The Effects of Low-level Laser Therapy on the Gait of the Osteoarthritic Canine Hindlimb.

Georgia Lewis B.Sc (Hons) and Susan Holt B.Sc (Hons) PGCHE Cert PM&A RVN FHEA

HARTPURY UNIVERSITY

INTRODUCTION

Osteoarthritis (OA) is a chronic musculoskeletal condition that is commonly seen in dogs. Currently there is no cure and animals may develop adverse effects as a result of prescribed medications used to treat the condition. These medications can reduce quality of life and may affect the animal's overall lifespan. Low-level laser therapy (LLLT) is a non-invasive treatment that has been proven to reduce pain and inflammation. It has been used to treat numerous human pathologies by increasing vasodilation and adenosine triphosphate in damaged cells' mitochondria (Alfredo *et al.* 2018 and Gobbo *et al.* 2011) (Plate 1). However, existing evidence for the use of LLLT in veterinary species is predominantly anecdotal.

Research objective: To investigate whether LLLT is an ethical and valid modality in the management of pain and dysfunction caused by hindlimb OA in dogs.

METHODS

The repeated measures design assessed hindlimb gait with 2-D kinematic analysis, on a convenience sample of dogs (N=7) diagnosed with OA of the hindlimbs, before, mid-way and after a veterinary prescribed course of six treatments of LLLT. Each participant was fitted with reflective kinematic markers on anatomical landmarks on both hindlimbs (Plate 2).

Participants were recorded walking for 5 metres in both directions along a flat pavement. Maximum flexion and extension was recorded along the sagittal plane using Dartfish gait analysis software. LLLT was delivered following World Association for Laser Therapy guidelines to provide pulsed 10-12 j/cm^2 to each OA joint (Bjordal, 2012). The treatment was repeated twice a week for 2 weeks then once a week for 2 weeks.

Owners were asked to complete an evaluation using Likert scales at the end of treatment.

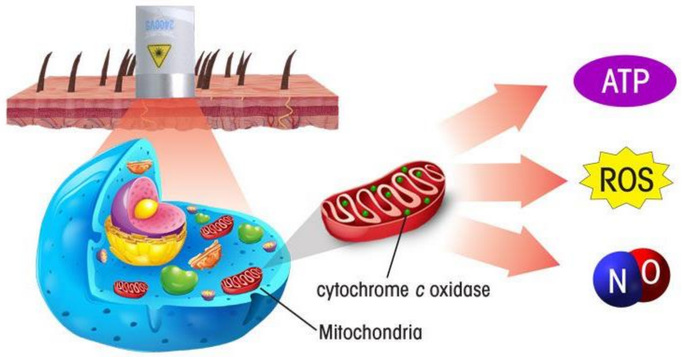

Plate 1: The Mechanisms of Photobiomodulation (LiteCure, 2018)

Plate 2: 2-D Hindlimb Kinematic Marker Placement

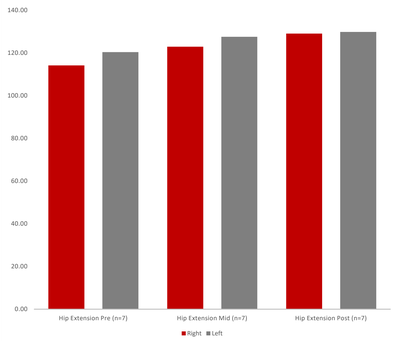

Figure 1: Cohort Mean Values of Hip Joint Extension Pre LLLT Treatment, Midway and Post Initial Course of LLLT Treatment

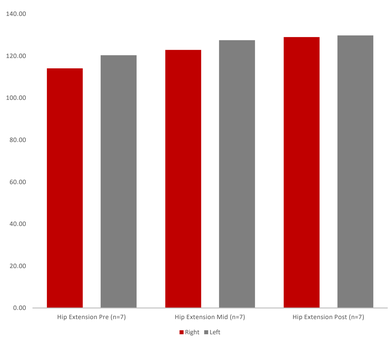

Figure 2: Cohort Mean Values of Stifle Joint Extension Pre LLLT Treatment, Midway and Post Initial Course of LLLT Treatment

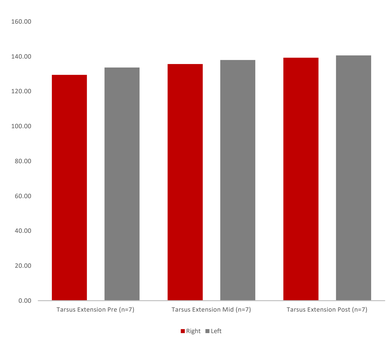

Figure 3: Cohort Mean Values of Tarsal Joint Extension Pre LLLT Treatment, Midway and Post Initial Course of LLLT Treatment

RESULTS

Data were analysed using non-parametric tests due to the low sample size. A Friedman's 2-way ANOVA was used to detect differences with a post hoc Wilcoxon signed rank test used where significance was found.

A significant increase in extension was noted in both the right (P=0.001) and left (P=0.003) hip and right (P=0.001) and left (P=0.001) tarsal joints between the cohorts' first and final recordings. There was also a significant increase in the cohorts' right (P=0.001) and left (P=0.001) stifle joint extension and right and left hip and tarsal joint flexion.

Owners also reported positive changes in their dogs' behaviour relating to decreased pain, after therapy had occurred.

CONCLUSIONS

These findings suggest that following LLLT, improved range of motion is seen in osteoarthritic canine hindlimbs, after a course of six treatments.

Whilst these results are promising, further research is required to elucidate the role of LLLT in the clinical management of dogs with OA.

REFERENCE: Alfredo P. P., Bjordal J. M., Junior W. S., Lopes-Martins R. Á. B., Stausholm M. B., Casarotto R. A. Marques A. P. and Joensen J. (2018) Long-term Results of a Randomised, Controlled, Double-blind Study of Low-level Laser Therapy Before Exercises in Knee Osteoarthritis: Laser and Exercises in Knee Osteoarthritis. *Clinical Rehabilitation* [Online]. 32, pp. 173 – 178. [Accessed 1 March 2018].

Bjordal J. M. (2012) Low Level Laser Therapy (LLLT) and World Association for Laser Therapy (WALT) Dosage Recommendations. *Photomedicine and Laser Surgery* [Online]. 30, pp. 61 – 2. [Accessed 2 February 2018].

Gobbo M., Ottaviani G., Mustacchi G., Di Lenarda R. and Biasotto M. (2011) Acneiform Rash Due to Epidermal Growth Factor Receptor Inhibitors: High Level Laser Therapy as an Innovative Approach. In: *Lasers in Medical Science*. 27, pp. 1085 – 1090.