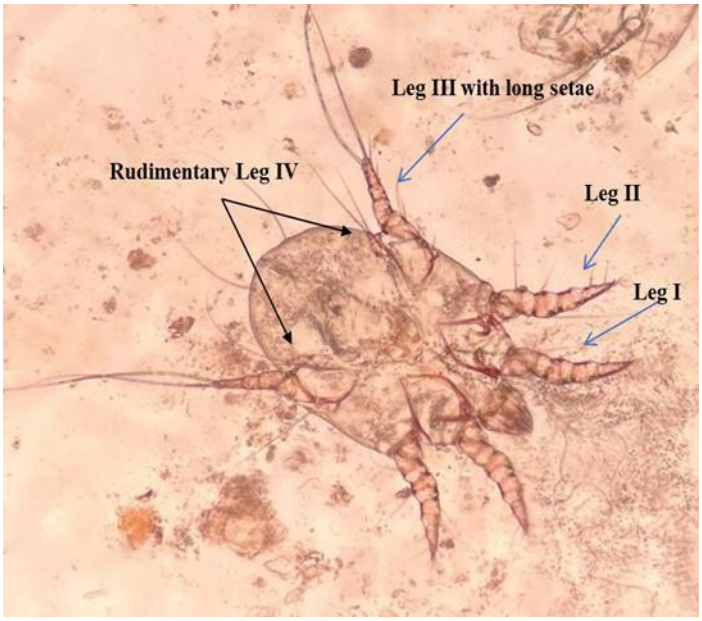

Figure 3-6 Adult female *Otodectes cynotis* (×10).

Adult Males

Males were smaller than females, and the posterior end of the body was blunt and showed a well-developed copulatory apparatus (**Fig. 3-7**). The sclerotized genitalia on the rear part of opisthosoma were well developed, consistent with descriptions in **Rataj *et al*. (2004), Salib & Baraka (2011) and El-Dakhly, (2024)**. Several developmental stages (eggs, larvae, nymphs and adults) were found together at the same time on individual specimens which are typical for completion of the life cycle in the host (**Curtis, 2004; Campbell, 2005).**

Figure 3-7: Adult male Otodectes cynotis (×10)

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Prevalence of *Otodectes cynotis* in dogs in Baghdad city

From November 2025 to April 2026, a total of 180 ear-wax specimens were obtained from client owned dogs visiting veterinary clinics in Baghdad city. Based on the results of light microscopy, 47/180 samples were found to be positive for *O. cynotis* with an overall prevalence of 26.11% (**Table-3-1**).

Table 3-1: Prevalence of *Otodectes cynotis* in examined dog

Parameter	Number of dogs	Positive	(%)
Examined dog	180	47	26.11

3.2.1 Sex-related prevalence of *otodectes cynotis* infestation in dogs

In sex-related the 180 dogs, 92 was male and 88 females. The infection rates were 25.00% (23/92) in males and 27.27% (24/88) in females. There was no statistically significant relationship observed (χ^2 = 0.12; df = 1; P > 0.05) (**Table 3-2**).

Table 3-2: Sex-related prevalence of *Otodectes cynotis* infestation in dog

Sex	No. examined	No. Positive	Prevalence (%)
Male	92	23	25.00
Female	88	24	27.27
Total	180	47	26.11

χ^2 = 0.12; df = 1; P > 0.05 (non-significant)

3.2.2 Age-related prevalence of otodectes cynotis infestation in dogs

Dogs were classified by life-stage: 6months–1 year, 1–2 years and >2 years. The prevalence was 43.33% (26/60), 25.86% (15/58) and 9.68% (6/62). The relationship was very significant (χ^2 = 17.90, df = 2; P < 0.01) (**Table 3-3**).

Table 3-3: Age-related prevalence of *Otodectes cynotis* infestation in dog

Age	No. examined	No. Positive	Prevalence (%)
6 mon. - 1 year	60	26	43.33
1–2 years	58	15	25.86
>2 years	62	6	9.68
Total	180	47	26.11

χ^2 = 17.90; df = 2; P < 0.01 (Highly significant)

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3.2.3 Monthly correlation with infestation by *Otodectes cynotis*

Predominance varied from 20.00% to 33.33% by the sampling month and no statistical monthly variation was found ($\chi^2 = 3.41$; df = 5; P >0.05) (**Table 3-4**).

Table 3-4: Monthly-related prevalence of *Otodectes cynotis* infection in dogs

Month	No. examined	No. Positive	Prevalence (%)
November 2025	28	9	32.14
December	30	10	33.33
January 2026	32	8	25.00
February	31	7	22.58
March	29	7	24.14
April	30	6	20.00
Total	180	47	26.11

$\chi^2 = 3.41$; df = 5; P > 0.05 (non-significant)

3.2.4 Housing conditions prevalence of *Otodectes cynotis* infestation in dogs

Dogs were classified as: Inside home alone, Inside home with cats, and Outside home in garden or garage. There was no evidence for an association between the two ($\chi^2 = 1.18$; df = 2; P > 0.05) (**Table 3-5**).

