Can stress-related behavior in dogs be due to pain? A pilot study.

Alice Pettersson

LiTH-IFM- Ex--15/3027-SE

Supervisor: Lina Roth, Linköping University
Examiner: Hanne Løvlie, Linköping University
Can stress-related behavior in dogs be due to pain? A pilot study.

Alice Pettersson

Dogs and other pets can have back pain for years that no one notices. As a result they become stressed and can e.g. develop aggressiveness or decrease their feeding. There are indications that chiropractic treatments can treat these animals but this is not commonly known by veterinarians. This study investigated stress related behaviors and average heart rate in ten dogs before and after chiropractic treatment. A control group of eight dogs was also tested but did not receive the treatment. The test consisted of three parts: 1) one part without owner interaction, 2) one part where a human approached and 3) one part were the owner commanded the dog to sit and lie down. Eight out of ten owners experienced a positive change in their dogs’ behavior one week after the treatment though the test results did rather point at more stressful behaviors. The test group showed an increase in yawning and panting from the first to the second test (after the treatment) and showed a higher heart rate after the treatment compared to the control group during part 1. Probably due to that the treatment and the tests were in the same local and the dogs became stressed by being there again. Part 3 did show a possible increase in movability and contact with the owner but more studies are needed to confirm the change that the owners experienced. Though, this study is a step in the right direction; more animals could be treated and saved from euthanizing if chiropractic and the diagnosis of this back injury are taught to veterinarians.

Dogs, canine behavior, stress-related behavior, stress, pain, pain-induced stress, chiropractic
Content

1. Abstract .............................................................................................................. 2

2. Introduction ........................................................................................................ 2

3. Material & methods ............................................................................................ 4
   3.1 Animals and ethics statement ....................................................................... 4
   3.2 Measurement procedures ............................................................................. 4
   3.3 Analyzing ....................................................................................................... 6
   3.4 Statistical analysis ......................................................................................... 8

4. Results ................................................................................................................. 8
   4.1 Part 1 - No contact with owner and the questionnaire ......................... 8
   4.2 Part 2 - Approaching human ....................................................................... 11
   4.3 Part 3 - Commanding ................................................................................... 14

5. Discussion ........................................................................................................... 15
   5.1 Conclusions .................................................................................................. 18
   5.2 Societal & ethical considerations ................................................................. 18

6. Acknowledgement .............................................................................................. 18

7. References .......................................................................................................... 19

8. Appendix ............................................................................................................. 22
   8.1 The first tests questionnaire ...................................................................... 22
   8.2 The second tests questionnaire .................................................................. 23
1. Abstract

Dogs and other pets can have back pain for years that no one notices. As a result they become stressed and can e.g. develop aggressiveness or decrease their feeding. There are indications that chiropractic treatments can treat these animals but this is not commonly known by veterinarians. This study investigated stress related behaviors and average heart rate in ten dogs before and after chiropractic treatment. A control group of eight dogs was also tested but did not receive the treatment. The test consisted of three parts: 1) one part without owner interaction, 2) one part where a human approached and 3) one part where the owner commanded the dog to sit and lie down. Eight out of ten owners experienced a positive change in their dogs’ behavior one week after the treatment though the test results did rather point at more stressful behaviors. The test group showed an increase in yawning and panting from the first to the second test (after the treatment) and showed a higher heart rate after the treatment compared to the control group during part 1. Probably due to that the treatment and the tests were in the same local and the dogs became stressed by being there again. Part 3 did show a possible increase in movability and contact with the owner but more studies are needed to confirm the change that the owners experienced. Though, this study is a step in the right direction; more animals could be treated and saved from euthanizing if chiropractic and the diagnosis of this back injury are taught to veterinarians.

