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Microbial profile and antibiogram trend of otitis externa in cats

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Abstract

A total of 44 ear swab samples from 40 cats were cultured to know the prevalence of microorganisms causing otitis externa and to evaluate the sensitivity pattern of antimicrobial drugs for the management of otitis externa in cats. The study revealed that the incidence of *Staphylococcus* (68%) was highest followed by mixed infection comprising of *Escherichia coli* and *Staphylococcus* (14%), *Escherichia coli* (11%) and *Pseudomonas* (7%) species. Highest rate of sensitivity was observed with amikacin (68.2%) followed by cefotaxime (56.8%), enrofloxacin (54.5%), azithromycin (31.8%), tetracycline (22.7%) and amoxicillin (9.1%). The maximum resistance of the bacterial isolates was observed with amoxicillin.

Keywords: Antibiogram, Antibiotic resistance, Bacterial culture, Cats, Otitis externa.

Feline otitis is etiologically a complex disease, which can be clinically challenging (Shokri *et al*., 2010; Kennis, 2013). Otitis externa is the inflammation of the external ear canal namely outside of the tympanic membrane and sometimes involving the pinna (Kennis, 2013; Bollez *et al*., 2018). Multifactorial etiologies are involved in causing otitis externa in cats which may persist as acute or chronic condition (Moriello, 2013). Primary Secondary Predisposing Perpetuating (PSPP) classification system is the important classification system used to describe various etiological factors responsible for otitis externa (Jacobson, 2002). It can be either primary or secondary which involves various predisposing and perpetuating factors (Moriello, 2013).

Bacteria represent an important element in the PSPP classification system of otitis externa. Bacterial otitis externa in cats have been associated with *Staphylococcus, Pseudomonas, Escherichia, Proteus, Enterococcus, and Corynebacterium* species of bacteria (Kittl *et al*., 2018). Due to the development of resistance to the majority of conventional antibiotics, antimicrobial-resistant strains of *Staphylococcus* and *Pseudomonas* have arisen as frustrating and challenging causes of otitis (Hariharan *et al*., 2006; Qekwana *et al*., 2017).

The present study was carried out to identify and record the prevalence of various microorganisms associated with otitis externa in cats and to study the current trend in the sensitivity pattern of otitis externa affected cats to commonly available antibiotics.

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Material and Methods

Study area and Study population

The present study was conducted in cats presented to Small Animal Dermatology Unit of Madras Veterinary College teaching hospital with signs of otitis externa. A total of 44 ear swab samples from 40 cats affected with otitis externa collected and presented to the laboratory were included for the study.

Bacterial culture

Collected ear swab samples inoculated with sterile inoculating loop into Brain heart infusion agar and incubated overnight observed for the presence and absence of bacterial colonies. Colonies were further cultured in MacConkey agar, Mannitol salt agar, Edward's medium and Eosin Methylene Blue (EMB) agar for identification of the organisms. Bacterial identification was made by studying the morphology of organisms in various media and by Gram's staining of bacterial colonies (Quinn *et al.,* 2002).

Antibiotic sensitivity test

Antibiotic susceptibility test was carried out to determine the antibiotic that will be most successful in treating a bacterial infection in vivo. In vitro antibiotic sensitivity patterns of the microorganisms isolated were carried out by standard agar disc diffusion method (Bauer *et al.,* 1966). Few isolated colonies were picked from the primary agar media and were streaked on Mueller Hinton agar plate. The commonly available antibiotics like amoxicillin, azithromycin, cefotaxime, enrofloxacin, amikacin and tetracycline discs were chosen for the study. The chosen antibiotic discs were then carefully placed on to the agar plates and pressed on to the surface to ensure complete contact with the agar surface. The plates were examined for the development of inhibition zones around the discs. Based on the diameter of inhibition zone developed, the antibiotics were coded as Sensitive (S), Intermediate (I) and Resistant (R).

Results and Discussion

Otitis externa affected cats on gross examination showed changes like black, dry, ceruminous and pus discharge from affected ears (Figure 1-3). Bacterial culture of ear swab samples from otitis externa affected cats revealed *Staphylococcus* (68%), followed by mixed infection comprising of *Escherichia coli* and *Staphylococcus* (14%), *Escherichia coli* (11%) and *Pseudomonas* (7%) spp. (Figure 4). Our results correlated with the findings of Hiblu *et al*. (2020) who reported *Staphylococcus spp*. as the most frequent bacterial etiology (75%) followed by *Proteus spp*. (16.6%) and *Pseudomonas spp.* (8.4%) in cats affected with otitis externa.

In vitro antibiogram

The highest rate of sensitivity of the identified bacterial isolates was observed with amikacin (68.2%) followed by cefotaxime (56.8%), enrofloxacin (54.5%), azithromycin (31.8%), tetracycline (22.7%) and amoxicillin (9.1%) (Figure 5). Earlier Hariharan *et al*. (2006) reported that 70-90% of bacterial isolates were more susceptible to gentamicin and enrofloxacin in his study on canine and feline otitis externa. Hiblu *et al*. (2020) in his study on feline otitis externa in Trpoli, Libya reported that the bacterial isolates were most susceptible to norfloxacin (83.3%) followed by gentamicin (70.8%), Oxytetracycline (62.5%), Amoxicillin (33.3%) and Penicillin (100%).