Table 3-5: Housing conditions-related prevalence of *Otodectes cynotis* infestation in dogs

Housing conditions	No. examined	No. Positive	Prevalence (%)
Inside home alone	40	8	20.00
Inside home with cats	90	27	30.33
Outside home in garden or garage	50	12	24.00
Total	180	47	26.11

$\chi^2 = 1.18$; df = 2; P > 0.05 (non-significant)

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3.2.5 Body condition–related prevalence of *Otodectes cynotis* infestation in dogs

Prevalence in dogs with unhealthy body condition was 48.33% (29/60) and in those with healthy condition was 15.00% (18/120). The relationship was highly significant ($\chi^2 = 21.84$; df = 1; $P < 0.001$) (**Table 3-6**).

Table 3-6: Body condition–related *Otodectes cynotis* infestation in dogs

Body condition	No. examined	No. Positive	Prevalence (%)
Healthy	120	18	15.00
Unhealthy	60	29	48.33
Total	180	47	26.11

$\chi^2 = 21.84$; df = 1; P < 0.001 (Highly significant)

3.2.6 Effect of viral vaccination and deworming on *Otodectes cynotis* infestation in dogs

Among the dogs that were viral vaccinated and dewormed, a prevalence of 12.63% (12/95) was detected compared to not treated dogs in which clinical signs were present in 41.18% (35/85). The difference was statistically significant ($\chi^2 = 18.96$; df = 1; $P < 0.001$) (**Table 3-7**).

Table 3-7: Prevalence of *Otodectes cynotis* infestation according to viral vaccination and deworming status in dogs

Viral vaccination and deworming	No. examined	No. Positive	Prevalence (%)
Yes	95	12	12.63
No	85	35	41.18
Total	180	47	26.11

$\chi^2 = 18.96$; df = 1; P < 0.001 (Highly significant)

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IV. . DISCUSSION

Morphological characteristics of the mites isolated in this study were typical for *Otodectes cynotis* found in regional and international documents (**Bowman, 1999; Campbell, 2005; Salib & Baraka, 2011; El-Dakhly *et al*., 2024 and Aljabory *et al*., 2025**). Eggs were oval, with thin clear egg shells which could be differentiated from those of other *psoroptid mites* (**Bowman, 1999; Campbell, 2005**). The associated finding of eggs, larvae, nymphs and adults indicated active reproduction and the completion of life cycles on the host (**Curtis 2004, Rataj *et al.* 2004**). Larvae had three pairs of legs, in nymphs and adults there were four pairs, as described on the basis of known taxonomy (**Wall and Shearer, 2001; Bochkov, 2010**). Adult females were frequently observed among positive samples, presenting its characteristic elongate pedicels while in males this was a rounded posterior end with clear presence of a copulatory bursa (**Campbell, 2005; Rataj *et al*., 2004**). These data also confirm that species identification can be reliably established according to the morphological standards.

Overall prevalence of 26.11% in general, suggests that *O. cynotis* infestation is still common among the owned pet dogs in Baghdad. Similar rates have been reported globally, with variation between studies perhaps owing to differences in climate, population structure and access to veterinary care. There was no relationship between infestation and sex in the present findings, which is consistent with the previous investigations that found similar home infestations in male and female dogs maintained under the same environmental conditions (**Silva *et al.* 2020; Mosallanejad *et al.* 2011; Beugnet *et al*., 2014**). Conversely, the variable of age was strongly associated with infestation, since young dogs were more infested than older ones. Similar findings have been reported by others (**Lefkaditis *et al*., 2009; Hussein *et al*., 2024**). Although the closer contact and more opportunities for transmission/exposure may lead to a greater susceptibility in younger dogs, it much be related to the immaturity of their immune system (**Powell *et al*., 1980; Kocoń and Nowak-Chmura, 2017**). Even though monthly variation was not statistically significant incidence was observed as a factor of corresponding in cooler months. The life history strategy of *O. cynotis* as an organism that is an obligate parasite in the ear canal probably minimizes strong environmental pressure (**Fanelli *et al*., 2020**). The housing was not a risk factor for infestation, but contact with cats had higher prevalence, which could be seen as supportive evidence of being reservoirs (**Sotiraki *et al*., 2001; Salib and Baraka, 2011**). Proximity and co-habitat are still the main transmission factors (**Beugnet *et al*., 2014**). Also, unhealthy body condition was highly correlated to infestation, a probable penalty of immunological impairment and inefficient grooming (**Powell *et al*., 1980; Siagian and Siregar, 2021**). Finally, the dogs that had regular veterinary care and vaccinated against viral and deworming would lead to less infestation rates (**Otranto *et al*., 2004; Hussein *et al*., 2024**).

V. CONCLUSIONS

Otodectes cynotis is still a common ectoparasite in pet dogs in Baghdad with overall prevalence of 26.11%. All developmental stages were visually detectable as a proof of the active infestation based on microscopic examination. Age and unhealthy body condition were the most significant risk factors, while sex, housing, and monthly seasonality were not significantly correlated. Lower infestation was related with regular preventive veterinary care, such results emphasize that systematic monitoring and control measures are the best way to manage canine *otoacariasis*.

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