Efficacy of Photobiomodulation in the Treatment of Osteoarthritis within the Coxofemoral Joint of the Canine.

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Objective:

The purpose of this study was to evaluate the effectiveness of PhotoBioModulation (PBM) in the treatment of Osteoarthritis (OA) within the coxofemoral joint of the canine.

Background:

Osteoarthritis (OA) is a very common degenerative disease affecting the articular cartilage in veterinary medicine[1,2]. OA of the coxofemoral joints in the canine species is associated with considerable inflammation, pain, degeneration of the articular cartilage, decreased range of motion all resulting in a significant decrease in quality of life. Often the only resolution of these cases is a surgical replacement.

When presented with a case of osteoarthritis, veterinarians recommend the basic treatment plan that is traditional in human medicine: weight loss[3], exercise, nonsteroidal anti-inflammatory pharmaceuticals (NSAIDs) and neutraceuticals[4], intra-articular medications[5,6,7] and rehabilitation techniques. The application of laser therapy is efficacious in the treatment of OA.[8] This is now an integral segment in the standard of care when treating OA of the coxofemoral joint in the canine.

Study Design:

Four different veterinary practices engaged in rehabilitation and utilizing Laser Therapy for PBM were supplied with case study forms (Figure 1). The case study forms were specifically designed to retrospectively collect information to evaluate the effectiveness of PBM in the treatment of OA within the coxofemoral joint of the canine.

The veterinarians were asked to record weight, age, breed, sex and coat and skin color for each patient on the case study form. The forms also required the following information both before and after PBM treatment: range of motion (degrees) of both the left and right coxofemoral joint in flexion and extension, lameness score at a walk, and pain score.

The quantity of physiologic or osteokinematic flexion and extension motion within the coxofemoral joints was measured using a goniometer.[9] These are actual geometric angle measurements due to the many different body types, breed and conformation characteristics unique to each patient.

The scoring system utilized for the subjective assessment of the patient's lameness at a walk is tabulated in Table 1.[10] A pain score was assigned using the scale in Table 2.[11,12]

Laser dosages (J/cm^2) administered to each coxofemoral joint, frequency of treatments and a notation of any changes in medical therapy were also recorded on the forms. Lastly, the veterinarians were asked to assign a number on the form to rate the success of the treatment plan utilizing the following scale:

1. Patient showed improvement
2. Patient showed no improvement
3. Patient's condition worsened.

All information was collected and summarized.

Table 1. Lameness Score

Score	Description of Patient's lameness at a walk
0	Normal walk
1	Slight, intermittent lameness
2	Obvious weight-bearing lameness
3	Severe weight-bearing lameness
4	Intermittent non-weight-bearing lameness
5	Continuous non-weight-bearing lameness

Table 2. The Pain Scale

Score	Range	Description of Pain
0	None	Pain free.
1	Mild	Pain is very mild, barely noticeable.
2		Minor pain. Noticeable on palpation. Comfortable when resting.
3		Pain is noticeable. Animal has adapted
4	Moderate	Moderate pain. Animal in pain but will still readily walk or play.
5		Moderately strong pain. Animal will respond but is reluctant.
6		Moderately strong pain that interferes with normal daily activities. Animal very reluctant to respond. Not eager to interact.
7	Severe	Severe pain that significantly limits ability to perform normal daily activities. Animal can't rest comfortably. Unwilling to move. Bites.
8		Intense pain. Physical activity is severely limited.
9		Excruciating pain. Constant crying out and groaning. Unresponsive to surroundings.
10		Unspeakable pain. Bedridden. Total loss of any quality of life.

Therapy Administered:

All patients were treated with Companion Therapy lasers by LiteCure, LLC. This laser system emits a calculated blend of 980 and 810 nm wavelength light, dependent on each patient's individual characteristics. The aiming beam wavelength is 650 nm.

All dosages were calculated and recorded in joules/cm^2. The frequency of treatments was also recorded. The number of days after the final re-evaluation was recorded. Range of motion measurements, lameness and pain scores and changes in medical therapy were made during re-evaluations and recorded at the final re-evaluation.

Results:

Data from thirty eight cases were collected and reviewed. One veterinarian (A Bancroft) used the forms to collect data on patients as she treated them. The remaining veterinarians collected the data on patients who had already been treated (retrospectively). Of the thirty eight cases submitted, three had incomplete data and were not included in the results.

After collection of the data the cases were further divided into two groups by the dosage administered in joules/cm^2.

