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Canine ear affections: Clinical investigations of 15 cases in Al Muthanna Province

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Abstract

Canine ear diseases are commonly occurred in veterinary practice and significantly affect a pet's everyday life. This study focuses on 15 selected cases showing different clinical signs of ear affections out of 165 dogs presented to Al Muthanna veterinary teaching hospital during the period extended from October 2017 to May 2021. Case history, clinical signs, diagnosis, and treatment were reported for all 15 cases. The total percentage of ear affections was 9.09 % (15 out of 165) cases. The affected cases were diagnosed as unilateral and bilateral ear hematoma, otitis externa, otitis media, and otitis interna with percentages of 20% (3 cases), 53.33% (8 cases), 20% (3 cases), and 6. 66% (1 case) respectively. This study showed that bacterial infection was the main cause, followed by a fungal infection. The age of infected animals was extended between 1-11 years while the gender of infected animals were 9 (60%) and 6 (40%) for male and female, respectively. In conclusion, this study focused on the clinical signs, diagnosis, and treatment of ear hematoma, otitis externa, otitis media, and otitis interna in 15 canine cases. The authors recommend another survey study including a large number of animals and in different provinces of Iraq to encourage the veterinarian in practice to find a successful treatment plan for the canine ear diseases.

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Introduction

Recently, people enjoy having pets such as dog to help reduce loneliness, sadness, and fill with positive feelings of responsibility and companionship. Ear diseases arre important in dogs and lead to pruritus, long treatment period and they are relapse easily. The most predominant disorders in small animal veterinary clinic is canine ear affections

including otitis externa, with higher prevalence incidence ranged between 5% to 20% (August 1988). These disease have a multifactorial etiology involving various predisposing, primary, secondary and perpetuating factors (August, 1988; Rosychuk and Luttgen, 2000; Krahwinkel, 2003). The diagnosis is simple and being based on case history, clinical signs and physical examination. However, treatment of ear diseases are extremely challenging and need multiple level by level strategic plan (Saridomichelakis *et al.,* 2007).

The predisposing factors are those which increase the risk for the development and persistence of otitis externa, but don't cause it alone and including conformation (pendulous pinna, congenital stenosis, excessive hairs in ear canal), breed disposition (Cocker spaniel, German shepherd, basset hound), excessive moisture (Swimmer's ear), immunosuppression (medications, immunosuppressive diseases) and respiratory viral diseases (more common in cats and common cause of otitis media) (Saridomichelakis *et al.,* 2007). The primary factors are the actual cause of otitis externa which start by the inflammatory process within the ear canal and change the aural milieu, permitting secondary complication factors, such as bacterial and fungus/ yeast infections, to develop.

The primary factors are mostly manifestations of generalized dermatological disease and including the parasites, dermatophytes, hypersensitivity disorders, endocrine disorders, foreign bodies, autoimmune disorders, benign tumors, malignant tumors, non-neoplastic growths, primary otitis growths and idiopathic. The ear canal epithelium is an extension of the skin, thus, it is prone to the same diseases. The perpetuating factors are those that maintain and intensify the inflammatory process and inhibit resolution of, or deteriorate existing, otitis externa (Harvey, n.d.)(Gotthelf LN., n.d.).

According to Masuda *et al.,* (2000) the ear inflammatory condition were divided into external (Otitis externa), middle (Otitis media), and internal (Otitis interna). They found that Otitis externa combated 8.7% of animals in veterinary clinic and affect from 10-20% of dog population (Angus, 2004; Cole, 2004).

