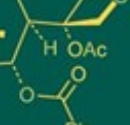
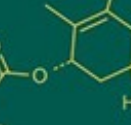
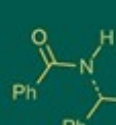
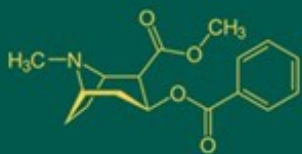


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Topographic epidemiological investigations of otitis externa in cats in Uttarakhand

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ABSTRACT

Otitis externa is a common multifactorial inflammatory condition of cats with a complex pathogenesis. However, population-based epidemiological data from India are scarce. This retrospective study estimated the prevalence of feline otitis externa in Uttarakhand and described its distribution by age, breed, sex, season and altitude. Outpatient records were collected from Government Veterinary Hospitals in all 13 districts for a year. *Otitis externa* was diagnosed with an overall prevalence of 15.9% among feline clinical cases. Affected cats were most often 6 months to 2 years old (44.98%), followed by those under 6 months (29.76%) and those over 2 years (25.25%). Exotic breeds (56.47%) and females (58.09%) accounted for the majority of cases. Cases were recorded in every month, with only minor monthly variation (7.58-8.81% of total cases). Prevalence was higher in lower-altitude areas than in higher-altitude areas and was highest in Dehradun (20.20%). These findings show that otitis externa is a substantial health problem in cats of Uttarakhand, particularly young cats, females, exotic breeds and cats in the plains and foothills. They provide baseline data for targeted diagnosis, prevention and control.

Keywords: Otitis externa, Cats, Uttarakhand, Prevalence, Epidemiology

Introduction

Otitis externa is a common inflammatory disorder of the external auditory canal in cats and represents an important clinical condition owing to its multifactorial etiology and potential for chronicity. The pathogenesis involves a complex interaction between primary initiating factors, host-related predisposing factors and secondary perpetuating factors that collectively influence the onset and persistence of inflammation (Kennis, 2013) [1]. Primary etiological factors include foreign bodies, hypersensitivity reactions, bacterial and fungal infections and ectoparasites, among which ear mite infestation is considered a frequent cause of feline otitis externa (Harvey et al., 2001) [2]. Several anatomical and environmental factors may further increase susceptibility, including stenotic ear canals, excessive canal hair, breed-associated predisposition in cats such as Persian and Himalayan breeds and increased humidity and moisture, which may impair ear canal ventilation and promote microbial growth (Bond et al., 1995) [3]. Persistent inflammation may subsequently alter the local ear canal environment and facilitate secondary bacterial colonization, thereby contributing to the progression, persistence, and increased complexity of the disease (Griffin, 2006) [4].

The external auditory canal of healthy cats harbors a relatively stable microbial community, predominantly comprising Gram-positive cocci, with *Staphylococcus* spp. being among the most frequently isolated organisms (Hariharan et al., 2006) [5]. Maintenance of this microbial equilibrium is influenced by the local otic environment; however, conditions such as inflammation, increased temperature, altered pH and excessive moisture can disrupt the normal microenvironment and promote dysbiosis, thereby facilitating the proliferation and overgrowth of opportunistic bacteria (Bensignor et al., 2006) [6]. The development of feline otitis externa is multifactorial, with parasitic, allergic and other primary causes contributing to initiation of the inflammatory process. Parasitic infestation, particularly by *Otodectes cynotis*, is considered an important cause and has been associated with a high proportion of feline otitis externa cases, especially in young cats and those with outdoor access (Lefkaditis et al., 2009; Fanelli et al., 2020) [7, 8]. Allergic disorders, including food hypersensitivity and atopic dermatitis, are also recognized as important underlying factors and otitis externa has been reported concurrently in a substantial proportion of cats with food allergy (Zur et al., 2002) [9]. In addition, foreign bodies, although less frequently implicated in cats than in dogs, may serve as primary initiating factors, with grass awns and other plant materials capable of inducing localized inflammation within the external auditory canal (Little et al., 1991) [10]. Collectively, these primary factors may alter the local otic environment and predispose affected cats to secondary microbial proliferation, thereby contributing to the persistence and progression of otitis externa.

Cats are one of the most widely kept companion animals worldwide, number of households preferring cats as pets has increased in recent years, and in several countries the cat population now exceeds that of dogs.