2. Introduction

Stress is frequently studied in both humans and animals and can have many different definitions. One commonly used definition is that stress is a response of the body to any noxious stimulus (Koolhaas et al., 2011). Pain is a well-known stressor, i.e. a stimulus that elicits a stress response (Mellor et al., 2000 cited by Camps et al., 2012). This stress reaction includes the sympathetic nervous system and the HPA-axis which, by several steps, increases e.g. the cortisol and adrenalin levels and affects the heart rate. The digestive system is suppressed and the blood is instead focused to the muscles to prepare them to fight or flight. Under short term stress the immune system is enhanced and the heart rate increases (Lucini et al., 2005; Destrez et al., 2012). However, under long term stress the cortisol suppresses the immune system which can delay healing and the animal can also suffer from sleep deprivation (Hellyer et al., 2007). The heart rate response to chronic stress may rather be a decrease (Lucini et al., 2005; Destrez et al., 2012). Though, the body is not only reacting...
physiologically, behavior can also be affected by stress. A pet animal may decrease its activity, feeding and interaction with its owner, become more aggressive and vocalize more (Hellyer et al., 2007). Another change in behavior that may be due to stress is a decrease in playing (Yeates & Main, 2008). However, several studies have reported individual differences in response to stress (Rooney et al., 2009). Hiby et al. (2006) showed e.g. that high stress levels instead increase the activity in dogs.

Aggressiveness is one commonly reported response of acute pain in animals but few studies have tested how chronic pain affects the animals’ behavior (Fureix et al., 2010). Fureix et al. (2010) was the first to show that there is a link between chronic pain and aggression. They tested 59 riding school horses for aggressiveness towards humans and showed with help of a chiropractor that “bad tempered” horses could be aggressive due to back pain (Fuerix et al., 2010). Chiropractic is specialized on the joints and spinal disorders and is defined as "the science and art which uses the inherent recuperative powers of the body and deals with the relationship between the nervous system, spinal column including its immediate articulations and the role of this relationship in the restoration and maintenance of health" (Homewood, 1962 cited by Taylor & Romano, 1999). Among racing horses chiropractic treatments are common but few veterinarians have the knowledge to perform it, since it is often not included from the ordinary veterinary education. A Swedish veterinarian, J. Furéus, has been working with chiropractic on the spine and pelvis of horses and has found that this might be a useful tool also for “problem dogs”. A “problem dog” can range from mildly annoying, e.g. pulling on leash or jumping on owner, to dangerous behavior, e.g. aggression or biting (Echterling-Savage et al., 2015). Dog aggression is a big problem since it concerns both human health and animal welfare and unfortunately many of these dogs are euthanized (Hunthausen, 1997; Mikkelsen & Lund, 2000 both cited by Rosado et al., 2010; Martinez et al., 2011), maybe completely unnecessarily. Some owners of Furéus treated dogs with behavioral problems experience large changes in the dogs’ behavior; they are e.g. calmer and seek more contact with their owner. Though, it is not yet scientifically proven that the chiropractic treatment can change a dogs´ behavior.

This study investigated if dogs with behavioral problems can be “treated” with chiropractic. I studied stress-related and contact behaviors and heart rate before and after chiropractic treatment. The owners also answered a questionnaire to investigate if they experienced a change in their dogs’ behavior. My hypothesis was that the dogs would show less stress-related
behavior, such as crying, panting, nose licking etc., but a higher heart rate after the treatment.

3. Material & methods

3.1 Animals and ethics statement

The veterinarian, J. Furéus, examined 25 dogs to investigate if they suffered from back pain. Most of these dogs had known behavioral problems. Twelve dogs with potential back and behavioral problems were then chosen to proceed with the chiropractic treatment and were in focus in this study. Also, ten dogs were chosen as a control group and did not proceed with the chiropractic treatment before the tests. Unfortunately four dogs were dismissed from this study due to snakebite and owner sickness. Hence, ten test dogs (3 females, 7 males, age: 3.9 ± 2.6 years) and eight control dogs (2 females, 6 males, age: 2.9 ± 2.1 years) were finally included in this study. All dogs were privately owned, of different ages, sex and breed and the owners had given their consent to participate in this study.

No permission for non-invasive observation on privately own dogs are required in Sweden. Though, all experiments were in line with ethical approval from the regional ethical committee for animal experiments in Linköping, Sweden (Permit number: 51-13).

