

Research Article

Effectiveness of an Otic Cleaner with Detergent and Acidifying Properties in Dogs with External Otitis

Camilo Romero Núñez¹, Ariadna Flores Ortega², Alberto Martin Cordero³, Galia Sheinberg Waisburd⁴, Rafael Heredia Cardenas^{5*} and Cecilia López Márquez³

¹Dermatología Especializada, Centro Veterinario México, México

²Doctorado en Ciencias Agropecuarias y Recursos Naturales, Centro Universitario UAEM Amecameca, México

³Dermatología Veterinaria Especializada, México

⁴Centro Veterinario México, México

⁵Centro Integral Veterinario CIVET, México

Abstract

Background: The use of an ear cleaner with detergent and acidifying properties can be an alternative to improve the hygiene of the ear canal with otitis.

Objective: Evaluate the clinical and cytological efficacy of an otic cleaner with detergent and acidifying properties in dogs with external otitis.

Animals: 52 dogs of different breeds, 50% female and 50% male, aged 4.5 to 3.1 years, with clinical and cytological evidence of external otitis.

Methods: An otic cleaner (dimethyl sulfoxide 5.0 ml, salicylic acid 2.0 g, boric acid 2.5 g, borax 0.40 g) was applied twice per week. Clinical and cytological evaluations were performed on days D1, D10 and D20.

Results: The polymorphonuclear leukocytes presented difference between the initial value at D1 and at D10 ($p=0.0001$) and between D10 and D20 ($p=0.0001$); the initial intracellular cocci presented difference ($p=0.0001$) from that at D10 and between D10 and D20 ($p=0.0001$); the extracellular cocci presented difference ($p=0.0001$); and yeasts showed difference ($p=0.0001$) between D1, D10 and D20. A reduction was observed in clinical signs, presenting differences in D1-D10 ($p=0.0001$) and D10-20 ($p=0.0001$).

Conclusion and clinical importance: The application of this otic cleaner is an effective treatment in dogs with external otitis. There was a rapid and significant decrease in clinical signs associated with otitis after its use, it constituting an alternative treatment for dogs that cannot use steroids.

Keywords: Otitis; Otic cleaner; Detergent; Topical therapy

Introduction

Topical therapy is reported to be effective as a treatment for external otitis in dogs; however, the use of systemic medication in external otitis should be administered cautiously due to bacterial and fungal resistance [1], and otic cleaners have demonstrated antibacterial

and antifungal efficacy [2]. Dimethyl Sulfoxide (DMSO)-based otic cleaners have been shown to have potential anti-inflammatory effects [3]. Another component found in otic cleaners is salicylic acid, and reports show that the low pH created by salicylic acid has an antimicrobial action [2]. Boric acid has also been used because of its effectiveness in fungal infections [4], and borax is a component that has shown good results in reducing inflammatory processes [3]. All these components are indicated to dissolve the cerumen and to fluidise the detritus without the need for mechanical manoeuvres, which may damage the epithelium. Therefore, the objective of this study was to evaluate the clinical and cytological efficacy of an otic cleaner (DMSO 5.0 ml, salicylic acid 2.0 g, boric acid 2.5 g, borax 0.40 g) with detergent and acidifying properties, in dogs with external otitis.

Methods

All patient owners signed an informed consent form, which outlined what would be done to each patient.

Citation: Núñez CR, Ortega AF, Cordero AM, Waisburd GS, Cardenas RH, Márquez CL. Effectiveness of an Otic Cleaner with Detergent and Acidifying Properties in Dogs with External Otitis Effectiveness of an Otic Cleaner with Detergent and Acidifying Properties in Dogs with External Otitis. World J Vet Sci. 2021; 3(1): 1014.

Copyright: © 2021 Camilo Romero Núñez

Publisher Name: Medtext Publications LLC

Manuscript compiled: May 31st, 2021

***Corresponding author:** Rafael Heredia Cardenas, Centro Integral Veterinario CIVET, Av. Valle del Don, Mz 374 Lt. 14b. Ecatepec de Morelos, México, E-mail: rafaesbirro@hotmail.com

Animals

A randomised controlled study was carried out over a period of 20 days in which 52 dogs of different breeds were included; 50% female and 50% male; the average age was 4.5 to 3.1, with evidence of external otitis in at least one ear with presence of erythema, pain and discharge from the ear canal and cytological evidence of external otitis (Presence of Polymorphonuclear (PMN) cells, Extracellular Cocci (EC), Intracellular Cocci (IC) and yeast). Cases that had received some topical ear cleaner two weeks prior to sampling, antifungal or systemic antibiotics three months prior to the study, as well as some with other dermatological or systemic diseases, were excluded. Information was collected to generate a clinical database that was used for statistical analysis.

