







Epidemiological profile of canine and feline otitis in a University Veterinary Hospital: a retrospective study

Perfil epidemiológico das otites canina e felina em um Hospital Veterinário Universitário: um estudo retrospectivo

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ABSTRACT: The objective of this work was to analyze the cases of otitis in companion animals treated at the Veterinary Hospital Jeremias Pereira da Silva / Universidade Federal do Piauí (UFPI) and the profile of antimicrobial drugs used in the treatment of these infections. A retrospective cross-sectional observational epidemiological study was carried out on the assisted animals with otitis at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), during the period from January 2015 to December 2020, through access to the registration system called “Doctorvet”, evaluating the characteristics of the patients treated, the diagnosis and therapy adopted and the clinical response to these services. Mixed breed dogs (MBDs), with bilateral presentation of this disease and the presence of comorbidities were frequent occurrences in the animals treated. Antibiotic prescriptions of aminoglycosides (Gentamicin and Neomycin) were the most used, in formulations associated with other substances, such as antifungals and anti-inflammatories, with the commercial presentation Aurivet being the most prescribed and the one that received the greatest number of favorable reports. However, the use of other different therapeutic protocols was evidenced without justification for this choice. Establishing therapeutic protocols to be followed by veterinary clinicians, when treating otitis, and monitoring the success or failure of these prescriptions, will contribute to reveal much more than the epidemiological profile of the etiologic agents, but the adequate use of antimicrobial agents, controlling the increase in rates of antibiotic resistance, as well as consolidating promising therapeutic approaches for these infections.

KEYWORDS: Antimicrobials, Otolgic infection, Therapeutics.

RESUMO: O objetivo deste trabalho foi analisar a casuística das otites em animais de companhia atendidos no Hospital Veterinário Jeremias Pereira da Silva/Universidade Federal do Piauí (UFPI) e o perfil dos antimicrobianos utilizados no tratamento dessas infecções. Foi realizado um estudo epidemiológico observacional descritivo transversal retrospectivo dos animais atendidos com otite no Hospital Veterinário Jeremias Pereira da Silva / (UFPI), no período de janeiro de 2015 a dezembro de 2020, por meio de acesso ao sistema de cadastro denominado “Doctorvet”, avaliando as características dos pacientes atendidos, o diagnóstico e a terapêutica adotada e a resposta clínica a esses serviços. Cães sem raça definida (RCM), com apresentação bilateral desta doença e presença de comorbidades foram ocorrências frequentes nos animais tratados. As prescrições de antibióticos de aminoglicosídeos (Gentamicina e Neomicina) foram as mais utilizadas, em formulações associadas a outras substâncias, como antifúngicos e anti-inflamatórios, sendo a apresentação comercial Aurivet a mais prescrita e a que recebeu maior número de relatos favoráveis. Contudo, foi evidenciada a utilização de outros protocolos terapêuticos diferentes sem justificativa para esta escolha. O estabelecimento de protocolos terapêuticos a serem seguidos pelos médicos veterinários, no tratamento das otites, e o monitoramento do sucesso ou fracasso dessas prescrições, contribuirão para revelar muito mais do que o perfil epidemiológico dos agentes etiológicos, mas o uso adequado de agentes antimicrobianos, controlando a elevação das taxas de resistência antibiótica, bem como consolidando condutas terapêuticas promissoras para estas infecções.

PALAVRAS-CHAVE: Antimicrobianos; Infecção otológica; Terapêutica.

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INTRODUCTION

Otitis externa is defined as inflammation of the external auditory canal, which comprises from the pinna to the tympanic membrane, being a disorder commonly diagnosed in routine consultations in companion animals, especially in dogs (Perry *et al.*, 2017; Forster *et al.*, 2018).

The diverse microbial etiology, the involvement of more than one agent in the same infection, combined with several factors, whether these are primary, secondary, predisposing or perpetuating, hinder the treatment (Paterson, 2016). The affected area and the severity of the inflammation classify this condition as otitis externa, media or internal. Regarding its evolution, it presents as acute, chronic or recurrent chronic and clinically, it is characterized as eczematous, suppurative, hyperplastic, and stenosing; it may affect only one ear (unilateral) or both (bilateral) (Fontoura *et al.*, 2014; Silva *et al.*, 2021).