3.2 Measurement procedures

The study was performed at Hundens och djurens beteendecenter in Linköping, Sweden. Each dog was tested for approximately 10 min, one week before and one week after chiropractic treatment, and filmed during the whole time. The camera used was a HD camcorder (Canon Legria HR G25) that was placed on a tripod. The behavioral test procedure was based on an earlier study by Roth and Jensen (In press) and consisted of three parts: 1) one part without any interaction with the owner, 2) one to test how the dog reacted to an approaching human (one of the female test leaders) and 3) one part to see how fast the dog reacted to a command. During the whole test the dogs’ heart rate was also monitored. A Polar M400HLM Sportwatch was used in this study. The system consisted of an elastic chest strap and a clock that received the pulse. The chest strap had an electrode which had to be in direct contact to the skin, therefore the fur of the dog were water combed and an electric gel was placed on the electrode before attachment to the dog. The clock and the chest strap were connected via Bluetooth and had to be rather close to each other. Therefore the owner of the dog had the clock on a lanyard around his/her
neck. In order to connect each part with the right heart rate the owner was asked for the time on the clock before each new part. Though, only the heart rate during the first part was used in this study.

When the dog arrived to the test center the owner attached the chest strap on her/his dog. Then the test leader gave some information about the test procedure while the dog acclimatized to the chest strap. Filming started when the owner and dog walked to the test area.

After the acclimatization time the owner and the dog walked up to a novel object, in this case a cone (Figure 1a) that was approximately 3-4 m from the camera. The owner started at cone 1 (Figure 1b) and stood facing the camera. He/she was not allowed to interact with the dog during the first part of the test. In order to facilitate that for the owner he/she stood on the leash instead of holding it. The leash was loose, approximately 1.5 m, in order to allow the dog walk around freely. After about 10 seconds one of the two test leaders walked up to the owner with a questionnaire for the owner to fill in. The purpose of this was mainly to distract the owner from the dog but also to investigate how the owners experienced the dogs’ behavior and behavioral problems. When the owner had answered all questions (or when 2 minutes had passed) the test leader walked up to the owner a second time to collect the questionnaire. The owner was then asked to pick up the leash and walk to cone 2 (Figure 1b) and command the dog to sit. As the last part of the test he/she was asked to command the dog to lie down. Finally the owner was asked to take off the chest strap of the dog and the filming stopped.

The questionnaire contained some dissimilar questions before and after treatment. Though, four questions were identical to see if they differed between groups and tests. The questions were 1) Have you observed a side preference when your dog lie down?, 2) Does your dog becomes very excited in new sudden situations, such as meeting a dog or car around a corner?, 3) Do you feel that your dog is sometimes so excited that you cannot obtain contact with him/her? and 4) Have you observed your dog to lick or bite his/hers leg? The first questionnaire asked for the dogs’ whole life while the second questionnaire asked about the last week, i.e. the week after the chiropractic treatment for the test group. For all these questions the owner could choose “yes” or “no” and for the third question they also had the option “yes, sometimes”.


3.3 Analyzing

During the analyzing of the video recordings both typical stress and contact behaviors were recorded according to predetermined ethogram (Table 1) with 1/0-sampling and 5 seconds interval. During part 1 (questionnaire) and 2 (approaching human) both stress and contact behavior was recorded. Though, during part 2 the interval was 10 seconds, 5 seconds before and 5 seconds after the approaching human, and during part 1 the activity of the dog was also recorded, with 5 second interval 1/0-sampling (Table 1).

Behavioral scores from both approaches during part 2 were summed and hence the recorded behaviors could have a score of 0, 1 or 2. During part 1 one dog was staring at a mirror on the opposite wall but even after excluding that time the dog could be observed for 2 minutes. The mirror was then covered with a blanket. It was also one dog that was not filmed for 2 full minutes, but for 1 minute and 45 seconds. Since the behaviors were tested in frequency of time the dog was kept in the study.

During part 3 (commanding) it was measured how long it took for the dog to actually perform the asked behavior from the first command and how long it took for the dog to sit/lie down (the duration). Three dogs (one from the test group and two from the control group) did not know
the command lie down and were therefore excluded from that measurement.

**Table 1. Ethogram of the stress-related behaviors, the contact behaviors and the activity of the dog that were recorded.**

