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# Update on microbial profile and drug sensitivity of canine otitis

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**Abstract**
A total of 55 ear swabs collected aseptically from 55 dogs affected with otitis were analysed to identify the microorganisms causing otitis and to understand the recent trend in the sensitivity pattern of commonly used antimicrobial drugs for treating otitis in dogs. The study revealed canine population belonging to various breeds, different age groups and of both sexes were affected with otitis. In microbial culture, Pseudomonas, Streptococcus, Staphylococcus, *E. coli*, Proteus, Candida, Malaseezia, Rhizopus, Rhodotorula and Aspergillus spp were isolated. Overall sensitivity pattern indicated highest sensitivity to cefotaxime followed by gentamicin, enrofloxacin, azithromycin, tetracycline and amoxicillin.

**Keywords:** canine, otitis, microbial profile, bacterial culture, fungal culture, antibiogram, antimicrobial sensitivity, antimicrobial resistance

## Introduction
Otitis is the broad term that refers to inflammation of the ear. The term ear infection is used specifically to otitis caused by infectious organisms like parasites, bacteria or yeast. The primary causes of inflammation include allergies/hypersensitivities, autoimmune diseases, keratinization disorders, and parasites in the ear canal and the progression of this disease can be perpetuated by bacterial and yeast infections [1]. The bacteria most commonly isolated from ear canals of dogs affected by otitis are *Staphylococcus* spp [2]. Other bacteria commonly associated with otitis include *Pseudomonas*, *Proteus*, *Enterococcus*, *Streptococcus*, and *Corynebacterium* [3]. Otitis and ear infection can be present simultaneously in the same ear. Canine otitis occur both unilateral and bilaterally with the affected dogs exhibiting symptoms like pruritus (itching) of the ear, head shaking, exudates in and around the ear canal, foul odour from the ear etc.
Otitis is particularly prevalent in dogs with long, floppy ears. It results as a combination of predisposing, primary, perpetuating and secondary factors [4]. Considering the recurrence and discomfort, pain experienced by the dogs and the recurrence, chronic otitis is a frustrating disease for dogs, pet parents and veterinarians. Further in small animals, otitis media may be resolved only by surgery, particularly if multidrug resistant bacteria are involved as causative agents. Hence, a study was conducted to know the prevalence of microorganisms causing otitis and its epidemiology in dogs and to evaluate the sensitivity pattern of antimicrobial drugs for the management of otitis in dogs.

## Materials and Methods
### Study area and Study population
A total of 55 ear swabs aseptically collected from 55 dogs affected with otitis externa and presented at Madras Veterinary College Teaching Hospital were utilized for the study. The epidemiological data such as age, breed and sex of the dogs suffering from otitis were recorded. The ear swabs were cultured in Centralised Clinical laboratory, Madras Veterinary College, Chennai.

### Processing of ear swabs for sensitivity and bacterial isolation
In vitro antibiotic sensitivity pattern of the microorganisms isolated were carried out by agar disc diffusion method [5]. Swabs were inoculated into 2 ml of nutrient broth and incubated at room temperature for 6 hours. Then it was uniformly streaked on the surface of Mueller Hinton agar plate. Commonly available antibiotics like amoxicillin, azithromycin, cephotaxime, enrofloxacin, gentamicin and tetracycline were used in this study.

The chosen antibiotic discs were placed carefully onto the agar plates and pressed gently onto the surface to ensure complete contact with the agar surface. The discs were distributed evenly no closer than 24 mm from the centre to centre to avoid overlapping of zones. These plates were inverted and allowed to stand for 10 min and then placed in the incubator for overnight incubation at 37 °C. The inoculated cultures were examined after 24 hours for bacterial colonies. After incubation, the plates were examined. The clear zone of inhibition which appeared as a halo around the antibiotic disc was measured including the diameter of the disc using a glass ruler. Based on the measurement the susceptibility of the microorganisms to these different antibiotics was noted as Sensitive (S), Intermediate (I) and Resistant (R). Bacterial colonies were identified based on morphology in various media, Gram's stain and biochemical tests [6].

**Collection and processing the ear swabs for the identification of fungus**

For the isolation of fungal organisms, swabs were inoculated in Sabouraud's Dextrose agar and Dermatophyte test medium. The plates were incubated at 37 °C for 4 weeks. The fungal growth was identified based on colonial appearance and microscopic appearance [7].

**Results and Discussion**

The canines suffering from otitis belonged to 10 breeds, of different age groups and of both sexes. The dogs suffering from otitis had symptoms likepruritus, self trauma and ulceration of the ear, erythema (Fig.1-2), shaking of the head, and foul smelling discharge from the affected ear. The observations were in accordance with a study on canine otitis externa in 122 dogs in Italy [8].