Clinical signs observed in animals with otitis include pruritus, otalgia, erythema, ear lesions from scratching, discomfort to the touch in the ear, tilt, and headshaking, and increased discharge characterized by foul odor. Behavioral changes are also observed, caused by inflammation of the auditory canal, such as agitation and vocalizations (Nelson; Couto, 2010; Conceição *et al.*, 2022).

The most frequently reported microorganisms in cases of canine otitis are usually Gram-positive bacteria such as *Staphylococcus pseudintermedius*, *Staphylococcus intermedius*, *Staphylococcus aureus*, and some species of the genera *Streptococcus*; or Gram-negative bacteria like *Pseudomonas aeruginosa*, *Escherichia coli*, and some species of the genera *Proteus*. On the other hand, other examples of bacteria often isolated in felines include species of the genera *Enterococcus* spp., in addition to Gram negative species *Pasteurella multocida* e *Klebsiella pneumoniae* (Gotthelf, 2007; Bourély *et al.*, 2019; Li *et al.*, 2021).

Additionally, given the importance of these agents in the development of canine and feline otitis, it is valid to consider the need to identify bacterial species, as well as their sensitivity profile to commercially available antimicrobials. In this sense, it is reiterated that once knowing their probable sensitivity patterns, it is possible to guide treatment choices, in addition to evaluating and monitoring the response of these etiological agents to the most different antibiotics (Nuttall, 2016).

In this perspective, the most current guideline of the Ministry of Agriculture, Livestock and Supply (MALS), reinforces in the Guide to Rational Use of Antimicrobials for Dogs and Cats, that the performance of the Antimicrobial Susceptibility Test (AST) represents an important tool in the definition of antibiotic therapy in cases of microbial infections in dogs and cats. In addition, it is also possible to monitor the occurrence of cases and the evolution of bacterial resistance in these animals, in order to implement measures to prevent and control multiresistant pathogens (Brasil, 2022).

Thus, it is understood that the identification of these microorganisms is of utmost importance for the appropriate

direction of treatment, since the incorrect and indiscriminate use of antibiotics contributes to the development of resistance to these drugs and, consequently, to treatment failures and aggravation of the infection (Miranda; Vieira; Souza, 2022).

Therefore, since microbiological profiles may vary according to the reality of each hospital environment, it is important that epidemiological surveys are performed frequently. Thus, it is possible to know the local epidemiological profile, in addition to carefully analyzing whether the proposed therapy has proven to be effective in coping with canine and feline otitis.

Hence, the present study aimed to analyze the epidemiological profile of otitis cases in companion animals treated at the Veterinary Hospital Jeremias Pereira da Silva/(UFPI), from January 2015 to December 2020. Furthermore, we sought to examine the prescriptions of antimicrobial drugs used to treat these infections, with in order o evaluate the success of these therapeutic approaches. The study also aims to raise awareness among veterinarians that, even though the clinic is sovereign over complementary exams, it is essential perform procedures involving diagnoses carried out through cytology, culture and antibiogram in the treatment of otitis in companion animals, consolidating clinical experience and the therapy implemented.

MATERIAL AND METHODS

This epidemiological study was designed as a retrospective descriptive cross-sectional observational study, carried out by collecting data from patients with otitis treated at Veterinary Hospital Jeremias Pereira da Silva / (UFPI), from January 2015 to December 2020. After formal authorization from the management of the Hospital, data was collected from electronic medical records, for cases of otitis, in animals treated in this veterinary hospital, through access to the registration system called "Doctorvet" (Management System for Clinics and Veterinary Hospitals- Siematec Informática - Copyright 2015-2022).

Data relating to the species, breed, age, sex of the animal treated, request for complementary tests, test results, therapeutic prescription established, and treatment effectiveness were evaluated according to the owners' returns to the hospital. The data obtained was analyzed using Excel software and through this tool, the absolute and relative frequency of otological care and antibiotic prescriptions used in the treatment of these infections was calculated. The success or failure rate of the adopted therapy was evaluated based on the number of returns of animals whose signs and/or symptoms related to otitis had ended, according to reports from the owner and which were recorded in the medical records during this service, serving as a basis to carry out this epidemiological study.

RESULTS AND DISCUSSION

Of the medical records accessed in the Doctorvet registration system in the established period, it was found that 396

animals with clinical symptoms of otitis were treated only in the years 2015 to 2019, with a greater number of visits in 2017 (Figure 1). The absence of records of patients with otitis in 2020 was justified due to the COVID-19 pandemic scenario.

