ISSN: 2456-2912
NAAS Rating (2025): 4.61
VET 2025; 10(9): 330-333

www.veterinarypaper.com
Received: 13-08-2025
Accepted: 09-09-2025

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Cultural isolation and antibiotic sensitivity in cases of otitis externa in dogs

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DOI: https://www.doi.org/10.22271/veterinary.2025.v10.i9e.2575

Abstract
Otitis externa is a common problem encountered in canine practice worldwide and is frequently associated with bacterial and fungal pathogens. The present study was conducted on 50 dogs with clinical signs of otitis externa to determine the causative microorganisms and evaluate their antimicrobial susceptibility. A total of 42 (84%) samples yielded microbial growth. *Staphylococcus* spp. (40.4%) were the predominant isolates followed by *Pseudomonas* spp. (26.1%), *Proteus* spp. (9.5%), *Escherichia coli* (7.1%), and *Klebsiella* spp. (4.7%). Fungal isolates *(Malassezia pachydermatis)* accounted for 11.9%. *Staphylococcus* spp. were highly sensitive to enrofloxacin (85.7%), gentamicin (81.0%), and amoxicillin-clavulanic acid (76.2%) but resistant to penicillin G (23.8%) and ampicillin (28.6%). *Pseudomonas* spp. were sensitive to imipenem (88.0%) and amikacin (72.0%) but resistant to tetracycline (16.0%) and chloramphenicol (20.0%). Culture-guided therapy resulted in faster recovery (10-14 days) compared to empirical treatment (> 21 days). The findings highlight the importance of routine culture and antibiotic sensitivity testing for rational management of canine otitis externa and prevention of antimicrobial resistance.

Keywords: Otitis externa, *Staphylococcus*, *Pseudomonas*, dog, antibiogram, antimicrobial resistance

1. Introduction

Otitis externa is defined as inflammation of the external auditory canal and is one of the most common ear diseases in dogs [1, 2]. It can present as acute or chronic and is often associated with bacterial and fungal pathogens. The canine ear canal is long, narrow, and L-shaped, providing a warm and moist environment favorable for microbial colonization [3].

The etiology of otitis externa is multifactorial, and it is often explained using the "primary, secondary, predisposing, and perpetuating" factors model. Primary factors include parasites (*Otodectes cynotis*), foreign bodies, allergic skin diseases, and endocrinopathies. Secondary factors are bacterial and fungal overgrowth, while predisposing factors include breed predisposition, pendulous ear pinnae, hair in the ear canal, and excessive cerumen. Perpetuating factors include hyperplasia, stenosis, and chronic inflammation that maintain the disease state [4, 5].

Among bacteria, *Staphylococcus pseudintermedius* is the most frequently isolated, followed by *Pseudomonas aeruginosa*, *Proteus* spp., and *Escherichia coli*. Fungal involvement is usually due to *Malassezia pachydermatis*, a commensal yeast that proliferates under favourable conditions such as allergy or antibiotic overuse [3, 6].

The disease is not only of clinical importance due to pain, pruritus, and reduced quality of life in affected dogs, but also due to its economic impact on pet owners. Chronic otitis can progress to otitis media or interna, leading to neurological signs, deafness, and in severe cases, intracranial complications [7, 13].

Antimicrobial resistance has emerged as a major challenge in veterinary medicine. Methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) and multidrug-resistant *Pseudomonas aeruginosa* are now frequently reported worldwide [7, 8]. Resistance is driven by indiscriminate use of broad-spectrum antibiotics, over-the-counter availability, and lack of culture-guided therapy.

Several studies from India have highlighted the predominance of *Staphylococcus* spp. and *Pseudomonas* spp. in canine otitis externa [9-13]. However, resistance profiles differ regionally. For example, isolates from Jabalpur showed higher resistance to fluoroquinolones compared to those from Himachal Pradesh [6, 9]. International studies also report similar patterns [2, 10, 11].

Given this scenario, the present study was undertaken to determine the prevalence of bacterial and fungal isolates in cases of canine otitis externa and to evaluate their antimicrobial susceptibility profiles. The study also aimed to compare the findings with published reports from India and abroad to better understand trends in antimicrobial resistance.

2. Materials and Methods
2.1 Study Population
Fifty dogs of different breeds, ages, and sexes were included. Inclusion criteria were clinical signs of otitis externa such as head shaking, scratching, pain on palpation of the ear, erythema, malodorous discharge, or ceruminous debris. Dogs under antibiotic or antifungal treatment in the preceding 7 days were excluded.

2.2 Clinical Examination
Cases were classified into mild, moderate, and severe otitis externa based on clinical grading. Mild cases showed erythema and mild pruritus; moderate cases had pain, discharge, and erythema; severe cases exhibited chronic thickening, ulceration, and purulent discharge.

