Veterinary Sciences and Medicine

RESEARCH ARTICLE

Clinical and Microbiological Comparison of Antimicrobial and Ceruminolytic Activity of two Commercial Ear Cleaners (Epiotic® Advance, Virbac) (Pyocleanoto®, LDCA) Utilizing Blinded Otoscopic Digital Imaging

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Abstract

Background - Otitis externa is frequent in cats and dogs. Ear cleaners are considered as an important part of immediate and long-term treatment programs. The objective of this study was comparing the efficacy of two commercial ear cleaners with antimicrobial and ceruminolytic properties using digital imaging with video otoscope in dogs with otitis externa.

Methods - A total of 8 patients (16 ears) with external otitis were evaluated. All dogs were treated with two different commercial ear cleaners (EpiOtic Advance® (Virbac, France) and Pyo Clean Oto® (LDCA, France) using a randomized table (Graphpad®) EpiOtic advance was applied twice a day, Pyoclean Oto, was applied once every other day. The treated ears were evaluated on day 0, 7 and 14. Both the ear canals were sampled for cytological evaluation for yeast, and cocci and rod bacteria. Four pictures of the same areas of the ear canal were taken using a video otoscope (Otopet®). The pictures were evaluated blinded by a veterinary dermatologist.

Results - There was no difference between groups before treatment in the number of microorganisms and the ear scores. After the treatment there was a significant improvement in numbers of cocci with Pyoclean ($p<0.05$) and in the yeast numbers with both treatments ($p<0.05$), but there was no difference between the two products.

Conclusion - Patients treated showed a decrease and resolution of most of the clinical signs as a sole treatment. Blinded evaluation with digital imaging allowed to decrease detection bias.

Keywords: Cleaners, Ear, Otoscopic

Introduction:

Otitis externa is a common condition in dogs, occurring as high as 10– 20%, being allergies the main underlying cause [1,2]. Clinical signs of the disease are caused by inflammation of the external ear canal and secondary complication with bacterial or yeast infection derivate from canine own microbiota and mycobiota which seems to be different in dogs with otitis externa compared to healthy individuals [3,4]. Cytology is an effective clinical test to identify microorganisms in ears and a grading scale is helpful in evaluating therapeutic results [5]. Bacteria commonly present as secondary complications of canine otitis externa includes *Staphylococcus spp*, *Streptococcus*, *Pseudomonas, Proteus* and *Escherichiacoli* with *Staphylococcus pseudintermedius* being the most frequent. *Malassezia pachydermatis* is the most common fungal pathogen isolated [6,7,8]. As treatment for otitis externa, topical therapy seems to be the most effective, and oral treatment is mostly recommended after flare ups [9]. The use of systemic medication in otitis externa is not very effective due to the difficult to find effective drugs for the affected área [10], this is the reason why topical therapy is recommended [11]. Additionally of existing the problem of bacterial and fungal resistance, by these reasons is necessary to investigate alternatives that may help on the treatment of otitis [12]. Therefore, ear cleaners are an important part of treatment in otitis externa, helping to maintain the normal otic environment

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[13] and many of them has shown antibacterial efficacy [14,15]. The other way of diagnostic support may be the use of video otoscopy, which is an effective tool for assessment, diagnosis, and treatment of otitis, which and facilitate sharing or image capturing therapeutic evaluation purposes [16,17]. The objective of this study was to compare the efficacy of two commercial ear cleaners with antimicrobial and cerumenolytic properties using digital imaging from a video otoscope in dogs with otitis externa.

