INTRODUCTION

Canine ear disease is a common issue among dogs and represents about 15% of veterinary visits. Ear disease is commonly medically managed by cleaning and use of topical therapy and sometimes systemic therapy. In chronic otitis externa, the quantity of ceruminous glands increases significantly secondary to the inflammatory process. In otitis externa, ear cleaning is frequently performed to maintain normal otic environment, help treat otitis and prevent recurrence in dogs prone to otitis. Effective removal of exudate is fundamental for a successful treatment of otitis externa in dogs. A wide range of ear cleaning preparations and procedures aimed to remove exudates and ceruminous debris has become very popular in veterinary practice. Among other components, most of the commercially available products for routine cleaning contain ceruminolytic agents.

STUDY OBJECTIVE

The objective of the study was to compare the ceruminolytic properties of different commercially available ear cleaners and one new prototype. A previously published in vitro method using a standardized synthetic cerumen that mimics the composition and texture of canine cerumen was used. It allows objective and comparable measure of ceruminolytic activity of ear cleaners.

MATERIAL AND METHODS

A standardized synthetic cerumen (SSC) mimicking the lipidic composition and texture of canine cerumen was prepared. The composition of this cerumen was based on the average composition of natural canine cerumen as described in the literature. Aliquots of approximately 500 mg of melted SSC was weighed and placed into individual 10 x 75 mm polypyrrolene test tubes. Tubes were placed in a vertical position in a test tube rack to allow the melted cerumen to collect homogeneously at the bottom of the tubes. Once the SSC solid and solidified in the tubes, these were weighed and then filled with 2 ml of the tested product. After 20 min incubation in a shaking water bath at 35°C and at a mild agitation of 50 rpm, tubes were removed from the bath and inverted for 1 hour to allow the dispersed SSC and the test product mixture to slide out of the tubes. Tubes and remaining SSC were then weighed to estimate the amount of SSC removed. The cycle of adding tested product, agitaiton, drainage and reweighing was repeated a further three times on each tube simulating consecutive applications of the products. The percentage of SSC removed was then calculated by comparing the initial and final weights of the tubes and SSC. Each of the products was tested in triplicate, by three different operators. Individual results of each replicate were used to calculate the average percentage of removed SSC.

RESULTS

In the present study, the ceruminolytic activity was defined as the weight loss of SSC after consecutive incubation and rinsing of otic preparations (Tests 1 to 4). Ceruminolysis causes disintegration and elimination of cerumen and is so characterized by weight loss. This is represented by a positive value. The negative values indicate impregnation of the product in the SSC without its disintegration and elimination. It is characterized by a weight gain. Results are shown in Table 1. The final percentage of SSC elimination was almost complete for SON (85.3%), whereas the 5 other products showed no evident ceruminolytic activity. For these 5 products, all values were negative, meaning that part of the tested product remained in the tube, but without any detectable action on the cerumen plug. Overall, SON was the most efficacious, reaching an in vitro ceruminolytic activity of 85%. None of the other products displayed any in vitro ceruminolytic activity.

Table 1 – Mean percentage of standardized synthetic cerumen (SSC) removed after each run

<table>
<thead>
<tr>
<th>Product</th>
<th>Number of samples tested</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLE</td>
<td>9</td>
<td>-6.3%</td>
<td>-7.0%</td>
<td>-5.9%</td>
<td>-6.6%</td>
</tr>
<tr>
<td>DOU</td>
<td>9</td>
<td>-9.9%</td>
<td>-13.4%</td>
<td>-14.1%</td>
<td>-15.3%</td>
</tr>
<tr>
<td>EPI</td>
<td>9</td>
<td>-9.5%</td>
<td>-16.2%</td>
<td>-18.4%</td>
<td>-17.8%</td>
</tr>
<tr>
<td>OTC</td>
<td>9</td>
<td>-15.0%</td>
<td>-17.7%</td>
<td>-17.1%</td>
<td>-15.2%</td>
</tr>
<tr>
<td>SON</td>
<td>9</td>
<td>-9.5%</td>
<td>-11.2%</td>
<td>-16.9%</td>
<td>-17.5%</td>
</tr>
</tbody>
</table>

CONCLUSION

Ear cleaning in diseased ears allows to remove debris and purulent material, therefore optimizing penetration and diffusion of topical medication to the deeper parts of the horizontal canal. The results obtained indicate that the ceruminolytic effect of each ear cleaning product is not easily deduced by their composition. This study helps the veterinary to choose the appropriate product based on the ceruminolytic effect. Based on this in vitro synthetic canine cerumen model, the new Vetoquinol prototype “SON” appears to have the most efficient ceruminolytic properties of the 6 tested ear cleaners. In the present study the ceruminolytic effect was based on the calculation of the weight loss of the SSC. Previous studies using a similar methodology were performed. One of the studies limitation is that synthetic canine cerumen doesn’t mimic the composition of cerumen in diseased ear which contains more keratin, inflammatory cells and serum than normal ears. Further studies evaluating the absolute efficacy values, adequately designed in vivo studies, should be performed.

REFERENCES