ELSEVIER

Applied Animal Behaviour Science 79 (2002) 53–61

APPLIED ANIMAL BEHAVIOUR SCIENCE

www.elsevier.com/locate/applanim

Comparison of dogs' reactions to four different head collars

L.I. Haug[a,*], B.V. Beaver[a], M.T. Longnecker[b]

[a]*Department of Small Animal Medicine and Surgery, College of Veterinary Medicine, College Station, TX 77843-4474, USA*

[b]*Department of Statistics, Texas A&M University, College Station, TX 77843-3143, USA*

Accepted 8 July 2002

Abstract

Head collars are widely used in canine behavior modification programs. Owner compliance is crucial for success and depends in part on the dog's acceptance of the product. The responses of 12 dogs to four different head collars were compared in a crossover design over four 10 min sessions each spaced 2 weeks apart. All dogs were naïve to head collars and were free of overt behavioral abnormalities. Dogs wore the collars only during testing sessions. Observed behaviors were divided into two groups. Group 1 included pawing, pawing nose, biting/pawing leash, opening mouth, rubbing face, and shaking head. Group 2 included rearing up, balking, rushing forward, and rolling on ground. No statistical difference was observed between dogs' reactions to the head collar types; although, there was a trend toward increased reactions to the Snoot Loop® and Response® collar during the first session. Dogs did show a marked reduction in overall reactions to the head collars over time. By Session 4 there was a significant decrease in behavioral scores as compared to Session 1. Based on this study, there does not appear to be an increased acceptance of one head collar type over another.

Keywords: Dog; Head collar; Client compliance; Behavior modification; Training

1. Introduction

Head collars increasingly are being used as part of a comprehensive behavior modification program, particularly for dogs that are unruly, anxious, or aggressive. Head collars also are becoming more readily available in retail outlets and many dog owners are purchasing

* Corresponding author. Tel.: +1-979-845-2351; fax: +1-979-862-1039.
E-mail address: lhaug@cvm.tamu.edu (L.I. Haug).

0168-1591/02/$ – see front matter
PII: S0168-1591(02)00115-6

and using them for basic training and control. By controlling the animal's head, the owner can manipulate the rest of the animal's body in a more efficient fashion. Additionally, these collars are alleged to work by mimicking natural dominance behaviors thereby increasing deference and obedience to the owner (Overall, 1997; Ogburn et al., 1998). Trainers and behaviorists often have preferences for which type they use, some anecdotally professing that dogs are more tolerant of a particular type. However, no studies have assessed the validity of these statements. A recent study compared physiologic and behavioral responses in dogs wearing a head collar or a regular nylon buckle collar (Ogburn et al., 1998). Although no differences were observed in physiologic parameters, dogs did show different behavioral responses to the collar types. Personal observation indicates that it is not uncommon for dogs to paw at and rub their faces while wearing head collars. Some dogs react quite violently with pawing, head shaking, exaggerated mouth opening, and leash biting when the head collars are first applied. Some owners become distressed when their dog reacts negatively to the collar and may subsequently discontinue the collar's use.

Inadequate compliance is a significant roadblock to successful management and treatment of all forms of health-related issues in both human and veterinary medical fields. Clients are more likely to adhere to treatment recommendations if: they directly observe the hazards associated with a particular problem, they have a realistic assessment of the risk associated with non-compliance, the treatment does not involve significant disruptions in their daily routine, and they are adequately educated as to the process (Liptak, 1996; Joffe, 2000). The success of behavior modification programs depends even more heavily on client compliance due to the nature of the process. Head collars are commonly prescribed by veterinary behaviorists as part of a comprehensive rehabilitation program, so it is important that clients actually use these products. Issues that might cause a client to discontinue use of the head collar include difficulty fitting the product, the dog not permitting application of the product, the product altering the dog's overall activity level resulting in the owner perceiving a change in the dog's personality, and the dog exhibiting behaviors reflecting aversion to the product. Even when clients understand that their pets have significant, and possibly dangerous, behavior problems, they often are reluctant to institute changes that they perceive as unpleasant to the pet. Identifying products that maximize the likelihood of owner compliance may increase response rates to modification programs. This study was designed to observe dogs' reactions to four different commercially available head collars. Additionally, notations were made concerning the fitting of these collars, as owners must be able to first apply and/or reapply the collars without professional supervision.