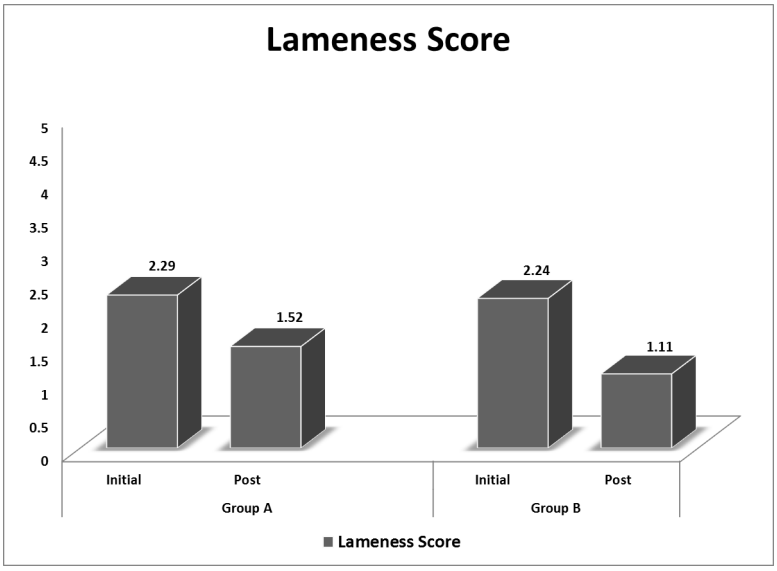
Group	Dosage	Number of Patients	Range	Average
A	10 J/cm^2 or less	17	4 - 10 J/cm^2	7.9 J/cm^2
B	>10 J/cm^2	18	12 - 24 J/cm^2	17.77 J/cm^2

Group	Number of patients	Weight (lb.)	Age (yr.)	Dose (J/cm^2)	Change in Lameness score (scale to 5)	Change in Pain Score (scale to 10)
All	35	66.66 ± 28.4	8.34 ± 2.88	12.97 ± 5.73	-1.06 ± 0.71	-2.43 ± 1.40
A	17	52.56 ± 21.72	8.24 ± 2.86	7.88 ± 2.00	-0.76 ± 0.55	-1.47 ± 0.50
B	18	79.97 ± 27.53	8.43 ± 2.89	17.78 ± 3.54	-1.33 ± 0.75	-3.33 ± 1.37

Results:

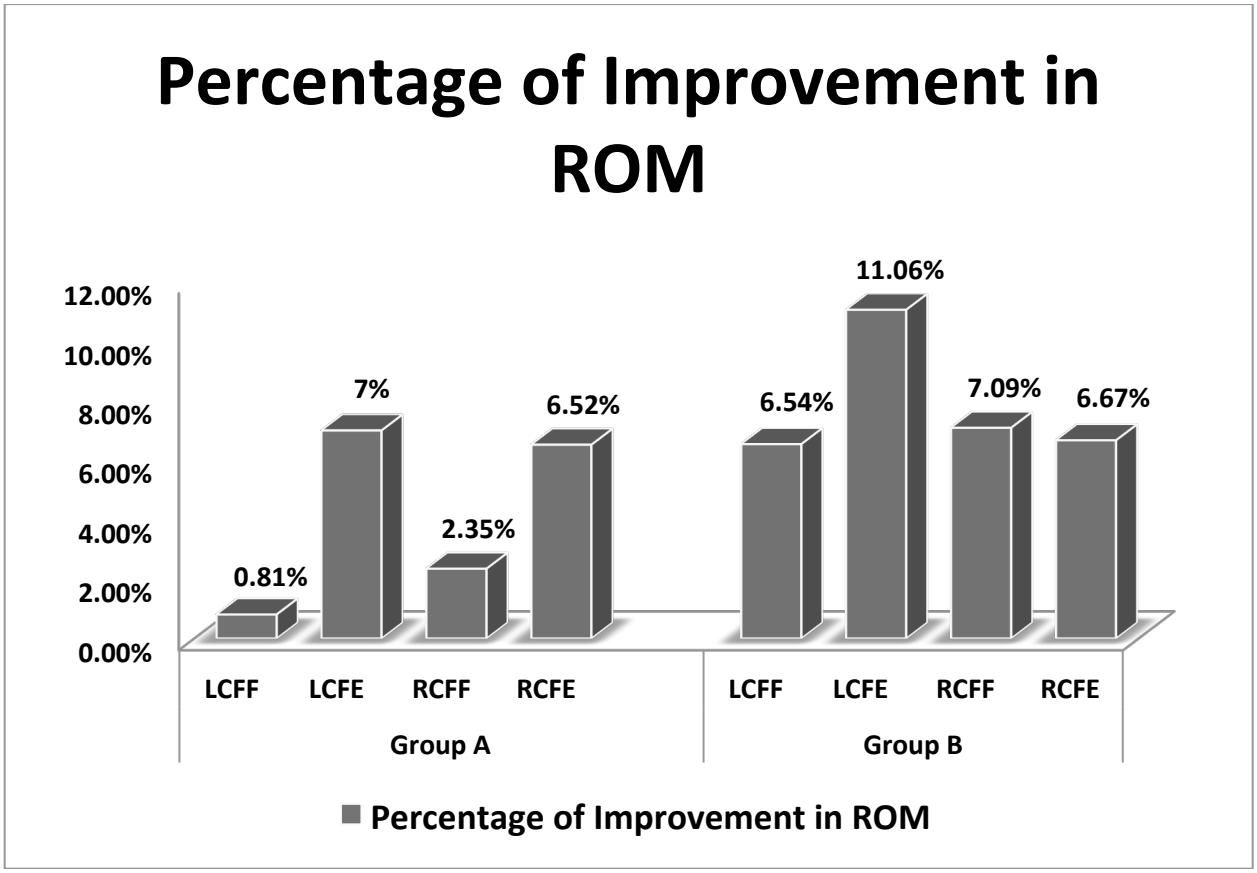
After Laser Therapy all patients demonstrated an increase in range of motion, and a decrease in pain, lameness and functional disability.