Fig 1: External ear canal changes in dogs affected with otitis externa

2.3 Sample Collection
Sterile cotton swabs were used to collect ear canal samples prior to cleaning or treatment. Two swabs per case were collected: One for bacterial culture and another for fungal culture. Samples were transported immediately to the laboratory in transport medium under refrigeration.

2.4 Cultural Isolation and Identification
Bacterial swabs were streaked onto Blood agar, MacConkey agar, and Nutrient agar. Fungal swabs were inoculated onto Sabouraud's dextrose agar with chloramphenicol. Bacterial cultures were incubated aerobically at 37 °C for 24-48 hours, while fungal plates were incubated at 25-28 °C for up to 7 days.

Isolates were identified based on colony morphology, hemolysis, pigmentation, Gram's staining, and biochemical tests (oxidase, catalase, indole, citrate utilization, triple sugar iron, urease). *Staphylococcus* spp. were further identified using coagulase and mannitol fermentation tests. *Pseudomonas* was confirmed by oxidase positivity, pigment production, and growth on cetrimide agar. *Malassezia pachydermatis* was identified microscopically (bottle-shaped yeast cells) and confirmed by germ tube test.

2.5 Antibiotic Sensitivity Testing
Antibiotic susceptibility was tested using the Kirby-Bauer disc diffusion method on Mueller-Hinton agar following CLSI guidelines. The antibiotics tested were:

- Amoxicillin-clavulanic acid (30 µg)
- Cefotaxime (30 µg)
- Gentamicin (10 µg)
- Enrofloxacin (5 µg)
- Ciprofloxacin (5 µg)
- Amikacin (30 µg)
- Tetracycline (30 µg)
- Chloramphenicol (30 µg)
- Penicillin G (10 units)
- Ampicillin (10 µg)

For fungal isolates, antifungal sensitivity was tested using ketoconazole and itraconazole discs. Zones of inhibition were measured, and isolates were categorized as Sensitive, Intermediate, or Resistant.

2.6 Data Analysis
Microbial prevalence was calculated in percentages. Statistical associations between age, sex, breed, and occurrence of otitis externa were evaluated using Chi-square test ($p<0.05$). Antibiotic sensitivity was summarized descriptively.

3. Results
3.1 Overall Prevalence
Out of 50 samples, 42 (84%) were positive for microbial growth. A total of 47 isolates were obtained (5 cases showed mixed infections).

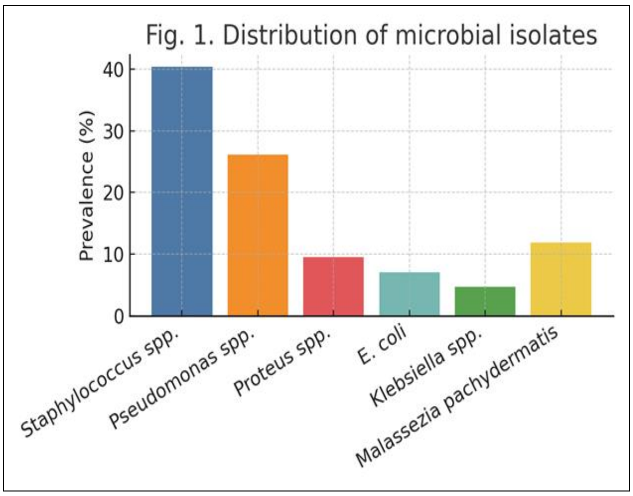

Fig 2: Distribution of microbial isolates in canine otitis externa

Table 1: Relative frequency of organisms isolated from canine otitis externa (N=42)

Sr. No.	Organism	Percent positivity (%)
1	*Staphylococcus* spp.	40.4
2	*Pseudomonas* spp.	26.1
3	*Proteus* spp.	9.5
4	*Escherichia coli*	7.1
5	*Klebsiella* spp.	4.7
6	*Malassezia pachydermatis*	11.9

3.2 Breed, Age, and Sex Distribution

Breeds most affected: Labrador Retrievers (28%), German Shepherds (18%), Pomeranians (12%), non-descript dogs (22%), and others (20%). Age group: Dogs between 1–5 years accounted for the highest prevalence (46%), followed by >5 years (36%) and < 1 year (18%). Sex: Males (60%) were more affected than females (40%).

3.3 Antibiotic Sensitivity

Staphylococcus spp. were highly sensitive to enrofloxacin (85.7%), gentamicin (81.0%), and amoxicillin-clavulanic acid (76.2%), while resistance was highest to penicillin G (23.8%) and ampicillin (28.6%).

Pseudomonas spp. showed highest sensitivity to imipenem (88.0%) and amikacin (72.0%) but were resistant to tetracycline (16.0%) and chloramphenicol (20.0%).