2. Materials and methods

The four most commonly available head collars were chosen for evaluation in this study. These include the Gentle Leader®, Halti®, Snoot Loop®, and Response® collar (Fig. 1). All head collars have a strap that encircles the dog's neck just behind the skull and another loop that encircles the dog's muzzle just rostral to the eyes as their basic design. The first three collars have a ring under the dog's jaw to which the leash attaches. The Snoot Loop® also has adjustable cheek straps that connect the neck strap and nose loop. The fourth

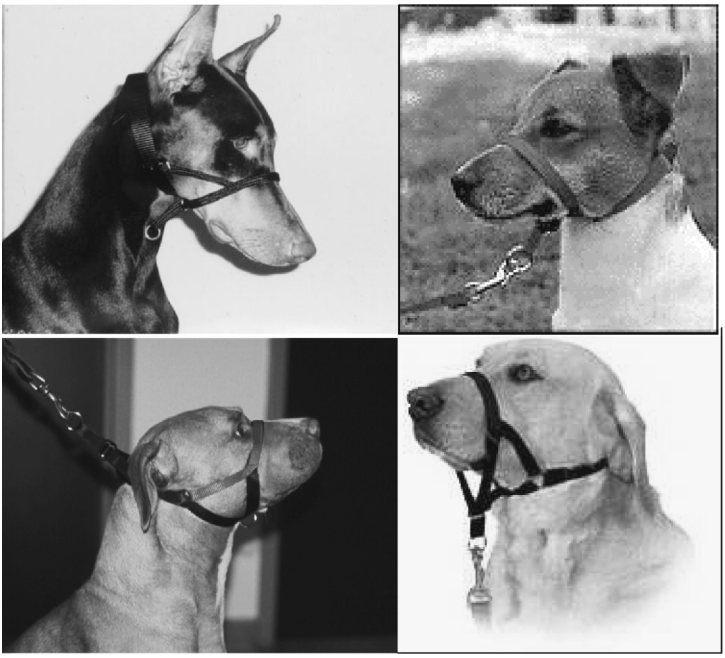

Fig. 1. The four head halters used during the study, clockwise from top left: Snoot Loop®, Gentle Leader®, Halti®, and Response® collar.

collar, the Response® collar, is based on a figure-eight construction connecting the nose loop to the neck strap. Two rings, one at the nape of the dog's neck and one under the jaw, provide alternative places to attach the leash. The manufacturer generally recommends that the leash be attached to the ring at the nape of the dog's neck for basic control while walking.

Twelve privately owned dogs free of overt behavioral abnormalities were used during the study. Training history was not obtained other than to verify that the dogs were familiar with being on leash and were naïve to head collars. There were eight female and four male dogs; all were neutered. The dogs ranged in age from 12 months to 8 years and weighed between 16 and 36 kg. Due to the residential locations of the dogs, they were tested in two groups, one of eight and one of four dogs. The two groups of dogs were tested within 24 h of each other for each session. Tests were conducted outdoors on neutral territory. All dogs were tested in the absence of the owner except for two dogs whose owner served as the videographer for all four sessions.

The experiment was conducted as a crossover design with the four head collars serving as the treatments. Dogs were observed during four sessions under one of four sequences, and there were three dogs per sequence. Three dogs were randomly assigned to each of the four sequences. Each dog was observed under all four head collar types; however, the order in which the dogs wore the head collars was varied according to the designated sequence. The experimental layout is given in Table 1. The sessions were spaced 2 weeks apart to

Table 1
Order of collar treatments per sequence

Sequence	Dogs	Session			
		1	2	3	4
1	1, 2, 3	Gentle Leader®	Snoot Loop®	Response®	Halti®
2	4, 5, 6	Halti®	Gentle Leader®	Snoot Loop®	Response®
3	7, 8, 9	Response®	Halti®	Gentle Leader®	Snoot Loop®
4	10, 11, 12	Snoot Loop®	Response®	Halti®	Gentle Leader®

reduce habituation to the collars. All dogs were fitted and handled by the principle investigator for all sessions. Two dogs were familiar with, although not owned by, the handler. Collars were sized and fitted based on package recommendations.