It was found that 377 (95.2%) of the patients treated belonged to the canine species and 19 (4.8%) to the feline species. Such prevalence of otitis in dogs was also observed by Santos; Guimarães (2020) in their study, which can be explained by periodic bathing habits, as well as the fact that these animals have ventilation of the auditory canal more difficult when compared to felines, and which can even be aggravated in dogs that have pendulous ears (Supptitz; Ribeiro; Ribeiro, 2022).

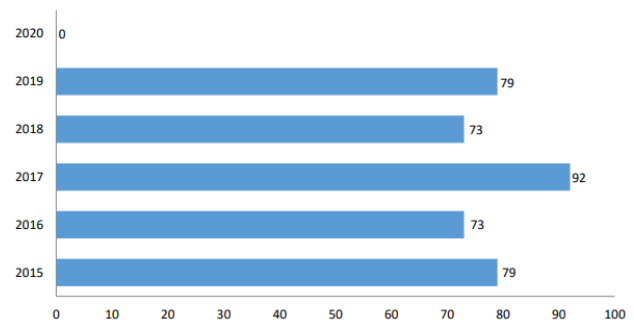
By analyzing the compiled data, it was found that the clinical presentation of bilateral otitis was reported in 73.5% (N=291/396) of cases, while 26.5% (N=105/396) was unilateral. Regarding sex, although there is no scientific evidence of sexual predisposition (Santos; Guimarães, 2020), the prevalence of this pathology was observed in males, both in the canine species with 57.8% (N=218/377), and in the feline species with 74% (N=14/19), unlike what was found by Peixoto (2016), who obtained in his studies, a greater number of cases of otitis in females.

When analyzing the age group, it was observed that 44.4% (N=176/396) were between 2 and 5 years of age; 24.5% (N=97/396) between 6 and 9; and 13.9% (N=55/396) were 10 years of age or older. Furthermore, it is important to highlight that the result of higher prevalence (44.4%, N=176/396) does not restrict the occurrence of this disease to the age group observed, as in other reports, such as the one described by Santos; Guimarães (2020) the highest incidence of otitis occurred among animals aged 5 to 10 years of age

(49% of cases). Thus, it is understood that the occurrence by age is variable, and it may be related to the greater number of animals of a certain age group in the total population of care at the location.

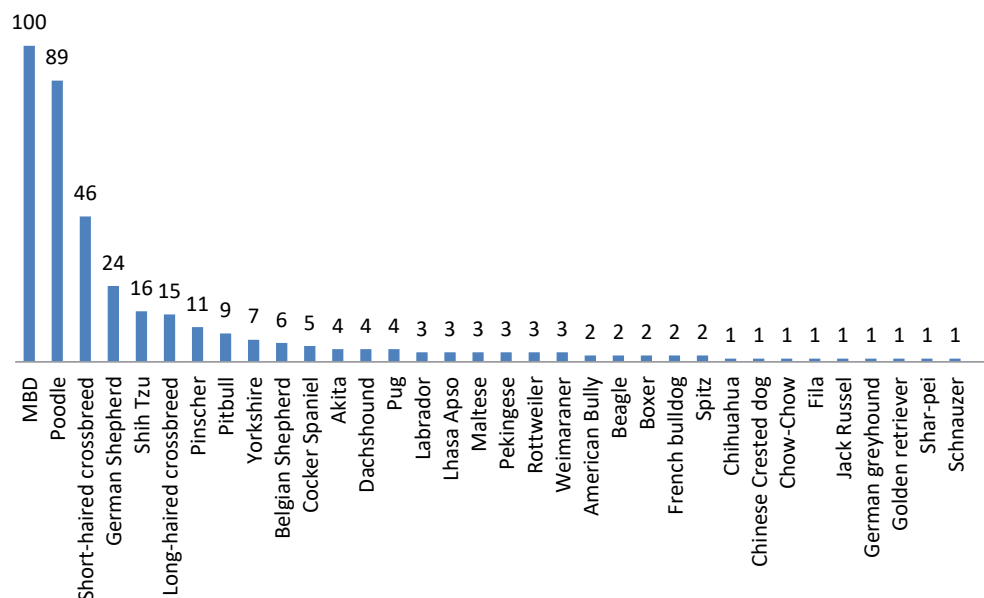
Taking racial characteristics into account, MBD animals exhibited the highest incidence of otitis cases. Statistics revealed a prevalence of 26.5% (N=100/377) among dogs and an impressive 77.7% (N=14/19) for cats, as evidenced in Figures 2 and 3.