In Iraq, the isolation and identification of bacterial isolates from canine ear infection and human has been reported (Al-Nassry, 2011), where 137 bacterial isolates from dogs ear were identified in percentages of 27.7%, 13.8%, 13.1%,12.4%, 8.2%, 7.2% , 6.5%, 5.8% and 5.1% for *S. aureus , Klebsiella spp. , E. coli, Streptococcus spp.,P. haemolytica, P. vulgaris , S. epidermidis, Salmonella spp.,* and *P. mirabilis* respectively. The study also approved that the canine bacterial isolates were sensitive to Imipenem (IPM), Streptomycin (S), Rifampin (RA) and Clindamycin (DA) but it were less sensitive to Erythromycin (E). However, the majorities of isolates were resistant to Cefotaxime(CTX), Ampicillin (AM) , Vancomycin (VA) and Trimethoprim (TMP). The treatment of experimentally canine otitis externa by *pseudomonas aeruginosa* was done in Iraq (Salih & Judi, 2009) in 25 local breed dogs. Infected dogs showed variations in the clinical signs and rupture of tympanic membrane in one of animal groups. Moreover, variations were seen in the period of the treatment of infected animals extended from 3 to 4 weeks after ear washing with acetic acid and boric acid and locally treatment with ciprofloxacin and dexamethasone beside local treatment with ciprofloxacin and dexamethasone and ciprofloxacin orally.

Review of literature regarding canine ear affections in Al Muthanna province revealed absence of publications and documented reports. Consequently, this study designed to focus on 15 canine ear affections presented to Al Muthanna veterinary teaching hospital

out of 165 canine cases, additionally, clinical signs, causative agents, diagnosis and treatment were also reported.

Materials and methods

Fifteen selected cases showing different clinical signs of ear affections out of 165 dogs at Al Muthanna veterinary teaching hospital during the period extended from October 2017 to May 2021 were used in this study. The cases showing different clinical signs of ear affections. The case history (age, sex and breed) for each case was collected. Moreover, clinical signs, clinical examination, individual diagnosis and treatment were done for each case (Table. 1). Sterile swabs were collected from all cases and cultured on different culture media as well as Sabouraud agar for bacterial and fungal isolation.

Results

Fifteen out of 165 cases (15 out of 165) (Figure.1, 2, 3, 4, 5) with a total percentage of 9.09 % were revealed clinical signs of ear affections. According to breed, there were 6, 1, and 8 for German Shepherd, White Terrier and local breed in a percentages of 40%, 6.66% and 53.33% respectively. The age of infected dogs were extended between 1 to 11 years. According to the sex of the infected animals, there were 9 (60%) and 6 (40%) for male and female respectively (Figure. 6).

Figure.1: Shows ear hematoma
Figure.2: Shows otitis externa and inflammation of skin of the ear.

Figure.3: Shows otitis media
Figure.4: Shows otitis externa and bilateral inflammation and sloughing of skin of the ear