Each session was conducted in three phases for a total observation time of 10 min. Because the sessions occurred in an unsecured area, all dogs were double leashed for safety. One leash was attached to the appropriate area on the head collar and a second leash was attached to the dog's regular collar. A standard hospital slip lead was used as the second leash if the dog was not wearing a regular collar. No pressure was applied to this second leash at any time during Phases 1 and 2. The dogs were restrained by this second lead only during Phase 3 when the primary leash was removed from the head collar.

Each 10 min session consisted of the following:

Phase 1: A 5 min period where the handler was stationary to assess the dog's reaction to initial application of the head collar. No vocal or physical interaction occurred with the dog during this time. No training or leash manipulations were done other than to prevent the dog from removing the head collar. Gentle upward pressure was applied to the leash if the dog attempted to paw off the noseband; this was released as soon as the dog ceased pawing or rubbing at the collar.

Phase 2: A 2 min walking session. Again the handler did not interact verbally or physically with the dog. The leash was used to prevent forging and encourage the dog to walk within a 4 ft radius of the handler's left side by maintaining gentle tension on the leash when the dog moved beyond this radius.

Phase 3: A 3 min period, where the handler was again stationary, to assess the dog's continued reaction to the collar and the ease of its removal by the dog. Many owners are instructed to leave head collars on their dogs while they are home. Dogs are free to manipulate the head collar at this time. For this reason, the leash was removed from the head collar during this phase and the dog allowed unhampered interaction with the device.

All sessions were videotaped and behavioral observations were scored from the videotapes by the same two observers. The following behavioral events were scored using all occurrences sampling: pawing (pawing motions that did not make contact with the dog's head or the leash), pawing nose, biting/pawing leash, opening mouth (exaggerated opening of the mouth not associated with vocalization or respiration), rubbing face (rubbing face on the ground, the handler or some other environmental object), rearing up (on hind legs), shaking head, rolling on ground (rolling or rubbing the body on the ground), balking (refusing to move with the handler during Phase 2), rushing forward

(lunging or charging forward on leash during Phase 2). Repetitive behavior events were scored as one occurrence until interrupted by any other behavior. Some information will be lost concerning duration of behaviors with this method.

Due to the small number of dogs, related event behaviors were grouped as follows to increase the power of the statistical tests of hypotheses. Group 1 included: pawing, pawing nose, biting/pawing leash, opening mouth, rubbing face, and shaking head. These behaviors were observed in all phases and were associated with the dog directly interacting with the collar. Group 2 included: rearing up, balking, rushing forward, and rolling on ground. These behaviors were observed primarily in Phase 2 and were considered general reactions to the presence of the collar. Behaviors were not analyzed within phases; rather behaviors were totaled across all phases for each group.

The Groups 1 and 2 behavior variables were subjected to an analysis of variance using a general linear mixed model analysis. The model fitted to the data included fixed effects terms for the four head collars, four sessions, and the four sequences in which the dogs wore the head collars. With this type of experiment, a crossover design, it is not possible to test for interactions between sequence, session, and head collar. A random effect term for individual dogs within sequence was included in the model. The statistical significances of the head collar, sequence, and session effects were tested using an F-statistic with the mean square error from the overall model entering as the denominator for testing head collar and session effects. The mean square for dog within sequence is the denominator of the F-statistic for testing sequence effects.

To assess the validity of the necessary conditions of applying the F-test from ANOVA, a residual analysis was performed. The Shapiro–Wilk's test of normality did not indicate a departure from normality for any of the behavior groups ($P > 0.10$ for both tests). A plot of the residuals revealed no indication of an inconsistency in the variances of the Group 1 behavior scores across the head collar types or sessions; however, there was a departure from constant variance for the Group 2 behaviors. This was because the dogs under Sequence 2 recorded zero occurrences of Group 2 behaviors during all four sessions. The analysis of the Group 2 behaviors was run both with and without the data from Sequence 2. Although the P-values changed slightly after deleting this data from the analysis, the overall conclusions were unchanged.