<table>
<thead>
<tr>
<th>Functional term</th>
<th>Descriptive term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviors related to stress</td>
<td></td>
</tr>
<tr>
<td>Nose licking</td>
<td>The dog is licking its nose.</td>
</tr>
<tr>
<td>Yawning</td>
<td>The dog is opening its mouth widely and closing its eyes.</td>
</tr>
<tr>
<td>Crying</td>
<td>The dog whine/whimper/yelp.</td>
</tr>
<tr>
<td>Paw-lifting</td>
<td>The dog lifts one of its forepaws from the ground.</td>
</tr>
<tr>
<td>Barking</td>
<td>The dog is barking.</td>
</tr>
<tr>
<td>Panting</td>
<td>The dogs’ chest moves in short and quick breaths. The tongue is out.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gazing toward owner</td>
</tr>
<tr>
<td>Gazing toward stranger</td>
</tr>
<tr>
<td>Jumping toward owner</td>
</tr>
<tr>
<td>Moving toward stranger</td>
</tr>
<tr>
<td>Sniffing toward stranger</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sniffing</td>
</tr>
<tr>
<td>Moving</td>
</tr>
<tr>
<td>Standing</td>
</tr>
<tr>
<td>Sitting</td>
</tr>
<tr>
<td>Lying</td>
</tr>
</tbody>
</table>
The heart rate measurements from part 1 were downloaded from the Polar appurtenant account and Excel 2010 (Microsoft) was used to calculate the average heart rate.

3.4 Statistical analysis

The number of times a behavior was performed were summarized and frequencies were calculated for each behavior. In addition the frequencies of nose-licking, yawning, crying, panting and paw-lifting were summarized into a total stress parameter. The number of times a behavior was performed during the human approach was not calculated to frequencies. The heart rate data were summarized in mean values over the two minutes.

The answers from the questionnaires were collected and transformed into numbers to be able to analyze it statistically. When there were only two alternatives (question 1, 2 and 4) “No” was equal to 1 and “Yes” to 2. In the third question, where there were three alternatives, the alternatives were transformed to “No”=1, “Yes, sometimes”=2 and “Yes, always”=3.

The data were not normally distributed and therefor the statistical tests used were Related-Samples Wilcoxon Signed Rank and Mann-Whitney U in IBM SPSS Statistics 22.

4. Results

4.1 Part 1- No contact with owner and the questionnaire

The control group showed no differences between the two tests (p>0.05; Figure 2). The test group, on the other hand, showed an increase in yawning (Z=2.04; p=0.041) and panting (Z=2.21; p=0.027) from the first to the second test (Figure 3). The test group also showed a tendency to sniff less (Z= 1.94; p=0.052) and nose lick more (Z=1.69; p=0.092) after the treatment (Figure 3). The total stress parameter showed also a tendency to be higher after the treatment (Z=1.68; p=0.093; Figure 3). The average heart rate did not differ between the tests in any of the groups (Figure 4).

The comparison between the groups before treatment showed that the control dogs sat more often than the test dogs (U=20.0; p=0.043). During the second test the control group stood less (U=15.5; p=0.028), lied down more (U=25.0; p=0.040) and had a lower heart rate (U=12.0; p=0.013; Figure 4) than the test group.
Figure 2. Performed behavior of the control group in mean % of time during part 1 (questionnaire). Dark grey bars show results from the first test and light grey bars show the second test, standard deviation (SD) shown as whiskers.
Figure 3. Performed behavior of the test group in mean % of time during part 1 (questionnaire). Dark grey bars show results from the first test and light grey bars show the second test. Stars indicate a significant difference (p<0.05) between the tests, stars in parenthesis show a tendency to differ (p<0.1). Standard deviation (SD) shown as whiskers.

Figure 4. Mean heart rate in beats per minute (BPM) of the two groups before and after the test group’s chiropractic treatment. Test group shown in dark grey, control group in light grey, standard deviation (SD) shown as whiskers. Star indicates a significant difference (p<0.05) between the groups.
The questionnaires from the two test occasions contained four similar questions that were compared between groups and tests. The test group answered that their dog showed more excitement in new situations before the treatment compared to after (Z=2.24; p=0.025). They also experienced a tendency of more difficulty to contact their dog (Z=1.73; p=0.08) and more biting/licking on one or several legs from their dog (Z=1.73; p=0.08) before the treatment compared to after. The control group also showed a decrease in excitement in new situations (Z=2.12; p=0.03) and biting/licking the legs (Z=2.24; p=0.025).

Comparing the answers from the first questionnaire showed that the control group bite/lick their legs more than the test group (U=24.0; p=0.049). The second questionnaire revealed that the test group was more excited in new situations compared to the control group (U=24.0; p=0.050).