Out of the total 55 cases studied, Labrador dogs had highest incidence 15(27.27%) followed by Spitz 11(20%), Non Descript dogs 10(18.18%), German Shepherd dogs 7(12.72%), Pug 5(9.09%), Dalmatian 3(5.46%) and one each (1.82%) in Rajapalayam, Cocker Spaniel, Great Dane and Dobermann.

On age wise analysis 3(5.46%) cases were observed in dogs aged less than one year, 19(34.55%) in age group less than 5 years, 27(49.10%) in the age group between 5-10 years, and 6(10.91%) in age group more than 10 years. The findings agreed with the study on 213 dogs affected with otitis externa [9] who also reported a low incidence 14(5.63%) of otitis in dogs aged less than one year. On sex wise analysis, 29(52.73%) of affected dogs were males and 26(47.27%) were females.

**Microbial profile**

Of the total 55 cases studied, 20(36.36%) isolates were identified as *Pseudomonas* spp followed by Streptococcus spp 18(32.73%), *Staphylococcus* spp 10(18.18%), *E. coli* 4 (7.27%) and Proteus spp 3(5.46%). This was in concordance with the earlier report on canine otitis which also recorded 113 isolates (49.34%) *Pseudomonas* spp followed by 50 isolates of *Staphylococcus* spp (21.83%), 39 isolates of *E.coli* (17.03%), 23 isolates of *Streptococcus* spp (10.04%), 19 isolates of *Bacillus* spp (8.30%), 15 isolates of Proteus spp (6.55%) and 13 isolates of *Klebsiella* spp (5.68%) [9a]. However, it differed from another study on canine otitis which reported *Staphylococcus* spp as the predominant organism followed by *Pseudomonas aeruginosa*, Proteus spp, *Candida* spp, *Aspergillus* spp and *Streptococcus* spp in decreasing order of prevalence [10].

In fungal culture *Candida* spp were isolated in 2 cases and *Rhizopus*, *Rhodotorula*, *Aspergillus* and *Malassezia* spp each were detected in a single case. However healthy ears are also the host to *Malassezia pachydermatis* as a study revealed *Malassezia pachydermatis* in 20% of the healthy ears in dogs [11]. A study on microbial profile of bilateral canine otitis externa cases also reported *Staphylococcus intermedius* and *Malassezia pachydermatis* as common pathogens in healthy ears of dogs [12].

**Sensitivity pattern of antibiotics to all bacterial isolates**

The highest rate of sensitivity of identified isolates was observed with cefotaxime in 41 cases (74.55%) followed by gentamicin in 36 cases (65.46%), enrofloxacin in 29 cases (52.73%), azithromycin in 21 cases (38.18%), tetracycline in 14 cases (25.46%) and amoxicillin in 3 cases (5.46%). This correlated with an earlier study on 213 dogs affected with otitis which reported highest rate of sensitivity to cefotaxime in 138 cases (60.26%), followed by gentamicin in 118 cases (48.9%) and azithromycin in 93 cases (38.91%) [9b]. However, Karnad *et al*. (2020) [13] reported that gentamicin had the most effective response against the otic microbes, followed by ciprofloxacin among the anti – microbial drugs tested. Petrov *et al.* (2013) [14] observed high sensitivity to beta- lactams and aminoglycosides. Though aminoglycosides are ototoxic, the benefits derived from the usage of aminoglycosides in the treatment of chronic otitis outweigh their ototoxic side effects Jones *et al.* (2000) [15].

Highest number of cases 49 (89.10%) were resistant to amoxicillin. Niculae *et al.* (2009) [16] have also reported a high level of antimicrobial resistance for penicillin, erythromycin, gentamicin, kanamycin, streptomycin, lincomycin, sulphamethoprim, cephalotin, polymixin B and amoxicillin in their study on otitis externa in dogs.

**Plate 1:** Dogs affected with otitis exhibiting erythema and foul smelling discharge on clinical presentation

## Conclusion

The present study carried out to study the epidemiology of otitis in dogs, the incidence of microorganisms causing otitis in dogs and their antimicrobial sensitivity pattern revealed that Labrador, Spitz breeds and Non-descript dogs were highly affected. Pseudomonas spp was the most commonly identified bacterial pathogen causing otitis and Malassezia spp was identified as the most common cause of fungal otitis. The highest rate of sensitivity of bacterial isolates was observed for Cefotaxim drug.

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