3. Results

There was no significant difference among the four sequences of applying the collars to the individual dogs for the Group 1 or Group 2 behaviors ($F = 0.77$; d.f. $= (3; 8)$; $P = 0.54$; $F = 2.35$; d.f. $= (3; 8)$; $P = 0.15$, respectively). This indicates that the order in which the dogs were assigned to wear the four head collars did not result in any significant difference in their behaviors.

There was no significant difference among the four types of head collars for the Groups 1 and 2 behaviors ($F = 1.53$; d.f. $= (3; 30)$; $P = 0.23$; $F = 1.13$; d.f. $= (3; 30)$; $P = 0.35$, respectively), although there was a trend toward increased reactions to the Snoot Loop® and Response® collars versus the Halti® and Gentle Leader® collars (Figs. 2 and 3) in both behavior groups during Session 1. This difference was not seen in other session and

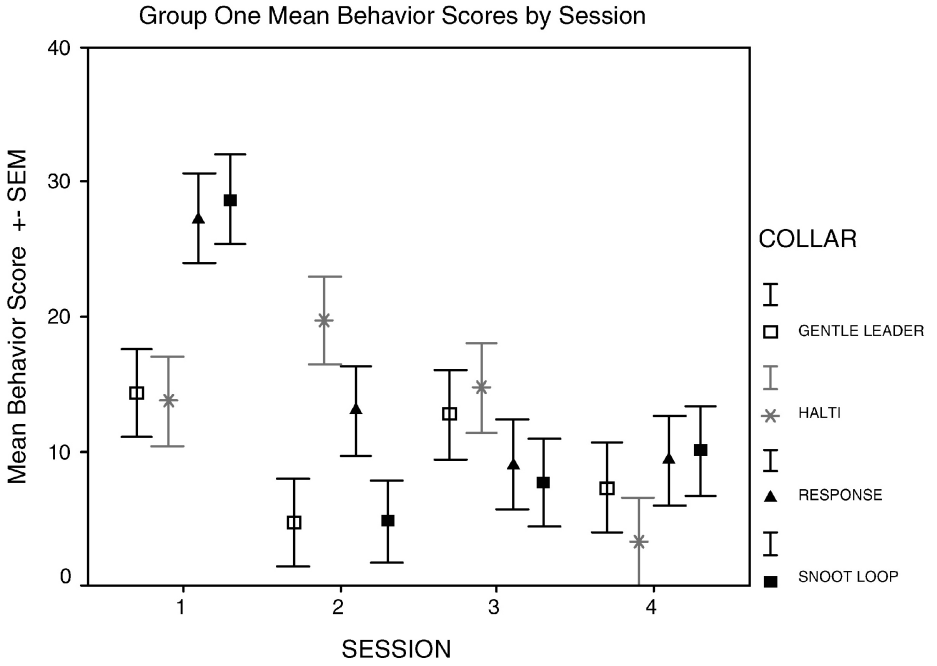

Fig. 2. Mean behavior scores (number of occurrences) for Group 1 (collar directed) behaviors for Sessions 1 through 4. The results are given in least squares means ± standard error of mean for all Group 1 behaviors for each halter during that session. There was no significant difference in the mean behavior scores among the four halter types or among the four sequences. There was a significant difference among the mean scores among the four sessions.

may have been due to individual dog's reactions to head collars in general. It is not possible to confirm this observation statistically because it is not possible to test for a head collar by session interaction. Furthermore, a statistical test of a difference in mean behavior scores among the head collars using just the Session 1 data was not significant for the Groups 1 and 2 behaviors ($F = 0.91$; d.f. $= (3; 8)$; $P = 0.48$ and $F = 2.53$; d.f. $= (3; 8)$; $P = 0.13$, respectively). The lack of significance is partially due to the lack of power of the F-test with such small degrees of freedom for error. Furthermore, there was considerable variability in the responses of the individual dogs assigned to a given head collar.