Such occurrence was due to the greater number of individuals of this racial category who were treated at the Veterinary Hospital Jeremias Pereira da Silva/(UFPI) with cases of otitis. In the search for otitis records, it was noticed a high frequency of other services also involving MBD animals. Therefore, it is possible to infer, similar to the report described by Carvalho (2017), that in the clinical routine of small animals with clinical symptoms of otitis, MBD animals are predominant.



Source: Research data (2023).

Figure 1. Distribution of the number of visits to animals with otitis at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), from January/2015 to December/2020.



Source: Research data (2023).

Figure 2. Number of animals (dogs) and breed pattern, treated for otitis at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), between January/2015 and December/2020.

Poodle dogs and Persian cats ranked second most frequently in cases of otitis, with 23.6% (N=89/377) and 15.8% (N=3/19), respectively. According to Silva (2014), poodles are predisposed to otitis due to some characteristics such as pendular ears and the presence of a greater number of hair follicles, which favors humidity within the ear canal, providing an ideal environment for the proliferation of fungi and bacteria.

Considering the importance of carrying out laboratory tests to assist in clinical diagnosis, the tests carried out in clinical care were evaluated as a complement to medical consultations. Table 1 presents the auxiliary examinations requested by veterinarians during consultations, and their respective results.

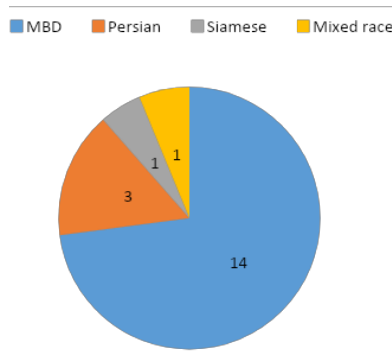
Therefore, through the diagnostic support provided by the different tests performed, it is clear that 220 (55.5%) of the animals treated had some other disease or problem in addition to otitis (Figure 4) and these diseases may be related to the emergence or maintenance of this otological disease, since these disorders compromise the physiological system

of the animal, and may act as a primary, predisposing and/or perpetuating factor (Silva *et al.*, 2021).

According to Gregório (2013), the imbalance of the normal microbiota of the auditory conduct can be assessed based on the change in the number of microorganisms. The microscopic visualization of more than 05 yeasts or 25 bacteria per field, in dogs, and values of 15 or more bacteria, in cats (magnification of 1000 X, in immersion oil) is already considered as indicative of some infectious process, which may reflect the existence of co-infections and/or low immunity, which must be investigated and corrected (Guimarães *et al.*, 2017).

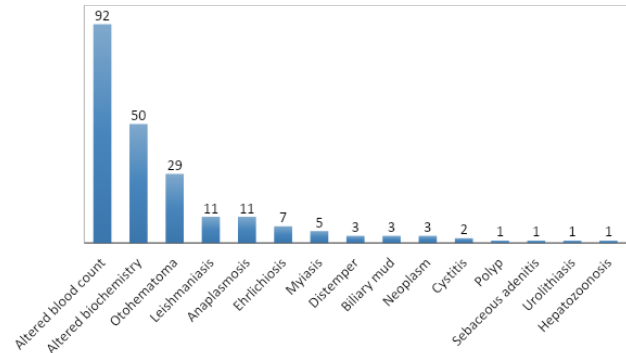
Furthermore, it is important to pay attention to the occurrence of primary problems, in order to prevent recurrence, since the use of antibiotics and other drugs to treat otitis alone may not be effective.

In the present study, the dysbiosis reported in the auricular cytology tests that were performed was, in most cases,



Source: Research data (2023).

Figure 3. Number of animals (felines) and racial pattern, treated for otitis at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), between January/2015 and December/2020.



Source: Research data (2023).

Figure 4. Diseases or other physiological disorders identified in patients treated at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), with otitis during the period of January/2015 to December/2020.

Table 1. Auxiliary tests requested during medical consultations for animals treated for otitis at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), between January/2015 and December/2020.

