

Comparison of Acupuncture with Dog-Appeasing Pheromone (DAP) Application in Separation Anxiety of Hospitalized Dogs

Young Mee Kim¹, Byeong Teck Kang¹, Su Hyun Gu¹,
Jong Hyun Yoo², Chul Park³, Dong In Jung¹, Hyo Won Jeon¹,
Dae Hyun Hahm³ and Hee Myung Park^{1*}

¹Department of Veterinary Internal Medicine and ²BK21 Program of Integrative Network Systems for Veterinarians in Basic Science, Industrial Animals and Preventive Medicines, College of Veterinary Medicine, Konkuk University, Seoul 143-701, ³Acupuncture & Meridian Science Research Center, Kyunghee University, Yongin 446-701, Korea

ABSTRACT

To evaluate the efficacy of acupuncture and synthetic Dog-Appeasing Pheromone (DAP) for the treatment of separation anxiety caused by hospitalization, 25 hospitalized dogs were examined. DAP was delivered with an electrically heated diffuser. Acupuncture was performed at the 2 proper positions, 'shen men', on the ear skin known as relating sedative effect. For the baseline assessments, clinical signs of separation anxiety were examined on the first day of hospitalization. These were regularly checked with the intervals of 8 hours and repeated until the day of discharge. By comparing with baseline and final assessments, the efficacy of acupuncture and DAP was evaluated. Separation induced problems were decreased in both treatment groups, and the efficacy was slightly higher in acupuncture treatment. However, the differences of the efficacy of two treatments were not statistically significant. In conclusion, acupuncture and DAP were all effective to decrease separation anxieties. Thus, acupuncture as well as DAP could be improving the welfare of dogs which are hospitalized.

Key words: acupuncture, dog, dog-appeasing pheromone (DAP), separation anxiety

INTRODUCTION

Separation anxiety probably results from the social nature of domesticated dogs and their emotional attachment to humans (Borchelt and Voith, 1982). When dogs are separated from their owners

due to hospitalization, dogs may experience distress and behavior problems related to the anxiety of separation (Pageat and Gaultier, 2003; Mills, 2005). These undesirable behaviors include 'destruction', 'vocalization', 'elimination of urine and/or stool', 'anorexia', 'hypersalivation', 'attempts at escape', 'pacing', 'self-mutilation', 'trembling', and 'depression'.

Hospitalized dogs may experience distress of separation and involve the separation induced be-

*To whom correspondence should be addressed.
TEL: 82-2-450-4140, FAX: 82-2-450-3037
e-mail: parkhee@konkuk.ac.kr

havior problems. Medication is commonly applied but it too may fail to provide a satisfactory outcome (Hewson et al., 1998; King et al., 2000). For example, clomipramine hydrochloride, a tricyclic antidepressant may be prescribed as a reference treatment, but this drug has the specific contraindications in the administration and the possibility of side effects, making them unsuitable and unacceptable for some hospitalized dogs with any other drugs concurrently (Podberscek et al., 1999; Seksel and Lindeman 2001; Gaultier et al., 2005).

Dog-Appeasing Pheromone (DAP) is synthetic mixture of simple compounds which have been produced from the secretions of the sebaceous glands in inter-mammary sulcus of bitches shortly after parturition (Tod et al., 2005). The level of production of appeasing pheromone increases very quickly just after the parturition and lasts during feeding (Pageat and Gaultier, 2003; Mills, 2005). Pheromonotherapy with DAP is getting attention in veterinary treatment and behavior modification clinics in these days, and it is adjusting treatment for canine behavior problems such as separation anxiety, stress on novel environments, phobia, anxiety induced aggression, and hyperattachment in dogs (Gaultier and Pageat, 2003; Sheppard and Mills, 2003; Mills and Hargrave, 2004).

Acupuncture is said to stimulate the vital force within the animal to bring about homeostasis and healing. Acupuncture involves piercing predetermined acupuncture points known as acupuncture points with slender needles (Panzer and Chrisman, 1994; Landsberg et al., 2003). Needling of acupuncture points is intended to recover balance along the lines of energy called meridians. It is said to lead to alteration in neurotransmitter pathways. Brain mapping studies have revealed correlation between acupuncture point stimulation and cortical activation (Landsberg et al., 2003). Although the primary indication for acupuncture might be known as pain management, it has also been reported to be effective in the treatment of respiratory, neurological, and gastrointestinal abnormal conditions, behavior problems such as aggression, anxiety, behavioral anorexia, depression, and compulsive disorders such as acral lick dermatitis system. Therefore, acupuncture comes into the spotlight as a faster and more effective form of therapy. There

are no controlled studies to show improvement of behavior problems with acupuncture (Landsberg et al., 2003).