There was a significant session effect for Groups 1 and 2 behaviors ($F = 12.63$; d.f. $= (3; 30)$; $P < 0.0001$; $F = 5.60$; d.f. $= (3; 30)$; $P = 0.004$, respectively). Additionally, a Tukey's multiple comparison procedure yielded significant differences between Session 1 and the other three sessions but found no significant difference between Sessions 2, 3, and 4 for the Groups 1 and 2 behaviors.

Only one dog removed any part of a head collar during the study and that was a dog wearing a Response® collar. The dog slipped free of the collar three consecutive times by backing away from the leash in both Phases 2 and 3. Even after adjusting the tension of the collar, the dog was easily able to pull its head free. This was a short haired dog with a neck diameter similar to that of its skull.

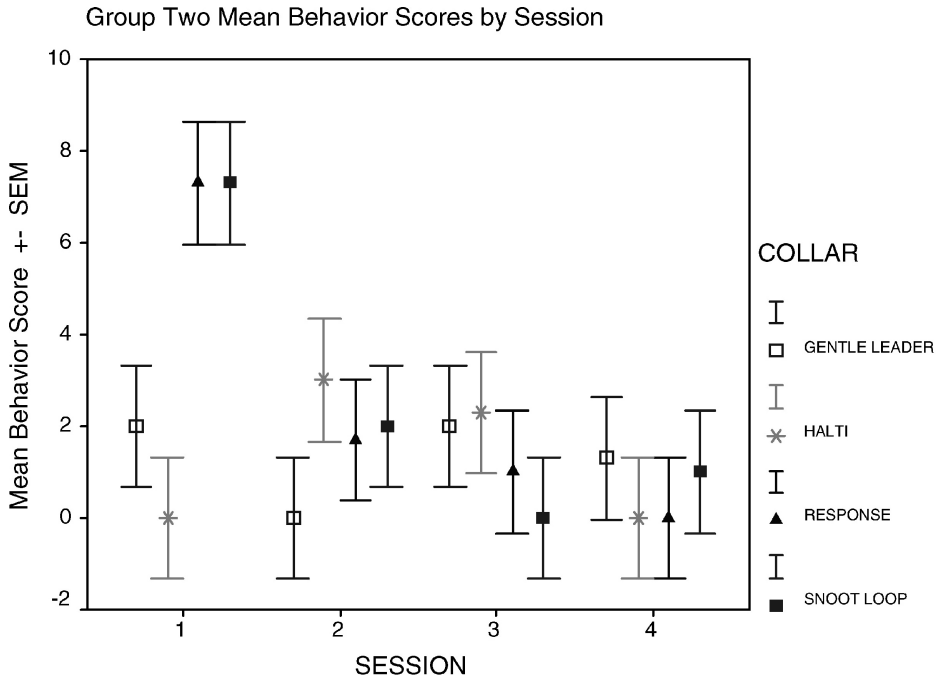

Fig. 3. Mean behavior scores (number of occurrences) for Group 2 (general reaction) behaviors for Sessions 1 through 4. The results are given in least squares means ± standard error of mean for all Group 2 behaviors for each halter during that session. There was no significant difference in the mean behavior scores among the four halter types or among the four sequences. There was a significant difference among the mean scores among the four sessions. There were no occurrences of Group 2 behaviors for the three dogs in Sequence 2 and hence their mean scores are zero.

4. Discussion

Head collars constitute an important part of many behaviorists' rehabilitation programs. In conjunction with providing the owner better control over the animal, the head collars also offer a measure of safety by allowing owners to interact with potentially aggressive dogs in a non-physical fashion while allowing gentle correction of inappropriate behavior (Overall, 1997). Successful use of these collars depends in part on proper fitting, acceptance by the dog, and acceptance by the owner.