Test requested	Number of Requests	Results
Serological tests to detect antibodies against ehrlichiosis	14	Seven positive tests.
Skin scrapings to identify scabies	05	All negative.
Tympanic heart x-ray	01	Without changes.
Abdominal and pelvic ultrasound	03	Biliary sludge was positive in all three animals.
Test for Leishmaniasis	25	11 positive tests.
Blood count	141	92 presented some type of alteration (anemia and/or thrombocytopenia, leukocytosis, etc.);
		11 animals also presented diagnostic structures of <i>Anaplasma platys</i> ;
		One animal had <i>Hepatozoon sp.</i> ;
Biochemical exams	79	Three animals presented Lentz corpuscles (distemper).
Cytology	99	Presence of <i>Malassezia sp.</i> in 68 of them; cocci-type bacteria in 59, and bacillary-type bacteria in 29.

Source: Research data (2023).

pointed out only through terms such as “large quantity” or “intense quantity” of yeasts and/or bacteria, without precise quantification of the number of microorganisms observed per field under the microscope.

Regarding the identification of microbial agents present in otitis, only 99 otological cytology tests were performed, which corresponds to 25% of the total number of animals treated with symptoms (N= 396). In this case, the presence of *Malassezia* sp. was detected in 68.7% (N= 68) investigations, 13 unilateral and 55 bilateral. Bacteria with the morphology of cocci were present in 59.6% (N=59) of the cytological tests, with 14 unilateral and 45 bilateral samples; while bacillary bacteria presented less frequently, with 29 cytologies confirming their presence, nine unilaterally and 20 bilaterally.

Considering the lack of microbiological culture and antibiogram, it is likely that cytology has become an initial, or even the only, parameter for the diagnosis of ear infections, encouraging clinicians to start treatment empirically. However, it is reiterated that adequate awareness of the importance of these tests should be carried out, in order to establish efficient protocols in the treatment of these infections.

The presence of these microorganisms is expected, once they are part of the normal microbiota of the external ear. However, when in conditions of perpetuation, they trigger conditions (Gregório, 2013), being, therefore, the microorganisms most frequently found in external, media and internal otitis (Baines, 2014). The fact that *Malassezia* sp. is an opportunistic yeast (Coatesworth, 2011) may explain its greater prevalence in otitis. These findings corroborate those found by Teixeira *et al.* (2019), which mention that fungal otitis externa in dogs has a higher incidence in veterinary routine.

The joint presentation of more than one etiological agent as the cause of otitis was also evaluated, in which it was found that in 17 cytological examinations there was the concomitant presence of the three types of microorganisms reported (*Malassezia* sp., cocci and bacilli), these being described bilaterally in 15 animals and unilaterally in two animals. The association of *Malassezia* sp. and cocci in the same inflammatory process was seen in 19 animals, six unilateral and 13 bilateral. Cocci and bacilli were concomitantly present in seven animals (three unilateral and four bilateral). The presence of *Malassezia* sp. and bacilli was observed in only three cytologies (one unilateral and two bilateral).

The visualization of neutrophils was described in nine cytologies, and in three of these animals there was a record of the presence of pus in the auditory canal, which is indicative of a more serious pathological process, as neutrophils, macrophages and other inflammatory cells only have access to the lumen of the ear canal due to the presence of exudative inflammation, ulceration of the epithelium or extension of the tympanic cavity during otitis media (Peixoto, 2016).

The largest case series for bilateral otitis observed in this study corroborates the reports described by Gregório (2013),

Santos and Guimarães (2020), which mention that keratinization disorders, sequelae of otocariasis, endocrine diseases and hypersensitivity reactions are directly related to the bilateral otitis externa. In this study, among the reports of animals with bilateral otitis, seven presented concomitant stenosis, which aggravates the situation, since the narrowing of the auditory canal creates an environment that favors the installation of the infectious process, in addition, it hinders administration and penetration of medications and consequently, becomes an obstacle to treatment (Gregório, 2013).

To identify the microbial species involved in the pathological process of otitis and for better targeting of appropriate treatment, Peixoto (2016) emphasizes the importance of requesting and performing culture and antibiogram. However, in the present study, when analyzing the medical records, only two requests for these procedures were identified. However, such tests were not performed. The low frequency of identification and antibiotic sensitivity tests can be explained by the difficulty in carrying out these procedures, related to the shortage of clinical professionals and laboratories in the area of Veterinary Microbiology, the time required for the completion of the examination and the dispatch of the report that involves at least three days, the impossibility of bearing more expenses by tutors, and even disinterest by the clinician himself. Additionally, as previously reported, this may also occur due to habits already established in the health institution, which recommend empirical treatment of these infections, in the face of not carrying out related diagnostic tests.