Lameness Exam Scores:



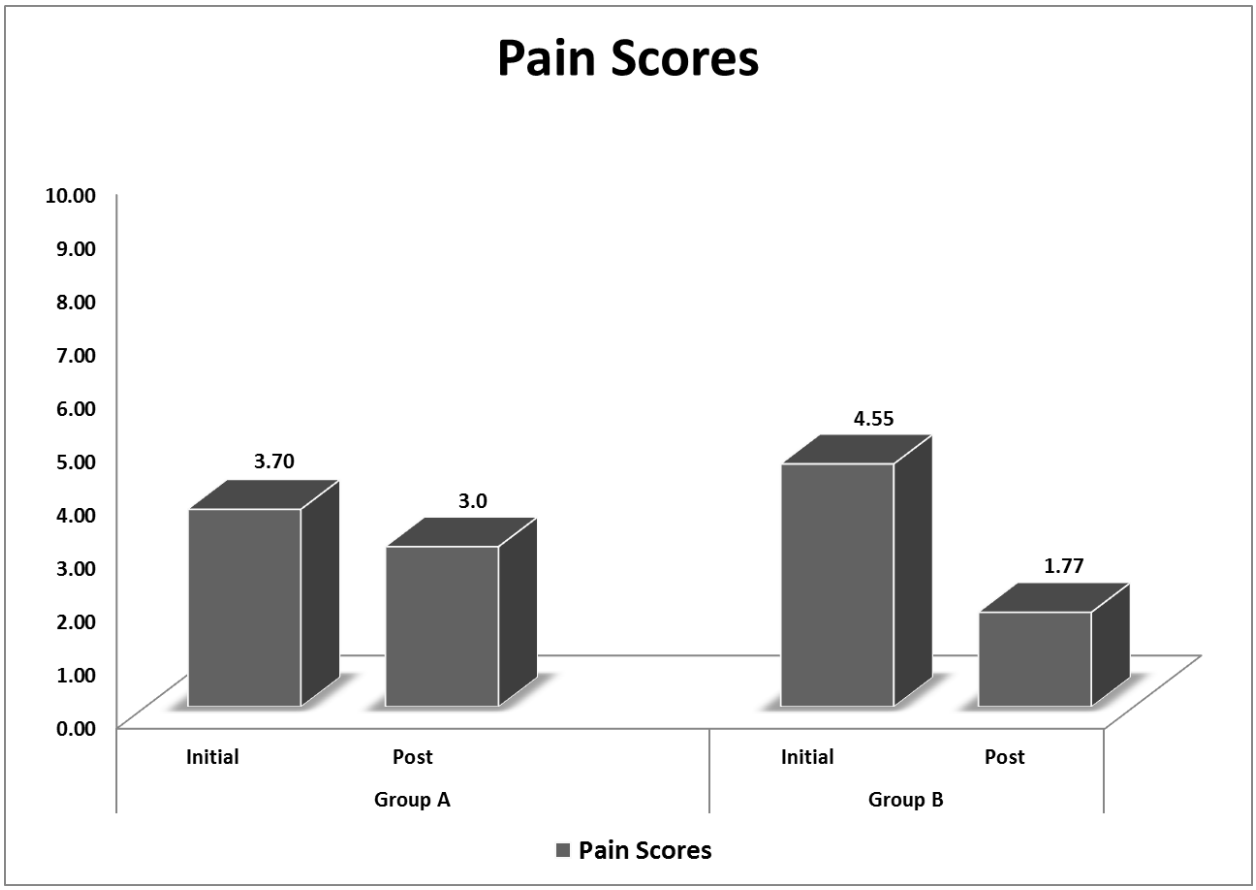
Initially the average lameness scores for both groups were equal. After therapy the group which received the higher dosage levels exhibited significantly lower average lameness scores.