Materials and Methods:

A total of 16 ears (8 patients) with otitis externa were treated with two different commercial ear cleaners (EpiOtic Advance® (Virbac, France) and Pyo Clean Oto® (LDCA, France). Using a randomized table (Graphpad®) ears were divided in two groups, one group was treated with EpiOtic advance (EPA) twice a day, and the other group was treated with PyoClean Oto (PYO) every other day. Ears were evaluated on day 0, 7 and 14. Cytological evaluation was performed using a semiquantitative grading scale from 1+ to 4+; 7 samples were heat fixed and stained with Diff quik®. Clinical evaluation was performed taking 1 picture of the exterior of the ear canal and three pictures of the external ear canal using a video otoscope imaging system (MedRx®, Largo, Fl). Pictures were evaluated blinded by a board-certified veterinary dermatologist of the American College of Veterinary Dermatology (ACVD); using a modification of a non-validated scoring system [12]. The images were scored for erythema, thickening/lumen narrowing, roughening, erosion/ulceration and exudation from 0 to 4 (none, mild, moderate, severe, respectively) giving a total score of 0-20.

Inclusion/Exclusion Criteria

Dogs with bilateral otitis externa were included in the study. No treatment with corticosteroids or anti-inflammatory medications in the last three weeks; including systemic corticosteroids, antihistamines, oclacitinib or cyclosporine. No topical ear products were permitted during or three weeks before the inclusion on the study. All animals were treated according their disease concluding the evaluations.

Statistical Analysis:

Data was analyzed in order to know their distribution by Shapiro Wilk test not having normal distribution Kruskal Wallis non parametric test was choosen to compare both treatments; EpiOtic Advance®, Virbac, France (EPA) and Pyo Clean Oto®, LDCA, France (PYO) groups, with an alpha of 0.05.

Results:

Results of comparison between treatments per week for cytological study showed: presence of cocci (COCCI) had a decrease tendency in treatment with EPA on days 7 and 14, p=0.09 and p=0.08 respectively, as it is important to highlight that the group treated with PYO on day 0 had not presence of cocci and on day 7 and 14 presence was higher than on the EPA group although statistical significance both groups were similar. The presence of rod bacteria (RODS) was equal at the beginning of the ear evaluations (Table 1). At day 7 the quantity increased on both groups showing a higher tendency on the PYO group and by day 14 both groups diminished without presenting significant difference. The quantity of yeast (YEAST) was numerically smaller on days 7 and 14 on EPA group but no significant differences were observed (Table 1).

Ears were evaluated using the following variables

1. Erythema, where the groups treated with EPA presented a greater decrease on day 0 to 14 in comparison with the group treated with PYO that on day 0 obtained a lower score and by day 7 and an increase by day 7 and 14, these differences were not significant
2. Thickening / stenosis, which on the initial evaluation EPA group presented higher score than PYO group which maintained by day 7 and decreased by day 14, on the contrary PYO group increased by day 7 and 14 without presenting significant difference
3. Roughening, both treatments obtained the same score in all evaluations
4. Erosion / ulceration, at the beginning of the study EPA group presented higher score than PYO group, on day 7 EPA group decreased to 0 and remained the same, PYO group increased and remained the same until final day, on the contrary EPA group increased from 0 to 0.37 by daVBGFVGy 14 without presenting significant difference

Table 1: Mean comparison of the values obtained by ear cytology of dogs treated with EpiOtic advance and Pyoclean Oto by week.

	Day 0	Day 7	Day 14
COCCI			
EpiOtic Advance	1	0.12	0.50
Pyo Clean Oto	0	1.25	1.25
CHI-SQUARE	3.42	2.78	2.88
GL	1	1	1
P	0.06	0.09	0.08
RODS			
EplOtic Advance	0.37	1.00	0.75
Pyo Clean Oto	0.37	1.12	0.62
CHI-SQUARE	0.21	0.06	0.01
GL	1	1	1
P	0.64	0.79	0.88
YEAST			
EpiOtic Advance	2.87	0.75	0.25
Pyo Clean Oto	3.37	1.50	0.75
CHI-SQUARE	0.93	2.03	0.59
GL	1	1	1
P	0.33	0.15	0.44
Alpha of 0.05 Kruskal Wallis test			

Table 2: Mean comparison of the score on clinical evaluation of ears treated with EpiOtic advance and Pyoclean Oto.