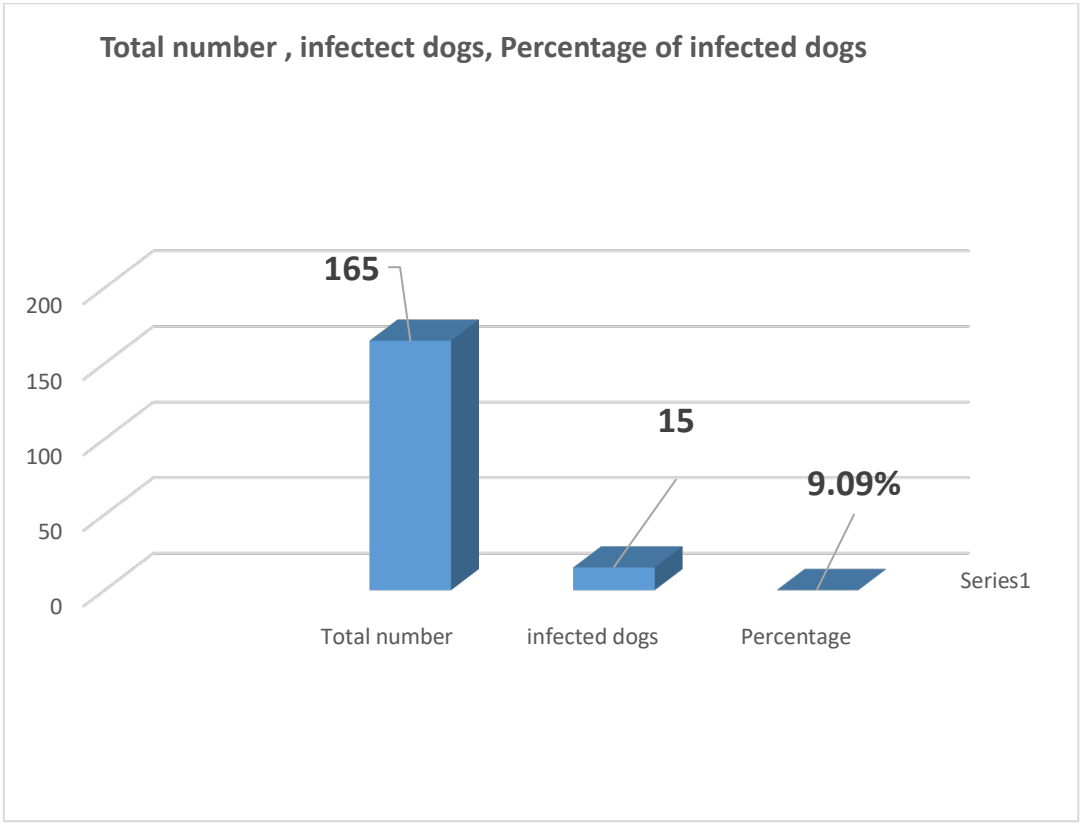

Figure. 5: Show the total number of dogs, infected animal and the percentage of infected dogs

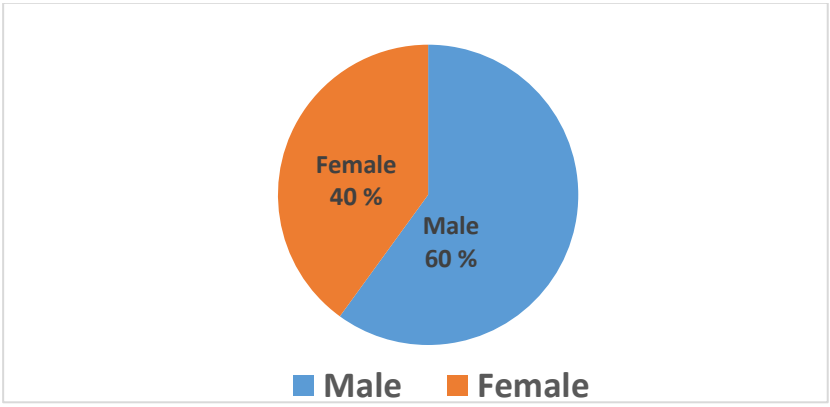

Figure.6: Shows the distribution of infected dogs according to the sex

All cases were showed various skin lesions, and according to these lesions, these cases were diagnosed as unilateral or bilateral ear hematoma 20% (3 cases) , otitis externa

53.33% (8 cases), otitis media 20% (3 cases) and otitis interna 6. 66% (1 case) (Figure.7).