Clinical evaluation

The ear canals were examined on D1, D10 and D20, as reported by Bajwa [1]. The Glasgow Compound Pain Scale (CMPS-SF) was used to measure arial pain [5], scoring 0=no pain, 1=mild, 2=mild to moderate, 3=moderate, 4=moderate to severe. The otitis index score of 0 to 3 (OTIS3) was used for erythema, inflammation, ulceration, pigmentation, malodor and exudate, as described Nuttal et al. [6] and based on reporting by Sheinberg et al. [7].

Cytological analysis

A sterile, cotton-tipped swab was inserted into the opening/light of the left and right external ear canal and rotated at least 180°. The cotton swab from each ear was rolled along a glass slide in various directions and stained with Diff Quick® for viewing under the microscope. The slides were examined using a 100X objective, with immersion oil, and a minimum of 10 fields were evaluated. Cytological evaluations were performed for the presence of PMN leukocytes, EC, IC and yeast on days D1, D10 and D20 [8].

Treatment

Otiflex Cleaner (DMSO 5.0 ml, salicylic acid 2.0 g, boric acid 2.5 g, borax 0.4 g) was applied to each dog, giving two pulses in each ear and massaging the base of the external auditory canal. This protocol was carried out twice per week for 20 days.

Statistical analysis

The data obtained from each evaluation were concentrated in a spreadsheet for later analysis. Once the data were concentrated, they were analysed by means of the Matched Pairs test, between D1, D10 and D20 evaluation of the patients, with a α -value of 0.05 using the statistical software JMP 0.8.

Results

A comparison of the values of the variable PMN was carried out, which presented significant difference between the initial value on D1 and the average on D10 ($p=0.0001$) and between D10 and D20 ($p=0.0001$) of treatment, showing a decrease in value. A comparison of initial IC presented significant difference ($p=0.0001$) with D10 and likewise between D10 and D20 ($p=0.0001$) showing a reduction in the mean between these intervals, reaching zero. The cocci (EC) presented significant difference ($p=0.0001$) when comparing the initial data against the days after treatment, a decrease being observed. The number of yeasts showed significant difference ($p=0.0001$) between D1, D10 and D20, decreasing throughout the study, as shown in Table 1.

Table 2 shows a comparison of clinical evaluations during the examination days. The evaluation of pain showed a significant decrease in the weekly comparisons; erythema decreased with significant difference; ear exudate decreased with significant difference; inflammation showed significant reduction in both comparisons; ulcers reached zero with significant differences in all evaluations; bad smell decreased in both evaluations with significant difference; ear pigmentation decreased from D1 to D10 and from D10 to D20 with significant difference; and the clinical scale score showed significant difference from D1 to D10 and decreased in the same way from D10 to D20.

Table 1: Comparison of the presence of PMN, IC cocci, EC cocci and yeast in ears treated with Otiflex Cleaner.

Days	1-10	10-20
PMN (20)	7.89-2.36	2.36-0.47
P-value	0.0001	0.0001
Cocci IC (10)	1.74-0.31	0.31-0
P-value	0.0001	0.0001
Cocci EC (30)	11.08-3.99	3.99-1.14
P-value	0.0001	0.0001
Yeast (10)	5.60-1.24	1.24-0.18
P-value	0.0001	0.0001

Matched Pairs test, $\alpha=0.05$

Table 2: Comparison of clinical evaluations per week in ears treated with Otiflex Cleaner.

Days	1-10	10-20
Pain	1.13-0.18	0.18-0.03
P-value	0.0001	0.0001
Erythema	2.15-0.48	0.48-0.019
P-value	0.0001	0.0001
Exudate	1.27-0.52	0.52-0.009
P-value	0.0001	0.0001
Inflammation	2.17-0.25	0.25-0.01
P-value	0.0001	0.0001
Ulcers	1.10-0.13	0.13-0
P-value	0.0001	0.002
Bad smell	1.26-0.26	0.26-0.01
P-value	0.0001	0.0001
Pigmentation	1.01-0.25	0.25-0.009
P-value	0.0001	0.0001
Clinical scale	1.54-0.53	0.53-0.06
P-value	0.0001	0.0001

Matched Pairs test, $\alpha=0.05$

Discussion

Topical treatment with ear cleaners is considered a valuable adjunct in the treatment of canine external otitis [1]. Cytological evaluations performed showed that PMN, CI, EC and yeast decreased significantly between D1 and D10 and between D10 and D20 of application; these results can be explained by the ear cleaner used in this research containing DMSO, which has anti-inflammatory properties and is particularly suitable for treating hyperplastic ear disorders [3]. Another component is salicylic acid, which in previous studies has been shown to create a low-pH environment that prevents the reproduction of microorganisms [2], in line with the results of this research, where CI and EC showed progressive decreases. The effectiveness of treatment in dogs with otitis was also observed in the significant decrease in the presence of yeast, attributed to the inclusion of boric acid, as reported by Collen et al. [4] and showing its antifungal effectiveness. Clinical evaluations - pain, erythema and inflammation - showed significant decreases related to the effect of DMSO, which

