大韓獸醫學會誌(2009) 第49卷 第1號
Korean J Vet Res(2009) 49(1) : 85~89

Efficacy of aromatherapy for the treatment of otitis externa in dogs

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(Accepted: January 5, 2009)

Abstract : This study examined the therapeutic effects of aromatherapy for the treatment of otitis externa in dogs. Eleven dogs with otitis externa were examined. The control group (5 dogs) was treated with susceptible antibiotics, and the experimental group (6 dogs) was treated with aroma-oil applied topically to the ear canal. The aroma-oil contained 10 ml sweet almond oil, 0.3 ml bergamot oil, 0.2 ml lavender oil, 0.1 ml tea tree oil and 0.1 ml roman chamomile oil. The blended aroma-oil (0.1 ml) was applied to the ear canal twice daily for 2 weeks. The authors examined the changes in the clinical signs, bacterial count in discharges, total WBC count and neutrophil/lymphocyte ratios in the two groups. The bacterial cell counts in the experimental group were significantly lower at one ($p < 0.01$) and two weeks ($p < 0.05$) after treatment than the control group. These results suggest that aromatherapy is an effective and practical treatment for otitis externa in dogs.

Keywords : aromatherapy, canine, essential oil, otitis externa

Introduction

Canine otitis externa is a common disease in small animal clinical practice. Otitis externa is an inflammation of the ear canal with a variety of causes. The causes of otitis externa can be classified into predisposing factors, primary causes and perpetuating factors [5, 12, 14, 18].

Saridomichelakis *et al.* [16] reported etiology of canine otitis externa. Allergic dermatitis (43%), grass awns (12%) and ear mite (7%) were reported to be the most common primary causative factors. *Malassezia* spp. (66%), cocci (38%) and rods (22%) were the secondary causative factors. Ear canal stenosis (38%) and otitis media with tympanic membrane perforation (25%) were the most common perpetuating factors. There are several treatments for otitis externa including cleaning of the ear canal, topical therapy, systemic therapy and surgery [5, 10, 12, 18].

Essential oils are volatile and lipophilic substances that are obtained from plant materials through distillation, mechanical separation, or solvent extraction [1, 17]. The oils are mainly hydrocarbon metabolites of monoterpenes and sesquiterpenes, phenylpropanoids, amino acid and fatty acids [1, 17]. Aromatherapy is the therapeutic use of volatile essential oils to produce a psychological or physiologic response. The oils are administered in a variety of ways: by diffusion or nebulization, massage or topical application and rarely orally [1, 17]. Essential oils have a variety of medical properties. In particular, they have good antimicrobial activity. The use of aromatherapy in veterinary medicine is largely unexplored. The clinical indications for essential oil prescriptions in animals have not been characterized [1, 17].

Due to the misuse or abuse of antibiotics and the increase in antibiotics-resistant bacteria, there has been increasing interest in complementary and alternative medicines, such as aromatherapy.

In veterinary medicine, the therapeutic effects of aromatherapy have been investigated in dogs with travel-induced excitement [21], prostatic abscess [7] and dermatitis [4, 13, 15, 22]. However, there are no reports on the therapeutic effects of aromatherapy on otitis externa in dogs.

The aim of this study was to establish the therapeutic effect of aromatherapy for otitis externa in dogs.

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Materials and Methods

Animals

Eleven dogs (seven males and four females; age: 1 to 4 years; weight: 2.8 to 5 kg) that presented with otitis externa were examined in this study. The dogs were privately owned by 11 different owners and were living indoors. This study was performed under the owner's consent. The dogs were divided randomly into the control group (antibiotics treatment: five dogs) and experimental group (aromatherapy: six dogs).

Treatment

The control group was medicated with amoxicillin-clavulanic acid 12.5 mg/kg (Clabulo duo syr; Il yang Pharm, Korea), ciprofloxacin 15 mg/kg (Prodin; Cellat Pharm Korea, Korea) and ketoconazole 10 mg/kg (Kaszol; Cellat Pharm Korea, Korea) according to the results of the antibiotics sensitivity test and bacterial isolation. The experimental group was treated with a blended aroma-oil using a modification of the method reported by Bell [1]. The aroma-oil was blended formulas follows: 10 ml base oil (sweet almond, Mandelol bio; Neumond, Germany), 0.3 ml bergamot (*Citrus bergamia*, Bergamotte bio; Neumond, Germany), 0.2 ml lavender (*Lavandula angustifolia*, Lavendel fein bio; Neumond, Germany), 0.1 ml tea tree (*Melaleuca alternifolia*, Tea Tree Oil; TP Health, Australia), and 0.1 ml roman chamomile (*Anthemis nobilis*, Kamille romisch bio; Neumond, Germany). The blended aroma-oil (0.1 ml) was applied to the ear canal twice daily for 2 weeks. The ear canals of all dogs were cleaned once in two days using normal saline.