The purpose of this study is to identify the usefulness and efficacy of acupuncture and DAP for the treatment of separation anxiety behavior problems in hospitalized dogs.

MATERIALS AND METHODS

Recruitment of dogs

Twenty five dogs were hospitalized in a veterinary medical teaching hospital and evaluated for behavioral examination. The dogs with abnormal mental status, like depression, stupor, and coma, were excluded from the study. The periods of hospitalization varied to each dog. Gender, breed, age, and medical problem of 25 dogs were evaluated.

Treatment methods

All dogs were assigned to 2 treatment groups with 13 dogs in acupuncture group and with 12 dogs in DAP group. DAP group was treated with synthetic DAP (DAP[®], CEVA Sante Animale, France). It was administered through a reservoir type electrical diffuser, containing 30 ± 0.2 g of a 2% solution of the synthetic pheromone in paraffin oil (Fig. 1). The plug-in diffuser continuously released appeasing pheromone into the hospital room (Fig. 2). Each plug-in is capable of infusing a 650-square-foot area.

Acupuncture was performed piercing the inside of



Fig. 1. Device of dog appeasing pheromone (DAP).

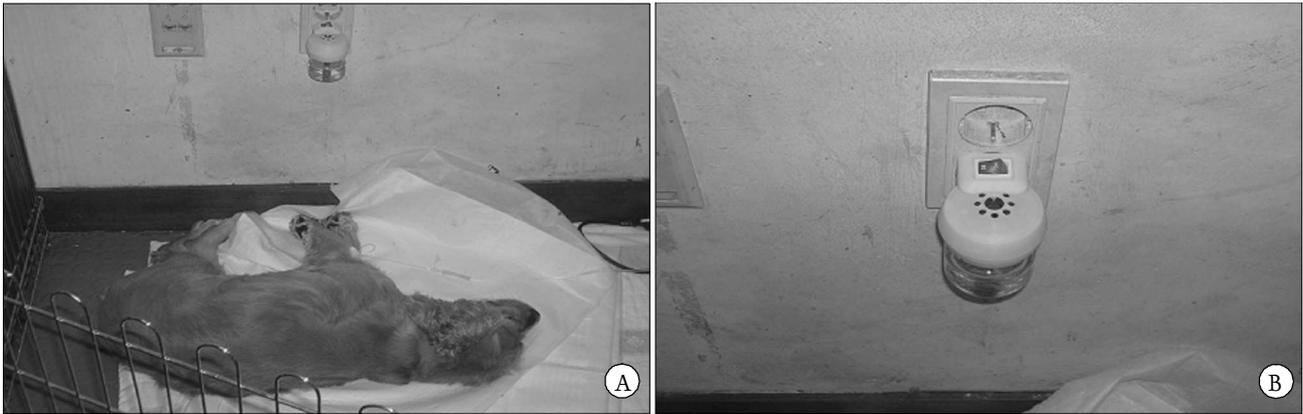


Fig. 2. Photographs of application of Dog Appeasing Pheromone in hospitalized dogs.

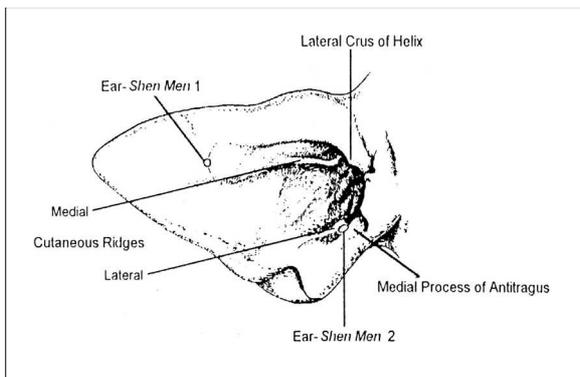


Fig. 3. Acupuncture points known as sedative effects.

ear skin with slender needles at two predetermined acupuncture points that are known as sedative effect (Fig. 3). The press-Needles (Korea Animal Acupuncture, Korea) were inserted 1~2 mm under the skin at 2 bilateral auricular points, 'shen men' on the ear. The first 'shen men' is located at the midpoint of a natural crease that occurs on the scapha when the pinna is folded backward. The second 'shen men' is located between the medial process of the antitragus and the lateral cutaneous ridge, where these structures meet (Fig. 4).