Table 2: Antibiotic sensitivity pattern of major isolates

Antibiotic	*Staphylococcus* spp. (%)	*Pseudomonas* spp. (%)
Enrofloxacin	85.7	60.0
Gentamicin	81.0	55.0
Amoxicillin-clavulanic acid	76.2	65.0
Imipenem	—	88.0
Amikacin	—	72.0
Tetracycline	42.8	16.0
Chloramphenicol	38.1	20.0
Penicillin G	23.8	—
Ampicillin	28.6	—

Malassezia pachydermatis isolates were universally sensitive to azole antifungals.

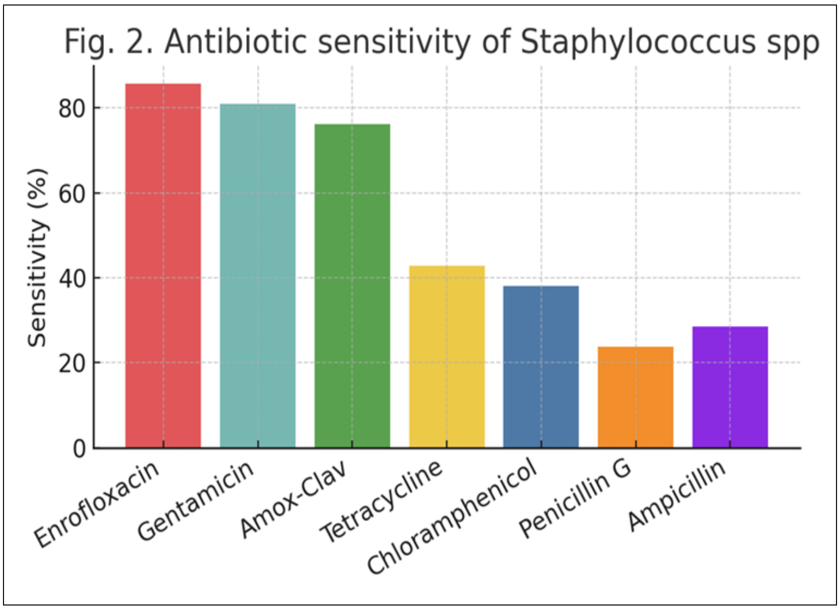

Fig 3: Antibiotic sensitivity of *Staphylococcus* spp

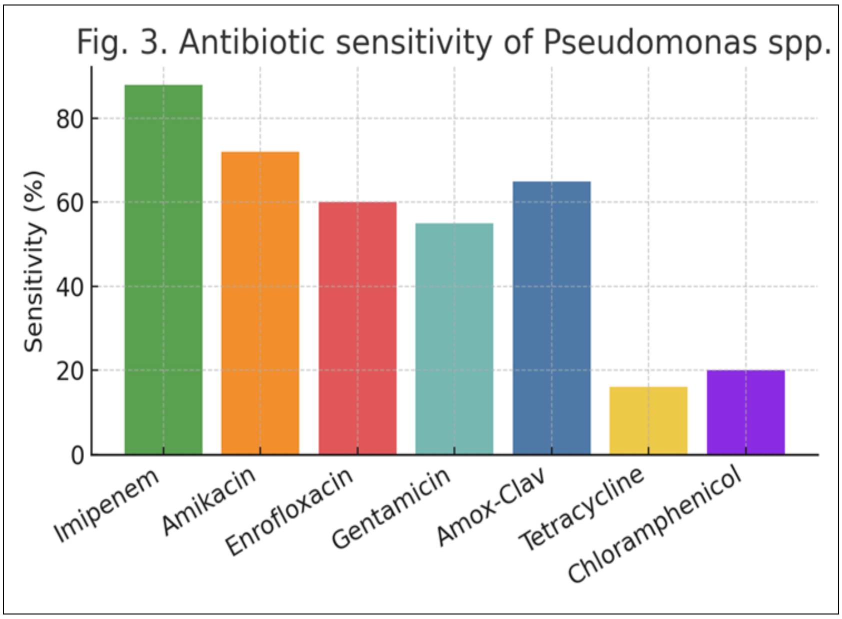

Fig 4: Antibiotic sensitivity of *Pseudomonas* spp.