Bacterial isolation

The samples for bacterial isolation were collected from the vertical ear canal of all dogs before treatment. All the bacterial strains obtained in this study were isolated and identified using the standard method and VITEC identification system (Biomeriux, France).

Total bacterial cell count

The bacteria isolated from the sample were suspended in 1 ml PBS. One hundred μl was then spread over BHI (brain heart infusion) agar, and incubated at 37°C for 48 h. The total bacterial colony forming units (CFU) were counted before treatment, as well as 1 and 2 weeks after treatment.

Clinical score

Seven clinical and otoscopic signs (pruritus, cerumen, redness, swelling, heat, pain and odor) were chosen to score the calculation elements. Each element was divided into several phases (0; no or little, 1; mild or slight, 2; moderate, 3; severe). These element phases were added and a score of 21 was considered a perfect score. The changes in the clinical scores in this study were recorded before treatment, as well as 1 and 2 weeks after treatment.

Blood analysis

Blood samples were collected from the cephalic vein by venipuncture. The total WBC counts and neutrophil/lymphocyte (N/L) ratios were determined using an automatic cell counter (MS9-5V; Melet Schloesing Laboratories, France). Blood analysis was determined prior to treatment, as well as at 1 and 2 weeks after treatment.

Statistical analysis

The statistical significance between the groups were analyzed using Mann-Whitney U of SPSS 12.0 K for window ($p < 0.01$, $p < 0.05$).

Results

Bacterial distribution

The distribution of the bacterial isolates obtained from the otitic dogs was *Malassezia* spp. and *Staphylococcus* spp. (5/11), *Staphylococcus* spp. and *Streptococcus* spp. (2/11), *Pseudomonas* spp. (2/11), *Staphylococcus* spp. (1/11) and *Staphylococcus* spp. and *Pseudomonas* spp. (1/11).

The change of bacterial cell count

The control group showed a slightly decreasing bacterial replication rate after treatment with the susceptible antibiotics (before: 5.7 ± 0.51, 1 week: 3.4 ± 0.58 and 2 weeks: 1.3 ± 0.47 log CFU/ml). However, the experimental group showed a dramatically decreasing bacterial replication rate (before: 6.1 ± 0.82, 1 week: 1.4 ± 1.30 and 2 weeks: 0.4 ± 0.59 log CFU/ml). The bacterial cell counts in the experimental group decreased significantly at one ($p < 0.01$) and two weeks ($p < 0.05$) after treatment compared with the control (Table 1).

Clinical score

The clinical and otoscopic signs improved significantly

Table 1. The change of bacterial cell counts in control and experimental group

Group	Days after treatment		
	Pre	1 week	2 weeks
Control	5.7 ± 0.51	3.4 ± 0.58	1.3 ± 0.47
Experimental	6.1 ± 0.82	1.4 ± 1.30*	0.4 ± 0.59†

Results are shown as the mean ± SD values. *Significant difference between control and experimental group ($p < 0.01$). †Significant difference between control and experimental group ($p < 0.05$).

Table 2. The change of clinical signs in control and experimental group

Group	Days after treatment		
	Pre	1 week	2 weeks
Control	19.4 ± 1.95	2.6 ± 1.14	1.0 ± 0.71
Experimental	17.8 ± 1.72	1.8 ± 1.47	0.7 ± 0.52

Results are shown as the mean ± SD values.

Table 3. The change of total WBC counts in control and experimental group

Group	Days after treatment		
	Pre	1 week	2 weeks
Control	12.0 ± 2.46	12.6 ± 2.54	12.0 ± 1.91
Experimental	10.6 ± 1.75	9.1 ± 1.68*	10.8 ± 2.84

Results are shown as the mean ± SD values. *Significant difference between control and experimental group ($p < 0.05$).

Table 4. The change of neutrophil/lymphocyte ratios in control and experimental group

Group	Days after treatment		
	Pre	1 week	2 weeks
Control	2.8 ± 1.16	3.7 ± 1.67	3.0 ± 0.46
Experimental	3.3 ± 1.34	2.7 ± 1.15	2.1 ± 0.76*

Results are shown as the mean ± SD values. *Significant difference between control and experimental group ($p < 0.05$).

after the 2-week treatment in the control and experimental groups. There were no significant differences in changes in the clinical scores between the control and experimental groups (Table 2).