Two treatment rooms were separated each other to avoid diffusing DAP pheromone to the Acupuncture treatment group. The application was maintained for a mean period of 2 days, ranged from 2 to 3 days.

Base line assessment of separation anxiety disorder was evaluated on the first day of hospitalization. These measures were repeated until the final assessment on the day of discharge. Each

dog was checked 3 times every 8 hours interval during a day at 9:00 am., 5:00 pm., and 1:00 am. Each evaluation was performed during 55 minutes (5 minutes per clinical sign). Change assessment was evaluated by comparison with base line assessment and final assessment for the degree of efficacy.

The investigator provided the following information about dogs' responses to separation anxiety related problems during the period of two treatments manipulated. A score of each behavioral sign on a five-point 'change scale' was used to make the numerical value of the treatments with 'much worse' -2, 'slightly worse' -1, 'same' 0, 'slightly better' 1, 'much better' 2. The scores of 'change scale' were rated by comparison of the scores with each base line and final assessment. The 11 behavior problems related to separation anxiety examined in this study are summarized in Table 1 (Mills, 2003; Gaultier et al., 2005).

Assessment of behaviors related to separation anxiety

The frequency and severity of behavior problems were rated with a 4 point scale (Gaultier et al., 2005); 0 - 'none', 1 - 'mild', 2 - 'moderate', 3 - 'severe'. 'None' identifies the total absence of the clinical signs. 'Mild' is based on a little change in the frequency and severity of the behavior. 'Moderate' is based on more changes in the frequency and severity of the behavior, and 'Severe' defines the continuance of the signs. In the assessment of each behavior, it was impossible to apply the same

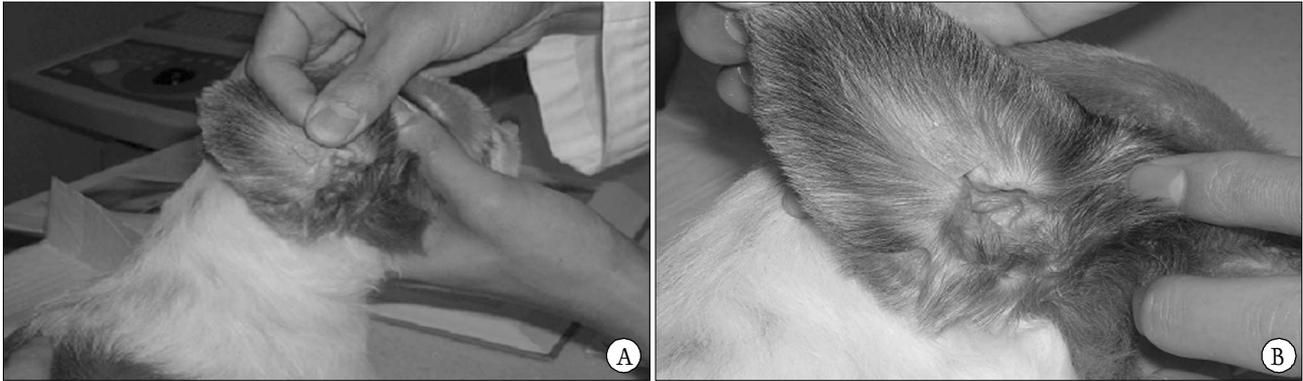


Fig. 4. Photographs of acupuncture manipulation in hospitalized dogs showing separation anxiety.

Table 1. Clinical signs of behavioral problems related to separation anxiety

No.	Clinical signs
1	Destruction (digging / scratching / chewing objects)
2	Vocalization (whine / barking / howling)
3	Elimination (urination / defecation)
4	Sleeping problems (vigilance)
5	Excessive licking
6	Feeding / drinking / problems (anorexia)
7	Gastrointestinal problems (vomit / diarrhea)
8	Hypersalivation
9	Shaking (trembling)
10	Restlessness (pacing)
11	Aggression (growling / snap / bite)

frequency and severity levels because of each specific behavioral character. Therefore, 11 behaviors in assessment checklist had each own assessment standard in the change of the frequency and severity of the behaviors.