Antibiogram against single genus isolates

Staphylococcus spp. were sensitive to amikacin (76.6%), enrofloxacin (60%), cefotaxime (53.3%), azithromycin (36.6%), tetracycline (23.3%) and amoxicillin (10%). Sensitivity of *E. coli* was cefotaxime (60%), amikacin (60%), azithromycin (40%), tetracycline (40%), amoxicillin (20%) and enrofloxacin (20%). Sensitivity of *Pseudomonas spp*. was amikacin (100%), cefotaxime (66.6%), azithromycin (33.3%). None of the *Pseudomonas* isolates showed sensitivity to amoxicillin, enrofloxacin and tetracycline. Mixed *E.coli* and *Staphylococcus spp.* showed most sensitivity to enrofloxacin (83.3%) followed by cefotaxime (66.6%) (Fig.6).

These observations are in accordance with Hariharan *et al*. (2006) that staphylococcal isolates of feline otitis externa were susceptible to gentamicin, enrofloxacin, and clavulanated amoxicillin, but more frequently resistant to penicillin and ampicillin. Similarly Jacobson (2002) reported that *Pseudomonas* isolates were susceptible to gentamicin and polymyxin B, but more resistant to penicillin in canine otitis externa cases.

The present study revealed *Staphylococcus* (68%) as the primary pathogen causing otitis externa in cats followed by mixed infection comprising of *Escherichia coli* and *Staphylococcus* (14%), *Escherichia coli* (11%) and *Pseudomonas* (7%) species. The sensitivity trend suggested amikacin (68.2%), cefotaxime (56.8%) and enrofloxacin (54.5%) as the most effective antibiotics for the treatment of otitis externa in the present scenario and revealed the development of resistance to amoxicillin in most of the otitis externa in cats.

Fig. 1. Black, ceruminous, dry discharge from left ear in a one year old male Persian cat.

Fig. 2. Pus discharge in a five months old female Bengal cat.

Fig. 3. Black nodular mass along with pus discharge in a five years old male Persian cat.

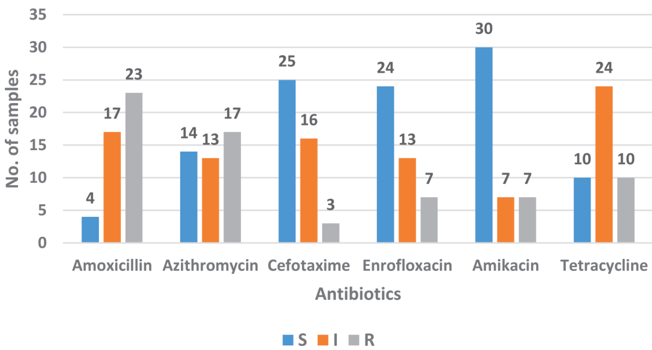

Fig. 5. Antimicrobial sensitivity pattern of otitis externa in cats.

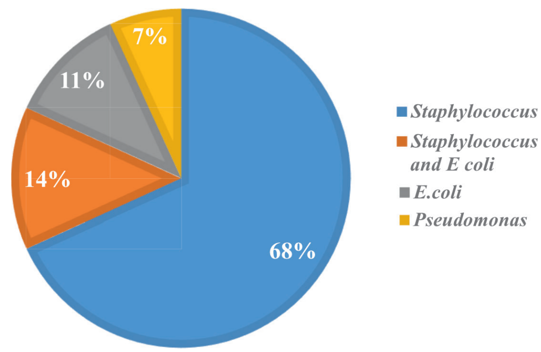

Fig. 4. Microbial profile of otitis externa in cats.

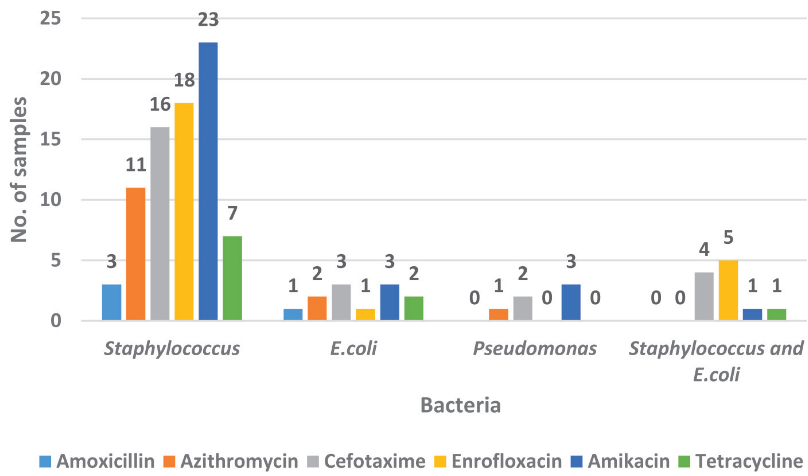

Fig. 6. In vitro sensitivity of bacterial isolates to antibiotics.

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