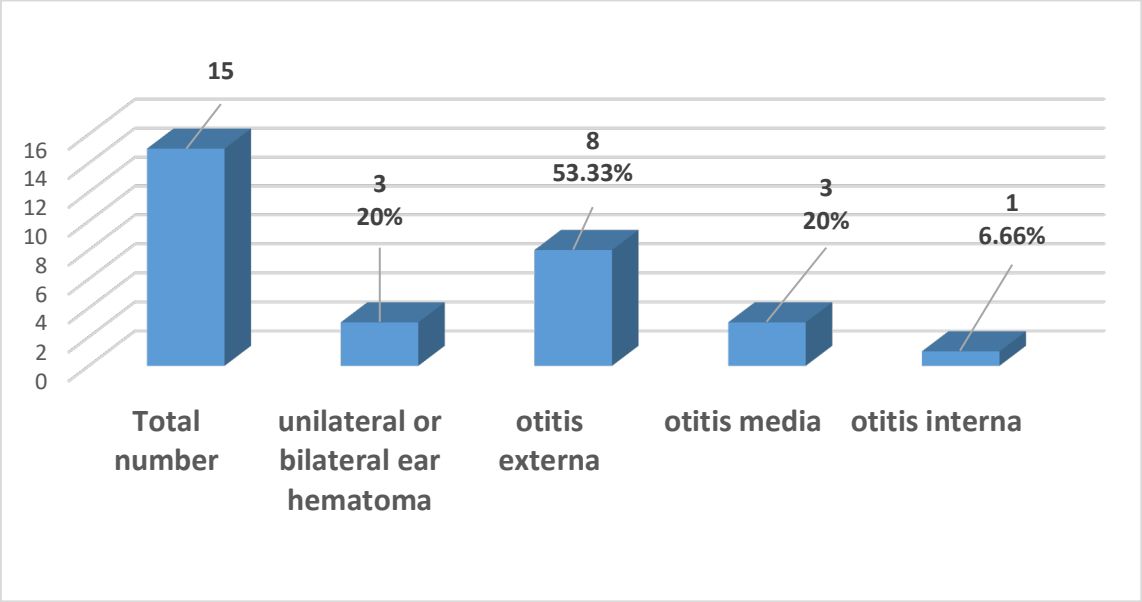

Figure.7: Shows the total number, and the percentages of different types of ear diseases in dogs

All dogs were presented with history of smelly, itchy ear and shaking of head and painful to touch, however there were variations in the history depending on the severity of the case. All dogs were, always paw its ears with different degree of head shaking. The examination of ear showed visible yucky, black and yellow substance inside the ear, trying removing of these substance led to bleeding that appeared mixed with debris. Twenty one different species of bacteria and yeast has been isolated from swabs including *Pseudomonas aeruginosa*, *Klebsiella spp*., *Staphylococcus aureus*, *E. coli* , *Streptococcus spp*., *S. epidermidis*, *P. haemolytica*, *Salmonella spp*. and *Malassezia pachydermatis* in the percentages of 33.33%, 14.28%, 9.52%, 9,52%, 4.76%, 9.52%, 9.52%, 4.76% and 4.76 % respectively (Figure.8).

All cases were treated, and individual treatment plan was used for each case depending on the clinical presentation and severity of clinical signs, lesions and underlying factors that led to progressing of otitis in the first place. Topical therapy was the first choice of treatment and the basis for otitis externa, moreover the treatment was accompanied with systemic anti-inflammatory and antimicrobial therapies regardless of the causative agent because it will benefited from anti-inflammatory therapy. Glucocorticoids used for a short period for some cases to help reduce the pain and swelling that help in improved compliance for ear cleaning and medication administration. The duration of treatment was variant according to the case and extended from 2-5 weeks. One dog was treated with terbinafine, florfenicol and betamethasone acetate for 7 days as indicated for otitis externa associated with susceptible *Malassezia pachydermatis.*