Total WBC counts and N/L ratios

The total WBC counts and N/L ratios were measured using a blood cell counter analyzer. There was a significant difference in the change in total WBC counts between the control and experimental group at 1 week after treatment ($p < 0.05$) (Table 3). There was a significant difference in the changes in the N/L ratios between the control and experimental group 2 weeks after treatment ($p < 0.05$) (Table 4).

Discussion

In this study, a topical blended aroma-oil drop was effective in treating otitis externa. The clinical signs improved significantly after a 2-week treatment in the aroma-oil and antibiotics treatment groups. The bacterial cell count in the aroma-oil group decreased significantly after the 2-week treatment.

Sweet almond oil was used as the base oil in this study. This oil is a lightweight, odorless base oil that contains high concentrations of vitamin A and E. In addition, sweet almond oil is an excellent moisturizer and skin penetrator [1]. Lavender oil is used as an antidepressant and tranquilizer. Wells reported that aromatherapy in the form of a diffused lavender odor can offer a practical alternative treatment for travel-induced excitement in dogs [21]. It is also helpful in treating inflammatory skin disease or lesions [17, 21].

Linalool is the major pharmacologically active constituent involved in the anti-anxiety effect of lavender oil [19]. In postoperative lavender oil aromatherapy, patients in the lavender application group showed a higher level of satisfaction with pain control than patients in the no lavender application group [8].

Bergamot oil has strong antifungal effects. Bergamot oil is active *in vitro* against several common species of dermatophytes, and its potential use in the topical treatment of dermatophytosis has been suggested [15].

Tea tree oil has anti-fungal and antibacterial effects. Farnan *et al.* reported that 71 percent of bacteria and yeast involved in otitis externa in humans are susceptible to oil containing 2% or less tea tree oil [3]. However, tea tree oil toxicosis has been reported when the oil was applied topically at inappropriately high doses to dogs and cats for dermatologic conditions. The toxicological signs are depression, weakness, incoordination, and muscle tremors [20]. In addition, Zhang *et al.* [23] reported that high concentrations of tea tree oil applied to the round window for a relatively short time was ototoxic to the high-frequency region of the cochlea in guinea pigs.

In this study, low concentrations of tea tree oil were used to avoid the abovementioned toxicosis. Kawakami *et al*. [7] reported that the treatment of prostatic abscesses by the aspiration of the purulent matter and the injection of tea tree oil into the cavities was quite effective in dogs. Reichling *et al*. [13] reported the therapeutic effect of topical tea tree oil in canine localized pruritic dermatitis without adverse effects. In other studies, treatment with oil of basil or essential oil components cured or healed 56%-81% of rats infected with *Haemophilus influenzae* and 6%-75% of rats infected with *Pneumococci*, compared with 5.6%-6% of rats in the placebo group. Essential oils or their components placed in the ear canal can provide an effective treatment for acute otitis media [9].

Some studies reported antibiotic resistance of otitis externa in dogs. Lilenbaum *et al*. [11] reported antibiotics resistance with 90.9% of isolates showing resistance to at least one drug, and resistance to three or more drugs was a common finding. On the other hand, the most frequently reported resistance to antibiotics was penicillin (69%) followed by ampicillin (65%) in coagulase-positive *Staphylococci*. In addition, the rates of resistance was approximately 13% in coagulase-negative *Staphylococci* [6]. Similar antibiotic resistance was observed in this study. Among the 13 antibiotics disks tested, at least one or six bacterial species showed resistance to antibiotics. In particular, more than 50% of bacteria isolated from dogs showed resistance to cefazolin and neomycin. Moreover, *Staphylococcus* spp. is quite sensitive to cefazolin, and neomycin is a common ingredient in topical products for otitis externa [2]. The incidence of antibiotic resistance has increased in otitis externa as well as in other diseases, and is a difficult problem to resolve in animal welfare.

Therefore, this study examined the efficacy of aromatherapy for the treatment of canine otitis externa. The clinical signs of the dogs were improved remarkably by aromatherapy. No adverse reactions, such as depression, weakness and muscle tremor, were observed during the present study. The bacterial cell counts in the aromatherapy group decreased significantly at 1 week ($p < 0.01$) and 2 weeks ($p < 0.05$) after treatment compared with the antibiotics treatment group.

One limitation of this study was the small number of dogs used. Therefore, further studies will be needed to confirm these results and evaluate the safety of aromatherapy.

In conclusion, aromatherapy is an effective treatment and may be an alternative treatment for otitis externa in dogs.

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