For more than 20 years, Lilenbaum *et al.* (2000) warned of the risk of selecting strains with multiple antimicrobial resistance, isolated from otitis, due to the indiscriminate use of these drugs without a previous sensitivity test. Unfortunately, antibiotic resistance is already a reality worldwide, and can be evidenced by the several reports of multidrug resistance in bacteria isolated from otitis (Santos *et al.*, 2019; Sellera *et al.*, 2020; Araújo *et al.*, 2023).

It should be noted that although the occurrence of antibiotic resistance in diagnostic tests such as the antibiogram and Minimum Inhibitory Concentration Determination assay is identified, the concentrations applied in clinical practice, when using topical medications in higher concentrations, may express a susceptibility profile. However, such action can lead to several limitations in veterinary clinical practice, given characteristics related to both the animal, such as the anatomical region and microbiota, as well as the pharmaceutical properties of the formulation, regarding the pharmacokinetic aspects necessary for the drug to exert its antimicrobial effect (Ray; Singh; Gupta, 2020).

In this study, even without this laboratory test, antibiotic therapy was instituted, and the options indicated for diagnosed otitis are presented in Tables 2 and 3. It is worth highlighting that 27 owners reported having already used medications to improve the otological clinical status of their animals without

Table 2. Characterization of topical medications with antimicrobial principles associated or not and anti-inflammatory drugs combined or not with other substances, prescribed to patients with otitis treated at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), between January/2015 and December/2020.

Commercial name	Antibiotic	Antifungal	Anti-inflammatory	Other substances
Aurivet	Gentamicin	Clotrimazole	Betamethasone	Benzocaine
Aurigen	Gentamicin	Miconazole	Betamethasone	-
Natalene	Neomycin	-	Dexamethasone	Diazino and Pimaricin
Otodem	Neomycin	Thiabendazole	Dexamethasone	Lidocaine
Otosporin	Neomycin + Polymyxin B	-	Hydrocortisone	-
Cream 6A	Bacitracin + Neomycin	Griseofulvin	Dexamethasone	Benzocaine
Cipro-otic	Ciprofloxacin	Clotrimazole	Betamethasone	-
Auritop	Ciprofloxacin	Ketoconazole	Fluocinolone	Lidocaine
Posatex	Orbifloxacin	Posaconazole	Mometasone	-
Zelotril Oto	Enrofloxacin + Silver Sulfadiazine	-	Hydrocortisone	-
Osurmia	Florfenicol	Terbinafine	Betamethasone	-
Otoguard	Tobramycin	Ketoconazole	Dexamethasone	Lidocaine
Vetaglós	Gentamicin + Sulfanilamide+ Sulfadiazine	-	-	Urea + Vitamin A Palmitate
Rifocin Spray	Rifamycin	-	-	-

Caption: -: No reports. Source: Research data (2023).

Table 3. Antibiotics administered orally prescribed to patients with otitis treated at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), between January/2015 and December/2020.

Commercial name	Active principle
Rilexine/ Lexin/ PetSporin	Cephalexin
Baytril/ Enrotrat	Enrofloxacin
Stomorgyl	Spiramycin + metronidazole
Agemoxi CL	Amoxicillin + Potassium Clavulanate
Doxifin	Doxycycline
Diaziprim	Sulfadiazine + Trimethoprim
Azicox-2	Azithromycin + meloxicam
Ciprofloxacin	Ciprofloxacin
Cefadroxil	Cefadroxil
Norfloxacin	Norfloxacin
Trissulfon SID	Sulfadimethoxine + Ormetoprim

Source: Research data (2023).

veterinary guidance, and without success. According to Tuleski (2007), the empirical use of medications, especially when referring to antibiotics, is one of the main challenges in the treatment of canine and feline otitis, which generally causes its chronicity.

For the treatment of the assisted patients, topical and/or systemic medications were prescribed (Table 2 and 3) with different combinations of drugs (Table 4).

From the analysis of the prescriptions, it was found that 86.4% (N=342/396) of the prescribed medications had some active antibiotic principle, 12.1% (N=48/396) of the indicated treatments were carried out only with cleaning products for the ears, and 1.5% (N=6/396) therapy was instituted only with the use of steroidal anti-inflammatory drugs (SAIDs).

The drugs most prescribed by veterinarians were Aurivet, Auritop and Natalene, both individually and associated with other drugs (Table 4).