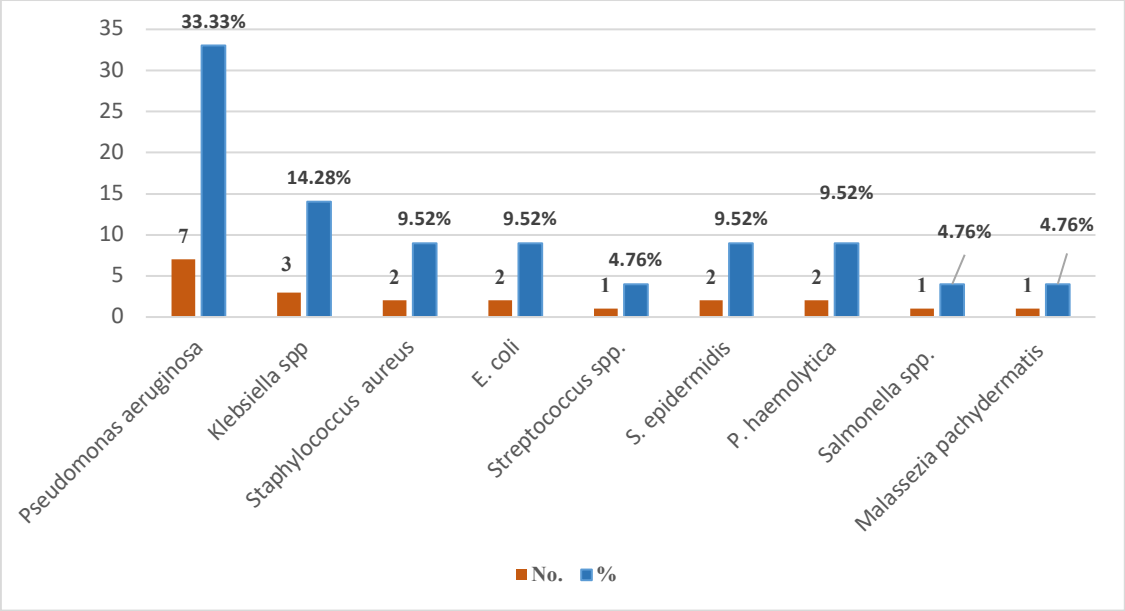

Figure.8: Shows the distribution of the different types of bacteria isolated from dogs

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Discussion

During the 4- years the period of this retrospective study, 165 dogs were presented to Al Muthanna Veterinary Teaching Hospital, the results of this study showed that fifteen out of 165 cases (15 out of 165) with a total percentage of 9.09 % were revealed clinical signs of ear affections. This result is compatible with previous study that reported the ear diseases, although it was considered as frequent but higher in incidence 8.7 % (Topală *et al.,* 2007). Regarding the distribution of ear diseases, according to breed of the animals, the results of this study showed higher incidence in local breed followed by German shepherd dog, White Terrier dog and in a percentages of 53.33%, 40% and 6.66% respectively. According to previous studies, there were a variation in the distribution of canine ear diseases and numerous breeds were affected (Terziev & Borissov, 2018). Moreover, studies approved that Cocker Spaniels revealed 15.99 % comparable to the observations of other studies ((Grono, 1969; Baba, 1981; August, 1988; Kiss *et al.,* 1997).

Most commonly, ear diseases were seen in Cocker Spaniels (15.99%) comparable to the observations of other researchers due to a numerous apocrine glands that found in the

ear canal of this breed (Grono, 1969; Baba, 1981; August, 1988; Kiss *et al.,* 1997). Otitis occurred and developed as a pathological process due to activation and excessive production of cerumen that worsen the condition. In this study the local breed reported the highest percentages of ear diseases might be due to the pendulous ears of these breed and make it susceptible to ear diseases due to reduce the ventilation of the ear canal (Mckeever *et al.,* 1997; Gotthelf, 2000). The most important observations during ear diseases that seen in the current study, were the inflammations which are become more prevalence due to the presence of abundant hair in the ear canal of mixed breed, German Shepherds and white terriers breed. These results agreed with previous observations reported by other researchers (August, 1988; Logas, 1994; Gotthelf, 2000).

In this study the age of the infected dogs was extended from 1 to 11 years, while the percentages of sex were 60% and 40% for male and female respectively. These results are in agreement with previous studies (Terziev & Borissov, 2018), that reported the effect of age of patients with pronounced (P=0.024) influence on the occurrence of ear diseases.