Percentage improvement in ROM:



Both groups demonstrated an increase in range of motion post therapy. However there was a greater percentage change in both flexion and extension ROM within the group treated at the higher dosage levels.

Average Pain Scores:



Initially the pain scores in Group B were higher than those of Group A. After therapy, the pain scores were significantly lower in Group B than those of Group A.

Changes in medications:

There was one patient in each group that never received any medications prior to therapy nor post therapy.

No change in their pharmaceutical/nutraceutical regimen:

Group A: 8/17 Group B: 7/18

Reduction in their required medications:

Group A: 11.76% Group B: 50%

Increase in their required medications:

Group A: 35.29% Group B: 16.66%

Addition of neutraceuticals to their diet:

Group A: 29.41% Group B: 11.11%

Conclusions:

1. All patients demonstrated an increase in range of motion and a decrease in pain, lameness and functional disability.
2. PBM effectively treated OA within the coxofemoral (CF) joint of all the patients and significantly increased their quality of life.
3. A decrease in the lameness scores was greater in those patients receiving a dosage of > 10 J/cm^2. Group B.
4. There was an increase in the extension and flexion range of motion (ROM) within the CF joints of the patients receiving a dosage of > 10 J/cm^2. Group B.
5. There was a greater reduction in the pain scores for the patients that received a dosage of > 10 J/cm^2. Group B.
6. The number of patients that received a reduction in medications was greater in Group B than Group A.

Conclusions

Photobiomodulation effectively treated OA within the coxofemoral joint of all the patients and significantly increased their quality of life. There was an increase in the extension and flexion ROM within the CF joints of the patients receiving a dosage of > 10 J/cm^2. There was a greater reduction in the pain scores for the patients that received a dosage of > 10 J/cm^2. Since this data was collected in the practice environment, there were no control groups for comparison. Further study is warranted to clarify dosage and methodology. The application of photobiomodulation should always be considered a therapeutic option in the treatment of OA of the coxofemoral joint.

Figure 1.
Osteoarthritis Data Collection Form:

Patient number:
Weight:
Age:
Breed:
Sex:
Coat color:
Skin color:

Left coxofemoral joint range of motion flexion: _____ degrees
Left coxofemoral joint range of motion extension: _____ degrees
Right coxofemoral joint range of motion flexion: _____ degrees
Right coxofemoral joint range of motion extension: _____ degrees

Lameness score at walk: Grade ____ - description of score *include lameness scale*

Pain score: ___/___ - description of score *include pain scale*

Medical therapy (including nutraceuticals/supplements): Drug, mg, route, frequency

Laser therapy: *List all areas treated - Coxofemoral joint must be listed*

Laser dose per coxofemoral joint: ____ Joules/cm2
Frequency of treatment: *List number of sessions per week*

Medications changes: *List any changes to medial therapy in same format*

Reassessment (____ days post initial assessment):

Left coxofemoral joint range of motion flexion: ____ degrees
Left coxofemoral joint range of motion extension: ____ degrees
Right coxofemoral joint range of motion flexion: ____ degrees
Right coxofemoral joint range of motion extension: _____ degrees

Lameness score: Grade ____ - description of score
Pain score: ___/___ - description of score
Medical therapy (including nutraceuticals/supplements): Drug, mg, route, frequency

After 4-6 weeks of laser therapy to the coxofemoral joints, assign a number to rate the success of treatment plan: ____
1 Patient showed improvement
2 Patient is no better (showed no improvement)
3 Patient is worse

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