RESULTS

Demographic characteristics and baseline data

Totally 25 hospitalized dogs were recruited onto the study through the hospitalization. In the acupuncture group, the average age of 13 dogs was 6.8 years and composed of 11 pure and 2 mixed breeds. Sex distribution was 6 male dogs with 3 neutered, and 7 intact females. In the DAP group, the mean age of 12 dogs was 6.3 years old, and composed of 9 pure breeds and 3 mixed dogs. Sex distribution was 3 males with 2 neutered and 9 intact female. There were no significant breed and sex specific differences between 2 groups.

The frequencies of the separation anxiety behaviors shown by the 25 dogs which adhered to full protocol are illustrated as follows. The most common signs included in order 'vocalization' (10, 19%), 'elimination' (8, 15%), 'feeding/drinking' (8, 15%), 'restlessness' (6, 11%), 'destruction' (6, 11%), 'sleeping' (3, 5%), 'excessive licking' (4, 7%), 'gastrointestinal problem' (4, 7%), 'hypersalivation' (3, 5%), 'aggression' (2, 4%), and 'shaking' (0, 0%).

Most of the signs were well balanced between 2 groups except for 'restlessness' and 'hypersalivation'. There were significantly more dogs in the DAP treatment group with 'restlessness', and more dogs in the acupuncture treatment group with 'hypersalivation'. In each group, the dogs of acupuncture treatment showed 27 separation anxiety behaviors and the dogs of DAP treatment also showed 27 separation anxiety behaviors.

Five of the 11 behavioral signs had a mean frequency rating of over 4.9 at the baseline assessment, indicating that almost half of the dogs with 68% displayed these signs in response to hospitalization. In contrast, 'shaking', 'aggression', 'hypersalivation', and 'sleeping' were rarely shown.

The numbers of separation anxiety exhibited by each dog had precise variation from 0 to 5. Especially one of dog in acupuncture group manifested even 5 and each sign was rated over 'moderate'. In the Acupuncture group, average numbers of the signs was 2 and in the DAP group, it was 2.2 (Table 2).

Assessment of efficacy between 2 treatments

These 2 assessments were indicating that the

Table 2. Numbers of behavior signs of dogs exhibited in 2 treatments before therapy

Dogs	Acupuncture (n=13)	DAP (n=12)
1	1	3
2	2	2
3	3	3
4	3	2
5	1	4
6	2	2
7	2	0
8	5	2
9	0	4
10	1	3
11	0	2
12	5	0
13	2	
Total	27	27
Mean	2.0	2.2
Range	0~5	0~4

Table 3. Change assessments of each behavioral signs dogs exhibited in acupuncture treatment group

Clinical signs	MW	SW	S	SB	MB
1. Destruction			1	1	
2. Vocalization			3	2	
3. Elimination	1	1		1	
4. Sleeping	1	1			
5. Excessive licking				2	
6. Feeding / drinking problems		1	2	1	1
7. Gastrointestinal problems			1	2	
8. Hypersalivation				2	1
9. Shaking					
10. Restlessness			1		
11. Aggression				1	
Total	2	3	8	12	2

MW: much worse, SW: slightly worse, S: the same, SB: slightly better, MB: much better

acupuncture treatment was slightly superior to the DAP treatment. However, significant differences were not found between 2 groups. Change assessments of each behavioral signs dogs exhibited in both treatment groups were summarized in Table 3 and 4.

At the final assessment, there was generally decrease in the mean change scores for 10 of the 11 behavioral signs that were examined, and the decrease was significant for the following behavioral signs. ‘Destruction’, ‘excessive licking’, ‘aggression’ and ‘hypersalivation’ in acupuncture treatment greatly reduced while the DAP treatment group showed decrease in ‘elimination problem’ and

Table 4. Change assessments of each behavioral signs in dogs exhibited in DAP treatment group

Clinical signs	MW	SW	S	SB	MB
1. Destruction		1	1	2	
2. Vocalization	1	2	2		
3. Elimination		1	1	1	2
4. Sleeping		1			
5. Excessive licking	1			2	
6. Feeding /drinking problems		1		1	1
7. Gastrointestinal problems	1				
8. Hypersalivation					
9. Shaking					
10. Restlessness		1		3	
11. Aggression		1			
Total	3	8	4	9	3

MW: much worse, SW: slightly worse, S: the same, SB: slightly better, MB: much better

Table 5. Change scores of each dog exhibited in acupuncture and DAP groups after therapy