In the second questionnaire nine out of ten owners of the test group said they had seen a difference in behavior in their dog the last week (after the treatment). Seven had seen a positive change; one had seen a negative change and one had seen both positive and negative changes. The positive differences were mostly a more happy, energetic and playful dog. Some owners also wrote that their dog could calm down faster and had better movability after the treatment. The negative differences that two owners saw were crying when time to sleep, chewing on their legs and more worried than before. In the control group seven out of eight answered no to the question. The one answering yes had observed a positive change in the dogs’ behavior.

4.2 Part 2 - Approaching human

During part 2 the dogs of the treated group showed less sniffing after the treatment (Z=2.33; p=0.02) and they were also gazing less often toward their owner (Z=2.33; p=0.02; Figure 5). The control group showed no significant differences between the tests (p>0.05).
Figure 5. Mean number of performed behavior of the test group during part 2 (approaching human). Dark grey bars show results from the first test and light grey bars show the second test. Stars indicate a significant difference (p<0.05) between the tests. Standard deviation (SD) shown as whiskers.

The comparison between the groups during the first test showed significant difference for sniffing and gazing towards owner (Figure 6). The test group sniffed more on the ground than the control group (U=15.5; p=0.021) and showed a tendency to gaze toward the owner more than the control group (U=24.0; p=0.088). During the second test the test group performed nose licking more often than the control group (U=20.5; p=0.044; Figure 7).
Figure 6. Mean number of performed behavior of the two groups during part 2 (approaching human) in the first test. Test group shown in dark grey, control group in light grey, standard deviation (SD) shown as whiskers. Star indicates a significant difference (p<0.05) between the groups, star in parenthesis shows a tendency to differ (p<0.1).
Figure 7. Mean number of performed behavior of the two groups during part 2 (approaching human) in the second test. Test group shown in dark grey, control group in light grey, standard deviation (SD) shown as whiskers. Star indicates a significant difference (p<0.05) between the groups.

4.3 Part 3 - Commanding

The latency from the lie down command to actual performance to lie down from the test dogs was significantly shorter after the chiropractic treatment (Z=2.17; p=0.03; Figure 8). The control group did not show a difference between the two tests.

Both the first and the second test comparisons showed no significant difference between the groups during part 3 (p>0.05).
Figure 8. Mean time from command and duration of performance in the test group before and after treatment. Dark grey bars show before and light grey bars show after treatment. The star indicates a significant difference ($p<0.05$) between the tests. Standard deviation (SD) shown as whiskers.

5. Discussion

The purpose of this study was to investigate if behavioral problems in dogs can be due to back pain and the stress that pain cause, and whether it can be treated with chiropractic. The results do not show that the treated dogs show less stressful behaviors after the chiropractic treatment than before as hypothesized, though most owners experienced a positive difference in their dog’s behavior.

During part 1 when the owner did not interact with the dog for 2 min I hypothesized that the test group would relax faster and show fewer stress-related behaviors after the chiropractic treatment compared to before. But instead they rather showed more stress related behaviors after the treatment. This could have been due to that the chiropractic treatment was performed in the same local as the behavioral tests. According to the veterinarian this group was the most difficult he had treated and e.g. two dogs were put to sleep during the treatment. The shockwave machine that the veterinarian used was quite loud which also could have affected the dogs though most of them did relax during that part of the treatment. Earlier studies have shown that dogs react with increased fear/anxiety and
freezing behaviors to persistent sound such as thunder (Gruen et al., In Press; Araujo et al., 2013). Even though the dogs in this study appeared in a positive and active state directly after the treatment and were not afraid of the veterinarian they might connect the local with something intimidating and therefor showed more stress related behavior during the second test. The higher average heart rate in the test group compared to the control group after the treatment also suggests that the test group was more stressed during the second test compared to the control group. Kuhne et al. (2014) found that dogs that showed more stress related behaviors also showed an increase in heart rate which is in line with my results. The increase in heart rate could indicate that the dogs were acute stressed and not long-termed stressed since it then would have decreased (Lucini et al., 2005; Destrez et al., 2012). Lucini et al. (2005) found that chronic psychosocial stressed humans had a lower heart rate compared to a non-stressed control group. Destrez et al. (2012) also experienced a decrease in heart rate after long-term exposure to various unpredictable events in sheep. The test sheep also showed an increase in fearfulness which Destrez et al. (2005) suggests can be used as a sign of chronic stress in animals. Maybe the increase in average heart rate, shown in the test dogs in this study, was due to that the dogs were no longer long-termed stressed. Though, one might think that the test group rather would have showed a lower heart rate than the control group before the chiropractic treatment. However, since the control dogs also had back problems they might have been long-termed stressed both in the first and the second test.

