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Effectiveness of Dry Needle Acupuncture of Arthritic Canines

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Abstract

Osteoarthritis is a progressive disease that is common among the canine population and is characterized as a disease process that causes pain and lameness. The purpose of this prospective cohort study is to determine the effectiveness of improving mobility from dry-needle acupuncture for mild/moderate elbow joint arthritis in canines as an additional treatment to NSAIDs, specifically Metacam and Carprofen. The control group will only take either Metacam or Carprofen. The treatment group will take Metacam or Carprofen and receive dry-needle acupuncture. After the baseline test, both groups will be retested every 2 weeks up until 24 weeks. The treatment group will receive weekly 30-minute dry-needle acupuncture sessions. A pressure plate will be used to determine amount of pressure, in Newtons, that a canine is placing on the affected limb. In addition, three observers will determine the lameness of the canine and be averaged. Both tests will determine if the canine showed a decline, unchanged, or improvement in condition throughout their participation of the study. Then, the data from both measurements will be analyzed to determine the effect of dry-needle acupuncture compared to NSAIDs alone.

Keywords: Arthritis, lameness, Metacam, Carprofen, acupuncture, pressure plate, canine, dry-needle acupuncture

Effectiveness of Dry Needle Acupuncture of Arthritic Canines

Osteoarthritis is a progressive disease that is common among the canine population and is characterized as a disease process that causes pain and lameness. Arthritis affects approximately 5% of the canine population and a study showed that, out of more than 12,000 German shepherd dogs, arthritis was the most common cause of euthanasia or natural death (Baker-Meuten, Wendland, Shamir, Hess, & Duerr, 2020). One of the most common treatments for osteoarthritis is NSAIDs. However, these can cause adverse effects, which is leading to increased pursuit for alternative therapies.

Owners are becoming more open to the idea of additional complementary and alternative treatments to ease pain and reduce stiffness. Acupuncture works by inhibiting inflammatory mediators and works on normalizing physiologic homeostasis and promote self-healing (Summers, 2020). Of three tested alternative treatments, owners perceived that only acupuncture had a pain reduction for their dog (Teixeira, et al., 2016). One study found immediate improvement of comfort level and mobility and case studies that showed an increase in mobility and life span of the dog. The dog was on multiple medications that were not working anymore, and the pet was deteriorating quickly. Acupuncture was suggested as a last resort before euthanasia and the pet was able to walk on its own and live for another three years, died at age 16 (Koh, N.D.).

Groups such as World Small Animal Veterinary association, American Association of Feline Practitioners, and American Animal Hospital Association suggest pain management guidelines that considered acupuncture as a part of multimodal pain management regimen (Koh, N.D.). Dry needling is the insertion of a fine, sterile needle into acupoints. Needles vary in size and length, 28- to 36- gauge and 0.25 to 1.5 inches. These needles are left in place for

approximately 10 to 30 minutes (Koh, N.D; Summers, 2020). Veterinarians must have formal training to perform acupuncture in practice settings. A meta-analysis article found that out of 64 studies, 55% showed adverse effects to NSAIDs (Teixeira, et al., 2016). Acupuncture may help to reduce the dosage of NSAIDs and therefore reduce the adverse effects, this is a promising alternative for canine's resistant to pain medication or cannot tolerate their side effects. Acupuncture has been found to provide immediate and cumulative effects, following repeated treatments (Koh, N.D.).

One meta-analysis article read and evaluated 68 research papers about alternative therapies and the impact on osteoarthritis management, with only one article for electro-stimulated acupuncture and osteoarthritis. Furthermore, there were zero articles discussing the effects of dry needle acupuncture, for treatment of any condition (Sanderson, et al., 2009). This shows a gap in research that this study will focus on effects of dry needle acupuncture on arthritis. Past studies are difficult to compare due to frequency of acupuncture between treatment protocols and different studies, and greatly influenced by treatment costs. More studies need to focus on a single joint; however, a large enough sample size will be difficult (Baker-Meuten, Wendland, Shamir, Hess, & Duerr, 2020). Common issues with current research and developing an effective model for the research, such as needing to be more high-quality and randomized. Many studies had a small number of canines involved, which caused limitations to detecting differences in canines, and were affected by the timing of these measurements (Baker-Meuten, Wendland, Shamir, Hess, & Duerr, 2020; Sanderson, et al., 2009). The gaps and limitations, listed previously, were considered in the design of this study.