By analyzing the prescriptions, it was found that 34 animals were treated only with systemic drugs (orally). According to Tuleski (2007), this route is generally reserved for chronic or recurrent cases of otitis externa or otitis media and interna with bacterial involvement and should always be associated with topical medication. However, based on the data recorded in the medical records, it was not possible to state that systemic use was indicated using the justification given by this author.

It is important to highlight that when planning a therapeutic protocol, whether for any illness, one of the criteria to be taken into account is the degree and safety of the possible toxic effect of these drugs, since, according to Tuleski (2007), not only therapeutic substances for systemic use pose health risk, but topical medications can also cause systemic effects. According to Gotthelf (2007), in general, the drugs that present ototoxic effect most frequently used in veterinary routine are antibiotics from the aminoglycoside group (such as: neomycin, gentamicin), antiseptics, diuretics, antineoplastics,

Table 4. Frequency of antimicrobial drugs and associations prescribed to patients with otitis treated at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI), between January/2015 and December/2020 and records of the amount of therapeutic success reported.

Prescribed antibiotics and combinations	Number of prescriptions	Number of reports of success in the therapy instituted and recorded in the medical records
Agemox (OA)	3	-
Rilexine (OA)	13	-
Rilexine (VO) + Florfenicol (OA)	1	-
Baytril (OA)	5	-
Ciprofloxacin (OA)	2	-
Doxifin (OA)	6	1
Trissulfim SID (OA)	1	-
Stomogyl (OA)	1	-
Norfloxacin (OA)	1	-
Ciprofloxacin (OA)	1	-
Aurivet/Aurigen (T)	77	8
Natalene/ Otodem (T)	42	5
Auritop (T)	46	5
Otosporin (T)	8	-
Cipro-Otic (T)	5	-
Posatex (T)	13	-
Otoguard (T)	1	-
Zelotril Oto (T)	7	2
Vetaglós (T)	1	-
Auritop (T) + Natalene (T)	2	-
Otosporin (T) + Ciprofloxacin (OA)	2	-
Aurivet (T) + Rilexine (OA)	10	-
Aurivet (T) + Baytril (OA)	5	-
Aurivet (T) + Doxifin (OA)	2	-
Aurivet (T) + Diaziprim (OA)	1	-
Aurivet (T) + Stomorgyl (OA)	1	-
Aurivet (T) + Agemoxi (OA)	5	1
Aurivet (T) + Vetaglós (T)	1	-
Auritop (T) + Azicox-2 (OA)	2	-
Auritop (T) + Rilexine (OA)	19	1
Auritop (T) + Agemoxi (OA)	1	-
Auritop (T) + Baytril (OA)	2	-
Auritop (T) + Aurivet (T)	1	-
Auritop (T) + Doxifin (OA)	2	-
Auritop (T) + Azicox-2 (OA)	5	-
Auritop (T) + Rilexine (OA) + Vetaglós (T)	1	-
Auritop (T) + Rifocina Spray (T)	1	-
Auritop (T) + Rilexine (OA) + Zelotril (OA)	1	-
Natalene (T) + Rilexine (OA)	13	3
Natalene (T) + Agemoxi (OA)	5	-
Natalene (T) + Doxifin (OA)	2	1
Natalene (T) + Enrotrat (OA)	1	-
Natalene (T) + Ciprofloxacin (OA)	1	-
Natalene (T) + Cefadroxil (OA)	1	-
Natalene (T) + Rifocina Spray (T)	2	-
Natalene (T) + Osurnia (T)	2	-
Natalene (T) + Azicox-2 (OA)	2	-
Natalene (T) + Zelotril Oto (T)	1	1
Cipro-Otic (T) + Doxifin (OA)	1	-
Cipro-Otic (T) + Rilexine (OA)	3	-

Caption: OA: Oral Administration; T: Topical route; -: No reports. Source: Research data (2023).

among others, which can cause hearing loss in dogs and vestibular signs in cats. It is worth noting that the topical use of otological medications with active ingredients that have an ototoxic effect are contraindicated in cases of perforation/rupture of the tympanic membrane (Lucas *et al.*, 2016).

From this information, it was observed that most drugs chosen by veterinarians contain at least one aminoglycoside antibiotic in their composition (Aurivet, Aurigen, Natalene, Otodem, Otopsporin, Crema 6A, Otoguard e Vetaglós). However, no problems associated with its use have been reported. It was observed that all the studies analyzed on this subject only present information regarding the action of active principles separately on pathogens, unlike this study that seeks to evaluate the effectiveness of medications in their commercial form (when made available through associations). Therefore, there are no reports that can be compared to the frequency of use and effectiveness of these commercial presentations mentioned above.