According to the two questionnaires the owners of the test group experienced an improvement in both excitement in new situations, times when they could not contact their dog and times they had seen the dog bite/lick its legs. Though, this comparison was between the dogs’ general behavior over longer period of time before the treatment and the one week after the treatment, but it is still significant data. Maybe the differences in the control group could be due to the different timespan of the questions since it compares years with one week. The control group was not treated and should not experience any differences in their dogs’ behavior. However they did experience a difference in excitement in new situations and times they had seen their dog lick/bite its legs. In addition the test group, that did receive the treatment, experienced that they could contact their dog more often after the treatment. Since the control group did not experience this it could indicate that the contact with the dog is better after the treatment and thus does not depend on that the comparison was between years and one week.
Almost all test group owners experienced a positive difference in their dog’s behavior according to the questionnaire. Mostly they reported of a happier and more playful dog which could be due to that they do not have back pain anymore. Unfortunately the behavioral method in this study did not capture the change in behavior. Though, the owners know their dog the best so their statements are really important. Serpell & Hsu (2001) showed that questionnaires can be used for measuring a dog’s behavior in situations where other methods are difficult to use. Only a few owners confirmed my hypothesis that the dog could calm down faster at home or in new situations after the treatment but it did not show in the behavioral tests. Though, the test group stood more often than the control group after the treatment and lied down less. Maybe this was also due to that the treatment was in the same local as the tests.

One owner in the control group experienced a positive difference in the dogs’ behavior during the last week before the second test. Almost all dogs in this study had behavioral problems, even those in the control group, and were training to improve it. The positive difference that this owner experienced was therefore probably due to that training.

Two owners experienced negative behavioral changes in their dogs after the chiropractic treatment. This might be due to the fact that the second test was only one week after the treatment. Maybe these two dogs were still stressed or sore and will hopefully recover and maybe they would have showed improved behavior if tested much later. Zoladz et al. (2015) exposed rats to a 30 second tone followed by a 1 hour predator session once per week for three weeks. They then tested the rats’ behavior after three months and showed that these rats showed more anxiety than the rats that had not been exposed to the predator (Zoladz et al., 2015). Hence it is not too difficult to imagine the dogs remembering the local as intimidating still after just one week. The dogs could also be accustomed to show the stress behaviors and could possibly show them on reflex even though they are no longer in pain or stress. Since they have been in pain for so long it might take longer than a week to recover from both the injury and the stress. Owners that have treated their dogs for Furéus before report of small improvements still after six months.

During part 2, approaching human, the treated dogs gazed toward their owner less often after the treatment compared to before. This means that they sought less contact after the treatment, maybe because they were more stressed the second time. It could also be due to that the dogs did not feel as helpless as before the treatment. Gazing is a strong tool for the dogs to communicate interspecific with humans and when dogs are faced with a situation that they cannot solve they gaze toward their owner for
help (Gaunet, 2008; Marshall-Pescini et al., 2009; Jakovcevic et al., 2012). Maybe the test dogs felt secure because they did not feel as much or no pain anymore and knew that they could solve the situation (approaching human) them-selves. The test group also performed nose licking more often than the control group the second time as well, this could indicate three things: 1) The dogs link the local and approaching humans with something scary, 2) they recognized the test leader that approached (and were in the local at the treatment day) and linked that person with something scary or 3) maybe the test dogs just performed nose licking behavior as frequently as during the questionnaire part.

Part 3, commanding, showed that the treated dogs lied down faster from command. This could indicate that the dogs actually were more contactable and willing to follow their owner than before the treatment. Maybe because they do not feel any more or little pain and therefore might have easier to concentrate. Maybe the movability of the treated dogs also could have affected these results since they do not have any tense muscles to prevent the pain. Though, there was no significant difference that indicated that.

5.1 Conclusions

This study shows that dogs with back pain can be treated with chiropractic which can change their behavior positively. Owners of treated dogs experienced this difference which was revealed through a questionnaire. However, the behavioral method used in this study did not confirm these findings even if the stress related behaviors measured were proved to be relevant parameters to study. Future studies should treat the dogs in a different local than the test local and have the second test later than one week after the treatment.