The results of this study showed that according to the sex of the infected animals, there were 9 (60%) and 6 (40%) for male and female respectively. This result approved that the male dog were more susceptible and showed higher incidences of ear diseases than female. These observations are in agreement to many other reports (Kiss *et al.,* 1997; Chaudhary *et al.,* 2003; Phutane & Joseph, 2003; Nair, 2004; Mhatre, 2005; Kumar *et al.,* 2014). In this study, ear hematoma was reported in 3 cases including 1 male and 2 females these indicated that female dog suffered more commonly from ear hematoma and otitis externa. These results are in agreement with previous reported cases by other researchers (Carlotti, 1991). However, regarding ear hematoma, other study claim that the male are more prone to ear hematoma due to fighting behavior, that suggested the more common fights between males and the higher risk of ear wounds, haematomas and traumas (Terziev & Borissov, 2018).

In this study, various bacterial isolates were identified with variation in the percentages including (33.33%) *Pseudomonas aeruginosa*, (14.28%) *Klebsiella spp.*, (9.52%)*Staphylococcus aureus,* (9,52%) *E. coli* , (4.76%) *Streptococcus spp*., (9.52%) *S. epidermidis*, (9.52%) *P. haemolytica*, (4.76%) *Salmonella spp.*, and (4.76 %) *Malassezia pachydermatis.* . These results are compatible with previous observations reported in Iraq by other researchers (Al-Nassry, 2011; Salih & Judi, 2009). It is important to identifying the species of the causative agents and testing their sensitivity or resistance to antibiotic used to treat these ear diseases and provide additional visions in the local cause and successful of the treatment plan, although in vitro studies remain beneficial for selecting the best medication for treating the ear diseases, particularly when the special treatment is unsuccessful (Lyskova *et al.,* 2007; Hariharan *et al.,* 2006; Zamankhan *et al.,* 2010; Jacobson, 2010; Kiss *et al.,* 1997; Lilenbaum *et al.,* 2000).

One of the challenge that face the veterinary practice is the treatment of ear diseases. The treatment of complex causes such as different types of otitis may advantage from the accurate examination of clinical records from veterinary practice. According to the results of this study there were variation in the prevalence of ear disease according to some factors such as age, sex and breed of the animals. In Iraq, especially in Al Muthanna province, there have been relatively few studies on the diversify and susceptibility of bacterial species associated with otitis (Al-Nassry, 2011; Salih & Judi, 2009). Therefore, the data of the microbial species present locally and their resistance

to specific antimicrobial and antibiotic will help in find the effective treatment and reduce the recurrent of the ear diseases.

The treatment plan used in this study is depended on topical therapy accompanied with systemic treatment such as inflammatory and or antimicrobial therapy and according to each individual case. The anti-inflammatory (glucocorticoids) is one of the important treatment in ear diseases, it acts to reduce the pain and swelling, thus helping the animal during the local treatment and cleaning of the ears. Although the results of this study showed somehow the long course of treatment but with successful result in most cases except one case which didn't response to treatment because the delay in the treatment of the animals and the advancement of pathological changes. These results are in agreement with previous study that approved a positive clinicall effect, and the beneficial of the management of canine otitis externa and appeared to be effective in the controlling the clinical condition, including the signs of inflammation and local pain, the growth of bacteria and later on increasing treatment compliance (Tambella *et al.,* 2020).

In conclusion, this study focused on the clinical signs, diagnosis and treatment of ear hematoma, otitis externa , otitis media and otitis interna in 15 canine cases. The authors recommend another survey study including large number of animals and in different provinces of Iraq in order to encourage the veterinarian in practice to find a successful treatment plan for ear diseases.