4. Discussion

This study demonstrated that *Staphylococcus* spp. (40.4%) and *Pseudomonas* spp. (26.1%) were the predominant isolates in canine otitis externa. These findings are in line with earlier Indian reports [5, 6, 9] and also comparable to international studies [2, 10]. The high prevalence of *Staphylococcus* reflects its dual role as both a commensal and opportunistic pathogen of the canine skin and mucosa. In contrast, *Pseudomonas* infections were often associated with chronic, purulent otitis. The ability of *Pseudomonas* to form biofilms and produce enzymes contributes to persistence and resistance [7, 10]. Breed predisposition observed in Labradors and German Shepherds supports earlier reports that dogs with pendulous ears, hairy ear canals, or heavy cerumen production are more prone to otitis [4, 9]. Males were slightly more affected, consistent with Singh *et al*. [8]. Antibiotic sensitivity results showed that *Staphylococcus* spp. were highly sensitive to fluoroquinolones and aminoglycosides but resistant to β-lactams. This is consistent with reports of methicillin-resistant strains emerging worldwide [11]. *Pseudomonas* spp. showed multidrug resistance, retaining susceptibility to imipenem and amikacin, similar to Korbelik *et al*. [10]. Fungal isolates of Malassezia pachydermatis were universally sensitive to azoles, consistent with findings from India [12] and Europe [3]. Culture-guided therapy resulted in faster recovery (10-14 days) compared to empirical therapy (> 21 days). Similar observations have been made by Sharma *et al*. [6] and Hariharan *et al*. [1]. These findings emphasize the need for rational antibiotic use and routine susceptibility testing to combat antimicrobial resistance. Preventive strategies such as regular ear cleaning, control of underlying conditions (allergy, ectoparasites), and owner education are also crucial.

5. Conclusion

Otitis externa in dogs is primarily caused by *Staphylococcus* spp. and *Pseudomonas* spp. Antibiotic resistance, particularly in *Pseudomonas* spp., presents a significant therapeutic challenge. Culture and sensitivity testing should be adopted as routine practice to ensure rational therapy. Malassezia pachydermatis remains sensitive to azoles. Long-term surveillance of resistance trends is essential for guiding therapy and supporting One Health antimicrobial stewardship efforts.

Conflict of Interest

Not available

Financial Support

Not available

Reference

1. Hariharan H, Coles M, Poole D, Lund L, Page R, Price C, *et al*. Clinical, bacteriological, and histopathological aspects of canine otitis externa. Can Vet J. 2006;47(10):993-998.
2. Oliveira LC, Leite CAL, Brilhante RSN, Monteiro AJ. Antimicrobial susceptibility of *Staphylococcus pseudintermedius* and *Pseudomonas aeruginosa* isolated from canine otitis externa. Vet Dermatol. 2008;19(5):326-31. DOI: 10.1111/j.1365-3164.2008.00702.x
3. Bond R, Morris DO, Guillot J, Bensignor E, Robson D, Mason KV. Antifungal susceptibility testing of *Malassezia pachydermatis* from canine otitis externa. Med Mycol. 2020;58(1):1-9. DOI: 10.1093/mmy/myz036
4. Selvakumar S, Narayanan A, Kumar P. A clinical study of otitis externa with bacterial isolation, antimicrobial susceptibility and therapeutic management in 44 dogs. Intas Polivet. 2015;16(2):289-292.
5. Barua A, Deka D, Bhattacharya M. *In vitro* antibiotic and antifungal sensitivity pattern of isolates from otitis externa in dogs. Indian J Vet Sci Biotechnol. 2022;18(2):90-93. DOI: 10.21887/ijvsbt.18.2.22
6. Sharma P, Kumar R, Singh A. Therapeutic efficacy of antibiotics in chronic canine otitis externa. Indian Vet J. 2024;101(3):20-23.
7. Walia C, Gupta P, Dubey R. Epidemiological studies on staphylococcal otitis in dogs at Jabalpur, India. J Adv Biol Biotechnol. 2025;28(2):179-190. DOI: 10.9734/jabb/2025/v28i21167
8. Singh S, Yadav N, Mehta A. Epidemiological studies on otitis externa in dogs. Int J Adv Biochem Res. 2024;8(7A):45-9.
9. Kashyap P. Studies on characterization of *Pseudomonas* spp. isolated from canine otitis externa and its therapeutic management [Master's Thesis]. India: Andhra Pradesh Veterinary University; 2022.
10. Korbelik J, Singh A, Weese JS. Antimicrobial resistance in *Pseudomonas aeruginosa* isolates from canine otitis externa. J Vet Med Sci. 2019;81(6):882-888. DOI: 10.1292/jvms.19-0012
11. Bourély C, Cazeau G, Jarrige N, Leblond A, Madec JY, Haenni M, *et al*. Antimicrobial resistance in *Staphylococcus pseudintermedius* isolates from dogs in France. BMC Vet Res. 2019;15(1):178. DOI: 10.1186/s12917-019-2081-2
12. Nainika R, Thomas A, Patel H. Diagnosis and management of *Malassezia* otitis externa in dogs. Indian Vet J. 2024;101(9):20-23.
13. Raval J, Anjaria P, Pal S, Rana T. Diseases of pinna and its clinical management. In: Common ear diseases in dogs: diagnosis and management. Sharjah (UAE): Bentham Science Publishers; 2025, p. 109-126.

How to Cite This Article

Raval J, Anjaria P, Soni M. Cultural isolation and antibiotic sensitivity in cases of otitis externa in dogs. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(9):330-333.