	Day 0	Day 7	Day 14
ERYTHEMA			
EpiOtic Advance	1.87	1.62	1.00
Pyo Clean Oto	1.25	1.62	1.50
CHI-SQUARE	1.77	0.0032	0.42
GL	1	1	1
P	0.18	0.95	0.51
THICKENING/ STENOSIS			
EpiOtic Advance	0.50	0.50	0.37
Pyo Clean Oto	0.37	0.75	0.62
CHI-SQUARE	0.23	0.50	0.26
GL	1	1	1
P	0.62	0.47	0.60
ROUGHENING			
EplOtic Advance	0.62	0.62	0.62
Pyo Clean Oto	0.62	0.62	0.62
CHI-SQUARE	0	0.03	0
GL	1	1	1
P	1	0.85	1
EROSION/ ULCERATION			
EpiOtic Advance	0.25	0	0.37
Pyo Clean Oto	0.12	0.25	0.25
CHI-SQUARE	0.38	2.14	0.81
GL	1	1	1
P	0.53	0.14	0.36
EXUDATION			
EpiOtic Advance	2.12	1.87	1.12
Pyo Clean Oto	1.25	1.50	1.12
CHI-SQUARE	3.35	0.44	0
GL	1	1	1
P	0.06	0.50	1
Alpha of 0.05 Kruskal Wallis test			

5. exudate, EPA group presented higher score at the beginning (2.12) and decrease by day 7 (1.87) and 14 (1.12), PYO group had a lower score (1.25) at the beginning, by day 7 increased (1.50) and by day 14 (1.12) decreased without presenting significant difference with EPA group.

Discussion:

Otic products are an important part of general management for otitis externa. With a growing variety of ear cleaners commercially available, an adequate selection may be hard [16]. Topical treatment with ear cleaners is considered a valuable complement in the treatment of canine otitis externa, which involved multi-resistant organisms or protections mechanisms [15]. There are several studies showing the efficacy of some of these ear cleaners. Good activity of Epi-Otic advance® on this research matches the findings of Marrero *et al*., 2017 having a good effect in decreasing the presence of *Malassezia pachydermatis*. In contrast with this research Steen *et al*. 2012 refers that Epi-Otic® used *in vitro* on isolates of dogs with otitis externa, showed an inhibition inconsistent of resistant *Pseudomonas*, nevertheless, on the current research both ear cleaners used of ears with patients of otitis, were effective in reducing bacteria and yeast. On both groups treated with EPA and PYO, a larger decrease of erythema, thickening/ stenosis, roughening, erosion/ulceration was present, although differences were present within 14 days, no statistical differences were obtained from both treatments, these results matches what is reported by Swinney et al. 2011 where EpiOtic® was effective against *S. intermedius, P. aeruginosa, Proteus spp.* and *M. pachydermatis in vitro* and *in vivo*, and improved clinical signs on 16 dogs with otitis externa obtaining negative cultures on 21 of 31 ears. More recently, EpiOtic® Advanced significantly improved clinical signs in 45 dogs and eliminated microorganisms in 68.1%. Ear cleaners are an important part of therapy in patients with otitis externa. Performing a therapeutic plan that combines anti-inflammatory agents, ear cleaners and antimicrobial therapy is an effective way of controlling secondary causes of otitis externa, as well as inflammatory conditions originated from an existing underlying cause, which must be identified, controlled and corrected in order to prevent future relapses or chronic otitis externa. Although the results of both ear commercial products do not show significant statistical differences, it is important to mention that in some of the criteria evaluated each product showed a different therapeutic efficacy. Additionally, despite the fact that no anti-inflammatory therapy was allowed on the study, patients showed a resolution or decrease of clinical signs. Video otoscope imaging allowed to perform a blinded evaluation that decreased detection bias. Although is known that a sole treatment with ear cleaners may not be enough to resolve most of the cases of otitis externa; patients under a sole treatment with these products may provide a clear view about their therapeutic efficacy; and establish a higher value in combined therapies.

Conclusion:

In conclusion, the use of EpiOtic Advance®, Virbac, France and Pyo Clean Oto®, LDCA, France is useful on the treatment of otitis externa in dogs.

Declaration of Interest:

The authors report no conflicts of interest

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