Most of these drugs are indicated for use in cases of acute or chronic otitis externa, belonging to important antibiotic classes, such as aminoglycosides, beta-lactams, and quinolones (Custódio; 2019; Santos *et al.*, 2019). It should be noted that Aurivet and Otodem, drugs identified in the present survey, have few restrictions, and are contraindicated in cases of tympanic perforation/rupture. However, in all drugs there is an important recommendation of a previous cleaning of the ear with appropriate otological solutions for this purpose.

Regarding antifungals, these were not prescribed as isolated therapeutic options, since they were used in association with nine of the topical medications (Aurivet, Aurigen, Otodem, Crema A6, Otoguard, Cipro-Otic, Auritop, Posatex e Osurnia) whose antifungal action is indicated for malasseziosis, with clotrimazole (Aurivet and Cipro-Otic) and miconazole (Aurigen) being the antifungals that present greater safety for otological use (Garcia; Dorigon, 2018).

Concerning the results of therapeutic efficacy, that is, the success or failure of prescribed therapies, it was not possible to evaluate this information in the researched medical records, since the vast majority of these did not present a record for return consultation. There was also no data on culture and antibiogram results to make it possible to analyze the information and make inferences about the success or failure of the established therapy.

There are several possible causes for therapeutic failure in otitis, such as owners' lack of adequate adherence to the administration of prescribed drugs, who claim difficulty in applying topical medications at home (reported by 10 owners); or even ineffective therapeutic prescription, due to the lack of identification of the etiological agent involved and its resistance mechanisms (intrinsic and extrinsic), which can lead to inappropriate and inefficient choice and use of antimicrobials (Kumar; Variela, 2013; Araújo *et al.*, 2023).

The absence of information regarding the return of the animals, for evaluation of the adopted prescription, allows the following hypotheses: the animal improved and, therefore, the

owner did not bother to return to the hospital; the animal did not improve, and the owner took it to another location to be assisted by a second professional; or the owner has given up on treating their animal.

On the other hand, among the 64 registered returns (60 dogs and 4 cats), only 28 (25 dogs and 3 cats) presented information for satisfactory results, with improvement in otological clinical signs, as can be seen in Table 4. It is worth highlighting that the thorough and correct completion of medical records is of valuable importance for the construction of more accurate epidemiological studies.

Although there were few return records, among the services performed, it is clear that if the culture and antibiogram for the otitis treated had been carried out, there would have been the possibility of evaluating more assertively the effectiveness or otherwise of the treatments, prescribed therapies and thus contribute to the analysis and definition of therapeutic protocols with a greater chance of success. However, the success of therapy is not restricted to adequate prescription, but also involves the adherence of tutors.

Therefore, more studies evaluating the antibiotic profile of microorganisms involved in otitis are essential, either to monitor microbial epidemiology or antimicrobial resistance of these agents, as well as to consolidate successful therapeutic approaches for otitis in companion animals. Finally, establishing and validating antimicrobial therapeutic protocols in clinical management is necessary for the correct use of antibiotics, aiming to control antibiotic resistance.

CONCLUSION

The results obtained in this study showed that the canine species, especially MBD dogs, treated at the Veterinary Hospital Jeremias Pereira da Silva / (UFPI) were commonly affected by bilateral otitis, the majority of which were male and aged between 2 and 5 years of age. The presence of comorbidities identified through complementary exams, and which were observed in the majority of patients with otitis, demonstrates that the etiology of this disease has a multifactorial origin. Through the analysis of prescriptions, it was noticed that antibiotics from the aminoglycoside class (Neomycin and Gentamicin) were the most used, with formulations associated with other therapeutic substances, such as antifungals and anti-inflammatories, with the commercial presentation Aurivet being the most prescribed. It was not possible to outline the success profile of the therapeutic approaches adopted by health professionals, since such information was not recorded in the assistance records, added to the low adherence to the necessary diagnostic tests. It is important to highlight that further studies evaluating data on the antibiotic profile of the microorganisms involved in otitis in companion animals are necessary to consolidate successful therapeutic approaches for this disease, as well as to enable constant monitoring of the treatments carried out in relation to the assistance of these animals.

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