The purpose of this study is to determine if dry needle acupuncture will increase the mobility of mild/moderate arthritic canines, as an additional treatment to NSAIDs, compared to

canines only using NSAIDs. With NSAIDs as a common treatment for osteoarthritis, with or without additional treatments, this study will focus on selecting canines using Metacam and carprofen for both the experimental and control group and determine the effectiveness of adding dry needle acupuncture as an additional treatment in this prospective cohort study.

Methods

Hypothesis

H0- Dry needle acupuncture, with NSAIDs, will show no difference of mobility in mild/moderate arthritic canines versus solely NSAIDs.

H1- Dry needle acupuncture, with NSAIDs, will increase mobility in mild/moderate arthritic canines versus solely NSAIDs.

H2- Dry needle acupuncture, with NSAIDs, will decrease mobility in mild/moderate arthritic canines versus solely NSAIDs.

The participants of the prospective cohort study will include canines with mild to moderate arthritis in the elbow joint. The participants level of arthritis will be confirmed by the osteoarthritis grade scale (see appendix A). The participants will also be prescribed Metacam or Carprofen prior to and for the duration of the study. The canines will be at least 2 years of age. The study will include a relatively equal number of females and males, and if these canines are spayed or neutered. The study will also use canine's that range in size, mini to giant. Participants will be recruited by local veterinary clinics and current clients with the veterinary school's clinics, advertisements through the vet school's websites and email advertisements to other academic programs at the school, direct advertisements to newspapers, and promotions of the study on school's social media sites. The participants will receive compensation for the treatment costs, during their participation in the study. The control group will be the canines that are only

receiving Metacam or Carprofen as treatment. The treatment group will be the canines that will receive Metacam or Carprofen and dry-needle acupuncture as treatment.

The canine should not be receiving other treatment's that could affect the results of the study, such as joint health diets, supplements, stronger medications, other alternative therapies, etc. A canine with severe arthritis will not be entered into the study. If a canine progressed into severe arthritis during the duration of the study, the canine will not be included in future data. If the canine developed another condition during the trial, the canine will be removed from the study.

The owners of the canines will decide which group the canines are organized into. The canines of both groups will take their prescribed dosage of Metacam or Carprofen for at least a week before starting the study to allow the medication to have an affect on the canine as a baseline. After this time, the canine will receive the initial/baseline test for proper comparison of future data. This study will utilize a pressure plate and videotaping to collect data. The pressure plate is on a linear track runway on a hard, non-slip surface. The owners will walk the dogs across the plate, after being instructed by the same investigator. The dogs will need to perform a continuous walking gait, with no acceleration or deceleration. The velocity will determine by videotaping both frontally and laterally, to confirm a continuous gait or if a retest is necessary. The acceleration and deceleration of the canine will be reduced by only using a 20 meter long track. The experimenters will allow the canine to warm up before performing the test. The pressure plate will be connected to a converter, which will be interfaced to a computer to collect the data. The force of pressure will be converted to Newton's and then normalize to the dog's body weight, so that pressure can be compared to canines of varying weights. As the canine is running across the pressure plate, several experienced observers will visually observe the level of

lameness from the recording using the lameness scale (see Appendix B). The observers scores will be averaged. The observers will not know which group the canine is in, to prevent bias. After the baseline data is collected, the treatment group will begin the dry-needle acupuncture treatment. The control group will be retested every two weeks to determine change in condition. The treatment group will have one 20-to-30-minute acupuncture session every week. The treatment group will be retested two weeks after the first treatment, then retested every 2 weeks after. The control group and treatment group will be tested, in two-week intervals, until they reach 24 weeks. The duration of the study will be three years.