Clinical signs	Acupuncture change scores	DAP change scores
1. Destruction	1, 1, 0	-1, 1, 1, 0
2. Vocalization	0, 1, 0, 1, 0	-1, 0, -2, 0, -1
3. Elimination	1, -1, -2	2, 2, 1, 0, -1
4. Sleeping problems	-1, -2	-1
5. Excessive licking	1	-2, 1, 1
6. Feeding/drinking problems	-1, 0, 2, 1, 0	2, -1, 1
7. Gastrointestinal problems	0, 1, 1	-1
8. Hyper salivation	1, 2, 1	
9. Shaking	0	
10. Restlessness		1, 1, 1, -1
11. Aggression	1	-1

‘restlessness’, which means DAP treatment was relatively effective. In the Acupuncture group, ‘restlessness’ was showed no change, and ‘sleeping problems’ was precisely deteriorated as average change score -1.5. In the DAP group, ‘sleeping problem’ and ‘gastrointestinal problem’ were shown deterioration as -1 (Table 5). The changes observed in the other behavioral signs were more variable.

At overall change, in the response of 2 behavior problems with ‘sleeping problems’ and ‘elimination’ were reported a lower overall rating than those at the baseline assessment in acupuncture treatment group and 2 of behavior signs with ‘elimination’, ‘restlessness’ were ameliorated the separation anxiety signs in DAP treatment group (Table 5).

DISCUSSION

The results of this study indicate that acupuncture treatment can relatively reduce the undesirable behaviors exhibited by hospitalized dogs suffering from separation anxiety problems in comparison with the DAP treatment. There was a decrease in the main behavioral signs of 'destruction', 'excessive licking', 'hypersalivation', and 'aggression' with acupuncture treatment.

The results produced by DAP were different to those produced by the acupuncture treatment as a controlled group, but although its efficacy appeared to be the relatively different, the treatment with DAP had practical benefits; undesirable effects were reported less frequently in the 3 signs of separation anxiety with 'elimination', 'feeding/drinking problem', and 'restlessness', and the simple form of administration potentially increased the compliance to the overall protocol.

Average treatment period as 2 days was significantly to mean a lack of duration for inducing a guarantee of precise assessment. In acupuncture treatment, it is more effective with having over 3 to 4 week treatment period, and in the case of DAP, many of studies were administered for over 1 month manifestation for the precise efficacy (Landsberg et al., 2003; Mills, 2003; Gaultier et al., 2005).

There was no design feature which was applied to the previous study, and then the scales of severity and frequency of the behaviors, the scales of daily process assessment, and the scales of change assessment were all created by the author. Hence, it seems relatively subjective for inducing precise validation with perception of behavior problems and statistical assessment.

In this study, all of the behavioral signs were assessed by only one investigator. That was also adhered the deficiency of objective assessment of the results. Many of the studies related the behavior problems recommended that the behavioral signs should be identified by over five of the experienced experts of canine behavior. Unless it is satisfied with over three common perceptions, it is ignored (Mills et al., 2003; Gaultier et al., 2005).

The lack of a placebo control means that some caution was required in the interpretation of these results, but it does not invalidate the results (Mills

et al., 2003). Throughout the study, the investigator kept daily process assessment records of their dog's exposure to hospitalization and their behavioral responses suggesting greater objectivity in the final frequency scores. However, the observed responses to 2 treatments suggest that these have potential value, rather than provide a precise measure of its efficacy (Mills et al., 2003).

A double blind, controlled trial would be required as a previous study for each 2 potential benefits, but would not be possible in clinical practice under administration of acupuncture (Mills et al., 2003). Because of it, were reported significantly different change assessment scores of some behavioral signs of each group (Taylor and Mills, 2005). It is impossible to identify that which treatment is more effective precisely. For instance, in 'vocalization', the group of acupuncture treatment showed slightly under 'slightly better' as average change score +0.4, while DAP group was reported 'slightly worse' as -1. The opposite result was identified as -0.6 change score of acupuncture group, +0.8 of 'elimination' in DAP and in 'aggression', 1 with Acupuncture, -1 with DAP. Pheromonatherapy with DAP and acupuncture seem to be a new therapeutic approach allowing practitioners for the treatment of behavioral disorders in because of a natural, specific, and safe way. Although the efficacy of pheromones and acupuncture has been assessed in specific behavioral problem with separation anxiety, it seems that their range of action could cover the wide field of reduction of distress; phobia and anxiety induced behavioral problem signs. Therefore, the use of pheromones with DAP and acupuncture should be included in a strategy of improving the welfare of pets in veterinary hospitals during examination and hospitalization. Moreover, further studies may allow the veterinary practitioner to use pheromone analogues or acupuncture in the field of diagnostics to determine the behavioral status of a pet. Pheromonatherapy and Acupuncture are at its beginning, and the use of pheromones and acupuncture could be applied in various fields of medicine is heartening.