The occurrence of otitis externa throughout the year in the present investigation, with only minor seasonal fluctuations, suggests that the disease is not restricted to a particular season. Nevertheless, the comparatively higher prevalence observed during the cooler months may be associated with increased indoor confinement, closer animal-to-animal contact, and environmental conditions that may favor persistence

or transmission of ectoparasites and secondary microbial agents. **Perego et al. (2014)** ^[14] and **Hadina et al. (2025)** ^[16] also reported seasonal variation in the occurrence of otitis externa, with increased prevalence during winter. **Hadina et al. (2025)** ^[16] further identified winter as a significant risk factor for *Malassezia*-associated otitis. In contrast, **Coelho et al. (2024)** ^[12] and **Perego et al. (2026)** ^[11] reported cases throughout the year without a pronounced seasonal predisposition, which more closely resembles the pattern observed in the present study. These differences indicate that seasonal effects may be influenced by local climatic conditions, housing systems, population density, parasite ecology, and management practices rather than season alone.

Geographical variation was also evident in the present study, with a comparatively higher occurrence of otitis externa in cats from plain and foothill regions. This pattern may reflect the combined influence of population density, climatic conditions, animal movement, management practices, and access to veterinary healthcare. Regions with greater cat density and closer animal contact may facilitate transmission of contagious or parasitic agents, particularly *O. cynotis*. Differences in veterinary accessibility and awareness may addition-

ally influence the likelihood of affected animals being presented for clinical evaluation, thereby contributing to regional differences in recorded prevalence. Therefore, the geographical distribution observed in the present study is likely to represent a multifactorial interaction between environmental, epidemiological, managerial, and healthcare-related factors rather than a direct effect of geographical location alone.

Conclusion

The present investigation revealed that otitis externa accounted for 15.89% of the feline clinical cases evaluated in Uttarakhand, with 2,281 cases diagnosed among 14,346 cats. The disease was predominantly observed in cats aged 6 months to 2 years, with a comparatively higher occurrence among females and exotic breeds. *Otitis externa* was recorded throughout the year, although its prevalence was comparatively higher during the winter months. Geographically, a greater occurrence was observed in cats from lower-altitude regions of Uttarakhand than in those from higher-altitude areas, indicating possible influences of age, sex, breed, season and altitude on the occurrence of feline otitis externa.

Table 1. Season wise prevalence of *Otitis externa* in Cats of Uttarakhand

Season	Month	Number of <i>Otitis externa</i> cases		Prevalence (%)	
Summer	May 2025	194	8.50	33.63	
	June 2025	201	8.81		
Monsoon	July 2025	193	8.46	24.33	
	August 2025	173	7.58		
	September 2025	189	8.28		
Winter	October 2025	184	8.06	42.04	
	November 2025	199	8.72		
	December 2025	175	7.67		
	January 2026	200	8.76		
	February 2026	201	8.81		
Summer	March 2026	187	8.19	33.63	
	April 2026	185	8.11		

Table 2. Dispersal of altitude wise prevalence of *Otitis externa* in cats of Uttarakhand

Government Veterinary Hospital	Topographic distribution		Elevation from sea (m)		Total no of cases	Prevalence
	Latitude	Longitude				
Gopeshwar (Chamoli)	30.4095°N	79.3198°E	1450	> 700m	4/41	9.75
Rudraprayag	30.2850°N	78.9822°E	701		13/111	11.71
Uttarkashi	30.7299°N	78.4434°E	1352		7/62	11.29
Tehri	30.3012°N	78.5661°E	1750		6/52	11.53
Almora	29.5971°N	79.6591°E	1651		6/59	10.16
Pithoragarh	29.58°N	80.22°E	1645		7/65	10.76
Bageshwar	29.8404°N	79.7694°E	1004		7/61	11.47
Champawat	29.335°N	80.091°E	1626		6/55	10.90
Haridwar	29.9457°N	78.1642°E	250	< 700m	438/2863	15.29
Dehradun	30.3165°N	78.0300°E	640		756/3741	20.2085
Rudrapur (U.S. Nagar)	28.98°N	79.400°E	215		638/3576	17.84116
Haldwani (Nainital)	29.2196°N	79.5125°E	424		370/3541	10.44
Kotdwar (Pauri)	29.7453°N	78.5198°E	395		23/119	19.32

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