has been used to reduce acute swelling due to trauma in dogs and horses. It has also been applied in dogs with Cushing's syndrome and calcinosis cutis to stimulate calcium reabsorption from the skin. It has been safely administered directly to the target organ or the therapy site: skin, ears and joints. In humans the biological effects of DMSO include the induction and alteration of inflammatory tissue responses [9], a myorelaxing effect and promotion of analgesia, not only because of its anti-inflammatory properties, but also because of a central action similar to that of morphine [9]. Borax is a component that has showed good results in reducing inflammation in kidney problems, so it is also effective in inflammatory processes such as otitis [3]. Ulcers, exudate and bad odour also decreased significantly. This result is similar to that of Huang et al. [10], who reported that salicylic acid, alone or in combination with other organic acids in aqueous solution, is keratolytic, has antibacterial properties and promotes the shedding of necrotic tissue. The positive results for ulcers and pain in this study are also attributed to DMSO, as in previous research it has been used for ischaemic ulcers, promoting a greater flexibility of the skin with a decrease in pain. Duimel et al. [11], examined the efficacy of topical DMSO in ulcer wound healing and its use as an anti-inflammatory; the effects reported were beneficial, both for wound healing and analgesia. The most frequent positive results reported were a reduction in erythema and rapid healing of ulcers, along with a decrease in the signs of inflammation, such as erythema, pain and heat [11]. The most common yeast in otitis problems is *Malassezia spp.* Pigmentation has been reported as a common clinical sign in patients with this yeast, and this sign was presented in the patients in this study. A significant and progressive decrease in this clinical sign was seen, which is related to the use of boric acid. It has been proposed that boric acid can clean the lipids of the epithelium, eliminating the metabolic substrates for *Malassezia spp* [12].

In conclusion, it could be determined that the Otiflex Cleaner (DMSO 5.0 ml, salicylic acid 2.0 g, boric acid 2.5 g, borax 0.40 g), is an effective treatment in dogs with external otitis, since the combination of its components was associated with a rapid and significant decrease in clinical signs of otitis in dogs after its use.

References

1. Bajwa J. Canine otitis externa - Treatment and complications. *Can Vet J.* 2019;60(1):97-9.
2. Paterson S. Topical ear treatment - options, indications and limitations of current therapy. *J Small Anim Practic.* 2016;57(12):668-78.
3. Bensignor, E, Pattyn, J, Reme CA. Reduction of relapse of recurrent otitis externa in atopic dogs with twice weekly topical application of 0.0584% hydrocortisone aceponate in the ear canal. a randomized, blinded, controlled study : P-098. *Vet Derm.* 2012; 23(1):92.
4. Mendelsohn C, Griffin CE, Rosenkrantz WS, Brown LD, Boord MJ. Efficacy of boric-complexed zinc and acetic-complexed zinc otic preparations for canine yeast otitis externa. *J Am Anim Hosp Assoc.* 2005;41(1):12-21.
5. Reid J, Nolan AM, Hughes JML, Lascelles D, Pawson P, Scott EM. Development of the short-form Glasgow Composite Measure Pain Scale (CMPS486 SF) and derivation of an analgesic intervention score. *Anim Welf.* 2007;16(s):97-104.
6. Nuttall T, Bensignor EA. Pilot study to develop an objective clinical score for canine otitis externa. *Vet Dermatol.* 2014;25(6):530-7,e91-2.
7. Sheinberg G, Romero C, Heredia R, Capulin M, Yarto E, Carpio J. Use of oral fluralaner for the 246 treatment of *Psoroptes cuniculi* in 15 naturally infested rabbits. *Vet Dermatol.* 2017;28(4):393-e91.
8. Udenberg TJ, Griffin CE, Rosenkrantz WS, Ghubash RM, Angus JC, Polissar NL. Reproducibility of a quantitative cutaneous cytological technique. *Vet Dermatol.* 2014;25(5):435-e67.
9. Garcia JG, Mercado HQ, Reyes AR. Histopathological analysis of the effect of dimethyl sulfoxide (DMSO) in an experimental model of retinal ischemia (in Spanish). *Revista Mexicana de Oftalmologia.* 2008;82:1-4.
10. Huang H, Little C, McNeil P. Histological changes in the external ear canal of dogs with otitis externa. *Vet Dermatol.* 2009;20(5-6):422-8.
11. Duimel IGP, Houwing RH, Teunissen CP. A systematic review of the efficacy of topical skin application of dimethyl sulfoxide on wound healing and as an anti-inflammatory drug. *Wounds - A Compendium of Clinical Research and Practice.* 2003;15(11):361-70.
12. Bensen CE. Susceptibility of selected otitis externa pathogens to individual and mixtures of acetic and boric acids. *Proc Annu Am Acad Vet Derm/Am Coll Vet Derm.* 1998;14:121.