No of animal	Age/ year	Sex	breed	Diagnosis	Cause	Treatment	Response to treatment
1	1	Male	German Shepherd dog	Otits media	*Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory, Glucocorticoids	Response to treatment with long period 4 weeks.
2	1	Male	Local dog	*Otitis Externa*	*Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 3 weeks.
3	5	Female	German Shepherd dog	Ear hematoma	*Klebsiella spp.*, and *Staphylococcus aureus*	Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 2 weeks.
4	6	Female	Local dog	Ear hematoma	*E. coli* and *Streptococcus spp.* , and *S. epidermidis*	Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 2 weeks.
5	9	Male	German Shepherd dog	Ear hematoma	*P. haemolytica* , and *Salmonella spp*	Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 2 weeks and revealed reccurence
6	11	Male	German Shepherd dog	Otitis interna	*Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Not Responsed to treatment
7	4	Female	German Shepherd dog	Otitis media	*Malassezia pachydermatis*	Washing, Cleaning, Antibiotic injection, anti-inflammatory. terbinafine, florfenicol and betamethasone acetate for 7 days	Response to treatment within 3 weeks.
8	5	Male	German Shepherd dog	Otitis media	*Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 3 weeks
9	7	Female	Local dog	Otitis Externa	*Staphylococcus aureus* and *Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 3 weeks.
10	2	Male	Local dog	Otitis Externa	*S. epidermidis* , *P. haemolytica*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 3 weeks.
11	3	Male	Local dog	Otitis Externa	*Klebsiella spp*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 2 weeks.
12	4	Female	White Terrier dog	Otitis Externa	*Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 3 weeks.
13	5	Male	Local breed	Otitis Externa	*Pseudomonas aeruginosa*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 2weeks.
14	2	Male	Local breed	Otitis Externa	*Klebsiella spp.*,	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 3 weeks.
15	3	Female	Local breed	Otitis Externa	*E.coli*	Washing, Cleaning, Antibiotic injection, anti-inflammatory	Response to treatment within 2weeks.

References

1. **August JR. (1988).** Otitis externa: A disease of multifactorial etiology. Veterinary Clinics of North America: Small Animal Practice. 18; 731-742.
2. **Angus J C. (2004).** Otic cytology in health and disease. Veterinary Clinics of North America: Small Animal Practice, 34, 411–424.
3. **AL- Nassry B S. (2011).** Isolation and Identification of bacterial isolates from ear infection and their sensitivity to usual antibiotics in human and dogs. Iraqi veterinary medical journal. 35 (1): 159 – 166.
4. **Baba E. & T. Fukata (1981).** Incidence of otitis externa in dogs and cats in Japan. The Veterinary Record. 108:393–395.
5. **Chaudhary M, Mirakhur K K & Jand S K. (2003).** Antibiogram and microbiological patterns of external ear canal of dogs with reference to otitis. Indian Veterinary Journal. 80:951–952.
6. **Cole L K (2004).** Otoscopic evaluation of the ear canal. Veterinary Clinics of North America: Small Animal Practice. 34:397– 410.
7. **Gotthelf LN. (2000).** Small Animal Ear Dis- eases. 1st edn, W. B. Saunders Co, Philadelphia: pp. 270-281.
8. **Grono LR & Frost A. (1969).** Otitis externa in the dog. The microbiology of the normal and affected external ear canal. Aus- tralian Veterinary Journal, 45, 420–422.
9. **Harvey RG, Patterson S. (2014).** Otitis Externa: An Essential Guide to Diagnosis and Treatment. Boca Raton, FL: CRC Press.
10. **Hariharan H, Coles M, Poole D, Lund L, Page R. (2006).** Update on antimicrobial susceptibilities of bacterial isolates from canine and feline otitis externa. Can Vet J. 47:253–255.
11. **Jacobson LS. (2002).** Diagnosis and medical treatment of otitis externa in the dog and cat. J S Afr Vet Assoc. 73:162–170.
12. **Kiss G, Radvanyi S. & Szigetti G. (1997).** New combination for the therapy of canine otitis externa. I-Microbiology of otitis ex- terna. Journal of Small Animal Practice. 38:57–60.
13. **Krahwinkel D J. (2003).** External ear canal. In: Textbook of Small Animal Surgery, Volume II. Third Edition. Edited by D. Slatter. Philadelphia: Saunders. 1746-1757.
14. **Kumar S, Hussain K, Sharma R, Chhib- ber S & Sharma N. (2014).** Prevalence of ca- nine otitis externa in Jammu. Journal of Animal Research. 4:121–129.
15. **Masuda A, Sukegawa T, Mizumoto N, Tani H, T. Miyamoto, K. Sasai & E Baba. (2000).** Study of lipid in the ear canal in ca- nine otitis externa with Malassezia pachy- dermatis. Journal of Veterinary Medical Science. 62:1177–1182.
16. **Mckeever P J & Globos H. (1997).** Otitis externa canina. In: Terapeútica Veterina- ria de Pequeños animales XII, eds R. W. Kira & J. D. Bonagura, Ediciones McGraw Hill Interamericana, pp. 698–707.
17. **Mhatre M D. (2005).** Studies on etiopathology of bacterial and mycological infections of skin and ear in canines and their clinical management. M.V.Sc. Thesis. Anand Agricultural University, Anand, Gujarat, India