All head collars used in this study were sized and fitted based on package directions. Poorly fitted head collars can override the dog's eyes, restrict opening of the mouth, and apply undesirable pressure across the dog's lips. Personal observation indicates that these problems affect the dog's reaction to the product. The ease of assessing appropriate size and fit varied considerably with the collar brand. The Gentle Leader® was the simplest to size, and each size adjusted easily to fit dogs of a variety muzzle shapes. The Halti® was the easiest to size and adjust. The only alteration necessary was changing the size of the neckband; however, due in part to the wide, non-adjustable cheek straps, it

was not as versatile in fitting dogs of differing facial conformations. Choosing the appropriate size of the Snoot Loop® was easy because each size adjusts to variety of skull sizes and shapes. However, it does require four adjustments: the neckband, the nose loop, and both cheek straps. The final collar, the Response® collar, was by far the most complicated to use. The size charts overlap greatly with respect to weight, body size, and skull conformation. Although the only adjustment necessary is the neck band, the correct size must be established and the multitude of straps makes the fitting somewhat complex.

No statistical difference was observed in dogs' reactions to the four different types of head collars in any of the four sessions; however, there was a trend toward increased reactions to the Snoot Loop® and Response® collars during Session 1. Dogs did show a marked habituation to the collars by Session 4 after only wearing a collar for a total of 30 min over the previous 6 weeks. This indicates that dogs do rapidly adjust to wearing head collars; although, the time required will vary with the individual dog and its behavioral diagnoses. During this study, there were obvious behavioral variations among dogs in response to head collars in general. Also, individual dogs seemed to show some variation in response to each collar type. This effect was partially confounded by habituation to the collars over time.

Head collars are purported to work by mimicking natural dominance behaviors used by dogs and wolves to establish or maintain status in social hierarchies (Overall, 1997; Ogburn et al., 1998). The muzzle strap presumably imitates a muzzle bite and the neck strap the effect of a conspecific placing its feet or mouth over the dorsum of the recipient's neck (while specifically avoiding pressure on the ventrum of the neck). Ogburn et al. (1998) noted that dogs appeared more subdued and obedient while wearing a head collar versus a regular collar, yet these same dogs often pawed at and attempted to remove the head collar. This struggle is often interpreted as the dog resisting human control and leadership. Yet many dogs that attempt to remove head collars also show pronounced submissive postures. It might be questioned how much a dog's resistance to the head collars is due to its attempts to resist human control versus a natural reaction to a novel object affixed to its body, particularly an area as sensitive as the head/face. Unquestionably, many behaviorists observe that dogs with more severe behavior problems often resist head collars more than dogs that do not have such problems, but such dogs also are probably less habituated to handling and control in general. Additionally, a dog's apparent increased obedience and subordination while wearing a head collar may be due to an overall suppression of behavior. While it is logical to assume head collars function at least partially by imitating natural dominance behaviors, this supposition remains to be confirmed.

Irrespective of the actual mechanism of action, head collars do serve an important role in behavior modification programs for dogs. Increasing client compliance by ensuring committed usage of the collar may increase the success of the rehabilitation program. Assisting clients with proper fit and instructing them in supplemental desensitization exercises can increase the dog's acceptance of the collar thereby increasing the client's likelihood of continuing to use the product. In this regard, the complexity of the Response® collar, coupled with the fact that one dog easily escaped it, may indicate some benefit to choosing another collar design over this one.

5. Conclusion

Although the number of dogs was low, there appears to be no particular advantage for choosing one collar type over another based on behavioral reactions of dogs in this study. This study also demonstrated that normal dogs can adapt quickly to wearing these collars even after wearing them only intermittently and for short periods of time.

References

Joffe, H., 2000. Adherence to health messages: a social psychological perspective. Int. Dent. J. 50, 295–308.
Liptak, G.S., 1996. Enhancing patient compliance in pediatrics. Pediatr. Rev. 17, 128–134.
Ogburn, P., Crouse, S., Martin, F., Houpt, K.A., 1998. Comparison of behavioral and physiological responses of dogs wearing two different types of collars. Appl. Anim. Behav. Sci. 61, 133–142.
Overall, K., 1997. Clinical Behavioral Medicine for Small Animals. Mosby, St. Louis, MO, pp. 289–290.