5.2 Societal & ethical considerations

If more veterinarians learn to diagnose and treat the pain investigated in this study it could increase the welfare for the dogs and also for humans and other animals. The many dogs that today are euthanized because of behavioral problems might be in pain and if they are treated for that pain they would not be aggressive and attack humans and other animals.

6. Acknowledgement

I would like to thank my supervisor Lina Roth and also Per Jensen for their support, my co-student Johanna Karlsson for the help with the set-up and performance of this study, the veterinarian Jörgen Furéus and the
people at Hundens och djurens beteendecenter, Annelie Andersson and Jennifer Milberg for their time and help.

Finally, I would like to thank all the dog owners who participated in this study as volunteers and of course their dogs!

7. References


dehydroepiandrosterone in aggressive dogs. Applied Animal Behavior Science 123(3-4)

Roth LSV, Jensen P (In press) Assessing companion dog behaviour in a social setting. Journal of Veterinary Behavior Clinical Applications and Research


Taylor LL, Romano L (1999) Veterinary chiropractic. The Canadian Veterinary Journal 40

Yeates JW, Main DCJ (2008) Assessment of positive welfare: A review. The Veterinary Journal 175(3)

8. Appendix
The two questionnaires used in this study (in Swedish):

8.1 The first tests questionnaire

Hundägarens namn: __________________

Härmed godkänner jag att jag och min hund medverkar i denna beteendestudie och att materialet senare ska kunna användas i vetenskapligt syfte.

____________________________________________________________________

Signatur av hundföraren

Min hunds namn: __________________

Hunden bor i: Villa Radhus Lägenhet Hundgård

Tillgång till trädgård:
Ja större än 300m² Ja större än 100m² Ja mindre än 100m² Nej

Har ni andra djur i hushållet? Om ja, vad för slags djur och hur många?

_____________________________________________________________________________

Har ni några barn i hushållet? Om ja, hur många och ålder?

_____________________________________________________________________________

Hur ser en vanlig dag ut för din hund? Ex: promenad, utfodring, socialisering, hemma eller hunddagis, lek, träning, vila etc.

Morgon: __________________
Förmiddag: __________________
Eftermiddag: __________________
Kväll: __________________

Har du sett din hund slicka/gnaga på sina ben/tassar?
Ja Nej

Har du sett om din hund föredrar att ligga på en sida mer än den andra när den vilar?
Ja, vänster sida Ja, höger sida Ja, men osäker på vilken sida Nej

Skulle du beskriva att din hund går från 0-100 vid plötsliga händelser som att det dyker upp en hund runt gatuhörnet eller om det ringer på dörrklockan?
Ja, alltid ja, ibland Nej

Har du lagt märke till om klorna slits olik a mycket på olika tassar?
Ja Nej

Upplever du ibland att din hund går upp i varv i den mån att du inte får kontakt, att den inte hör dig?
Ja Nej
8.2 The second tests questionnaire

Hundägarens namn:

E-post:
(Så vi kan delge er resultatet från studien)

Min hunds namn:

Min hund är kastrerad
Ja Nej

Nu kommer frågor enbart om den senaste veckan:

1) Har du sett din hund upprepandes slicka/gnaga på sina ben/tassar?
   Ja Nej

2) Har du sett om din hund föredrar att ligga på en sida mer än den andra när den vilar?
   Ja, vänster sida Ja, höger sida Ja, men osäker på vilken sida Nej

3) Har din hund under den senaste veckan gått från "0-100" vid plötsliga händelser som t.ex. att det dyker upp en hund runt gatuhörnet eller om det ringer på dörrklockan?
   Ja, alltid Ja, ibland Nej

4) Har du under senaste veckan upplevt att din hund ibland går upp i varv i den män att du inte får kontakt och att den inte hör dig?
   Ja Nej

5) Har du märkt några skillnader i din hunds beteende den senaste veckan?
   Ja Nej (se nästa sida)
   
   Om Ja på fråga 5, är förändringarna åt det bättre eller sämre hållet?
   Positiva Negativa Både och

   Om Ja på fråga 5, kan du specificera vilka förändringar du upplevt (beteende, sömn, stress- och aktivitetsnivå mm) och om är de positiva eller negativa?

   Om Nej på fråga 5, har du ändå upplevt oönskade beteenden den senaste veckan (även om det inte skiljer sig från andra veckor) och i så fall vilka?