IRB Approval (or IACUC Approval)

The project will require IACUC approval.

Analysis

Force of pressure from the pressure plate will be converted to Newton's and normalized to the canine's entered weight, so that breeds of varying sizes can be compared. With the data collected from each session, the change of condition will be determined between sessions and from beginning the study to completion of involvement. The change can range from positive improvement to negative improvement, worsening condition. The data will be separated by the number of canines within a range of change. For example, 2-3% improvement or 1-2% worsening condition. The ranges will be separated between control and treatment group for comparison. Once the groups are separated, the percentage of control and treatment groups will be determined for each range compared to the overall sample of each group to compare for overall improvement or worsening of condition for the control and treatment groups.

Lameness will be determined by three experienced observers and averaged for an accurate lameness score, at each session. The canine will be sorted into three groups: decreased

lameness, unchanged, and increased lameness. The data will be retrieved between each session and from beginning to the end of study involvement. The chart will be separated into subgroups for the treatment and control group. The percentile of treatment and control groups for change of lameness will be determined. Once the percentages are determined, the treatment and control group will be compared for an overall change in the group population.

Discussion

Using a prospective cohort study design allows the study to find canines with mild to moderate arthritis and follow along to the future to determine effectiveness of dry needle acupuncture. The design also reduced the potential of additional treatments to impact the study. The study also has greater control over the number of canines involved in the study. While past research had struggles with low participation, the study allows for a relatively equal number of canines in both the treatment and control groups. The study will also provide more precise data, instead of relying solely on medical records. One of the common issues with cohort studies, especially with owner's knowing which treatment their dog is receiving, is bias. However, this study is set up to minimize bias. The pressure plate does not have any human intervention to cause bias. The lameness of the canine will be determined by observers who do not know which treatment group the canine is in. By compensating for the treatment cost of both groups, this will help improve participation of the general population. However, there is potential that people who cannot afford the treatment will be more likely to participate. Some of the limitations is the duration of the study and potential cost to cover the treatments for the three-year duration of the study. Another limitation is the potential for loss of follow-up. The owners may not want to return for the 2-week interval retest and, for the treatment group, the weekly acupuncture session.

Another way to test this hypothesis would be by a randomized-control trial. This type of study would allow for additional types of testing, such as owner questionnaires. It would also allow for a randomization of the treatment groups. This study could not utilize an owner questionnaire because of the potential for bias. Randomized-control trial was not chosen for this study because of the issue of volunteer bias and follow-up. The cohort study has a similar issue, but the owners would be less likely to abandon the study if they knew the treatment their animal was receiving and can continue the treatment after their involvement in the study, although without compensation. Owners will also be more willing to join the cohort study since they have the choice to give their canine the additional treatment.

With this study being one of the few studies involving dry needle acupuncture, future experiments will be important for future comparison of treatment options and the effectiveness of dry-needle acupuncture on arthritis. This study will only include canine's currently taking Metacam and Carprofen. However, future studies should consider using other types of low-dose NSAIDs. Future studies could also compare the effectiveness of dry needle acupuncture to other forms of alternative therapies. This study is important for starting the discussion on the impact of dry needle acupuncture for multi-modal treatment plans treating arthritis.

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Appendix

Appendix A
Osteoarthritis Grade Scale

OA Grade	Description
1	Suspicion based on history Recognised incongruity No OA changes on radiographs
2	Mild clinical signs Discomfort on examination of joint Early OA changes on radiographs
3	Moderate clinical signs Reduced range of motion of joint & crepitus Moderate OA changes on radiographs
4	Overt clinical signs Crepitus, thickening of the joint & pain Obvious OA changes on radiographs
5	Pronounced clinical signs Severe joint changes on palpation End stage joint disease on radiographs

Appendix B
Lameness Grade Scale

Criterion	Grade	Clinical evaluation
Lameness	1	Walks normally
	2	Slightly lame when walking
	3	Moderately lame when walking
	4	Severely lame when walking
	5	Reluctant to rise and will not walk more than five paces