18. **Nair S. (2004).** Studies on clinico-etiopatho- logy and therapeutic management of vari- ous canine dermatoses. M. V. Sc. Thesis, Anand Agricultural University, Anand, Gujarat, INdia.
19. **Louis N. Gotthelf. (2004).** Small Animal Ear Diseases, An Illustrated Guide, 2nd Edition.
20. **Logas D B. (1994).** Disease of the ear canal. Veterinary Clinics of North America: Small Animal Practice. 24:905–917.
21. **Lyskova P, Vydrzalova M, Mazurova J. (2007).** Identification and antimicrobial susceptibility of bacteria and yeasts isolated from healthy dogs and dogs with otitis externa. J Vet Med Ser A. 54:559–563.
22. **Lilenbaum W, Veras M, Blum E, Souza GN. (2000).** Antimicrobial susceptibility of staphylococci isolated from otitis externa in dogs. Lett Appl Microbiol. 31:42–45.
23. **Phutane K. & Joseph E. (2003).** Inhibitory effect of the aqueous extracts of Allium sa- tivum (garlic) bulbs and Syzgium aromati- cum (clove) flower buds on fungi isolated from canine otitis externa. Indian Journal of Animal Science. 73:286–287.
24. **Rana A M Salih & A M H Judi. (2009).**Treatment of otitis externa experimentally infected with Pseudomonas aeruginosa in dogs. Iraqi veterinary medical journal. 33(2): 62-66.
25. **Rosychuk RA. and Luttgen P. (2000).** Diseases of the ear. In: Textbook of Veterinary Internal Medicine: diseases of the dog and cat, Volume II. Fifth Edition. Edited by S.J. Ettinger and D.J. Feldman. Philadelphia: Saunders. 986 – 1002.
26. **Saridomichelakis MN, Farmaki R, Leontides LS, *et al.* (2007)**. Aetiology of canine otitis externa: a retrospective study of 100 cases. Vet Dermatol. 18; 5: 341-347
27. **Tambella AM, Attili AR, Beribè F Galosi M, Marchegiani A, Cerquetella M, Piccionello A P, Vullo C, Spaterna A & Fruganti A. (2020).** Management of otitis externa with an led-illuminated gel: a randomized controlled clinical trial in dogs. BMC Vet Res. 16**:**91. https://doi.org/10.1186/s12917-020-02311-9
28. **Terziev G. & Borissov I. (2018).** Prevalence of ear diseases in dogs – a retrospective 5-year clinical study. Bulgarian Journal of Veterinary Medicine, 2018, 21, No 1, 76–85. DOI: 10.15547/bjvm.1075
29. **Topală R, Burtan I, Fântânaru M, Ciobanu S. & Burtan L C. (2007).** Epidemiological studies of otitis externa at carni- vores. Lucrări Ştiinłifice Medicină Veterinară. 40:247–251.
30. **Zamankhan Malayeri H, Jamshidi S, Zahraei Salehi T. (2010).** Identification and antimicrobial susceptibility patterns of bacteria causing otitis externa in dogs. Vet Res Commun. 34:435–444.