CONCLUSION

This is the first controlled study of the use of

DAP and acupuncture together in the treatment of dogs with separation anxiety problems in hospitalized dogs. The results showed that these 2 treatments reduced many of the problem signs.

Furthermore, the pheromone and acupuncture did not appear to induce the commonly reported undesirable side effects inherent in the use of drugs, and their convenient form of administration increase the likelihood of the compliance.

Neither toxicity nor side effects were not significantly observed in the use of DAP and acupuncture, which makes them particularly beneficial to sick or aged pets and allows for their safe use alone or in combination with psychotropic drugs.

REFERENCES

- Borchelt PL and Voith VL (1982) Classification of animal behavior problems. *Vet Clin North Am Small Anim Pract* 12:571-585.
- Gaultier E, Bonnaïfous L, Bougrat L, Lafont C and Pageat P (2005) Comparison of the efficacy of a synthetic dog-appeasing pheromone with cbm ipram ine for the treatment of separation-related disorders in dogs. *Vet Rec* 156:533-538.
- Gaultier E and Pageat P (2003) Effects of a synthetic dog appeasing pheromone (DAP) on behavior problems during transport. In: *Proceedings of the 4th International Behavior Meeting, Cabundra, Australia*. Post Graduate Foundation in Veterinary Science, Sydney. pp 33-35.
- Hewson CJ, Luescher UA, Parent JM, Conbn PD and Ball RO (1998) Efficacy of cbm ipram ine in the treatment of canine compulsive disorder. *J Am vet Med Assoc* 213: 1760-1766.
- King JN, Simpson BS, Overall KL, Appleby D, Pageat P and Ross C (2000) Treatment of separation anxiety in dogs with cbm ipram ine: results from a prospective, randomized, double-blind, placebo-controlled, parallel-group, multicenter clinical trial. *Appl Anim Behav Sci* 67:255-275.
- Landsberg G, Hunthausen W and Ackeman L (2003) Feeding and diet-related problems. In: *Handbook of behavior problems of the dog and cat*. Saunders, Philadelphia. pp 154-165.
- Mills DS (2005) Pheromonotherapy: theory and applications. *In Pract* 27:248-255.
- Mills DS, Estelles MG, Colshaw PH and Shorthouse C (2003) Retrospective analysis of the treatment of firework fears in dogs. *Vet Rec* 153:561-562
- Mills DS and Hargrave C (2004) Dog appeasing pheromone reduces the anxiety of aggressive dogs in the veterinary practice. In: *American Veterinary Society of Animal Behavior Proceedings*. Saunders, Philadelphia. pp 6-7.
- Pageat P and Gaultier E (2003) Current research in canine and feline pheromones. *Vet Clin North Am Small Anim Pract* 33:187-211.
- Panzer RB and Christian CL (1994) An auricular acupuncture treatment of idiopathic canine epilepsy a preliminary report. *Am J Chin Med* 22:11-17.
- Podberscek AL, Hsu Y and Serpell JA (1999) Evaluation of cbm ipram ine as an adjunct to behavioral therapy in the treatment of separation-related problems in dogs. *Vet Rec* 145:365-369.
- Seksel K and Lindeman MJ (2001) Use of cbm ipram in in treatment of obsessive-compulsive disorder, separation anxiety and noise phobia in dogs: a preliminary, clinical study. *Aust Vet J* 79:252-256.
- Sheppard G and Mills DS (2003) Evaluation of dog-appeasing pheromone as a potential treatment for dogs fearful of fireworks. *Vet Rec* 153:432-436.
- Taybr K and Mills DS (2005) The control of puppy (canis familiaris) disturbance of owners at night. In: *Current issues and research in veterinary behavioral medicine*. Purdue University Press, Indiana. pp 27-30.
- Tod E, Brander D and Wran N (2005) Efficacy of a dog appeasing pheromone in reducing stress and fear related behavior in shelter dogs. *Appl Anim Behav Sci* 93: 295-308.