

Effect of 4 Sessions of Low-Level LASER Therapy on Pain in Acute and Chronic Ankle and Foot Conditions

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Abstract

Background: Common foot and ankle conditions cause pain and limit functional everyday activities. LASER helps in reducing pain and promotes tissue healing.

Purpose: To study the effect of LASER on pain in common foot and ankle conditions.

Method: Pain score was assessed on numerical analogue scale. 4 sessions of LASER were given to all acute and chronic foot and ankle conditions. Physical therapy exercises were also advised wherever indicated.

Results: Pain scores showed improvement after 4 sessions of LASER (p value less than 0.05).

Conclusion: LASER can be used in common ankle and foot conditions to reduce pain and improve tissue healing.

Keywords: LASER, Ankle and Foot, Plantar fasciitis, Achilles tendinitis.

Introduction

Ankle and foot pain are significantly emerging entities in the field of Neuromusculoskeletal health¹. Increasing prevalence has sort attention to this otherwise overlooked area of Orthopedics. Current trends show Achilles tendinitis, Plantar fasciitis, Retrocalcaneal bursitis, Calcaneal spurs, Pes planus/cavus, chronic ankle sprains etc., to be affecting the general population at any given age group¹. Common characteristics between all these conditions is the damaged or non-healing soft tissues and fascia around the ankle joint and foot as a whole.

Tissue healing is an important aspect of recovery or maintenance of symptoms. Inadequate tissue healing leads to chronic ankle and foot pain. LASER or Light Amplification for Stimulated Emission of Radiation is one therapeutic modality that has emerged in Orthopaedic Physiotherapy as a tissue healer and pain reliever. It works at the cellular level and promotes tissue healing by fastening the stages of healing. Low level LASER therapy includes the application of light to body tissues to produce a photochemical effect that promotes healing and regeneration and reduces inflammation and pain².

Purpose of study

LASER works on tissue healing mechanism. There is a need to study its effects on pain in common ankle and foot conditions. Also there have been insufficient studies on LASER and its effects in ankle and foot conditions.

Methods

Common acute and/or chronic ankle and foot conditions including Achilles tendinitis, Plantar fasciitis, Retrocalcaneal bursitis, Calcaneal spurs, pes planus/cavus, chronic ankle sprains that presented to the OPD where included in the study. Other less common conditions included in the study were Hallux valgus, unspecified heel and foot pain, Post traumatic subtalar arthrosis, metatarsalgia, haglund's deformity, ankle synovitis and accessory navicular bone.

Pain score was recorded on a Numerical Pain rating scale on day 1 and day 4 of the treatment course. Physical therapy exercises were prescribed according to the condition presented to be done daily at home.

LASER was administered and progressed in the following sequence:

Day 1: Noncontact;8W/cm²; continuous/8 minutes over targeted areas of foot and ankle.

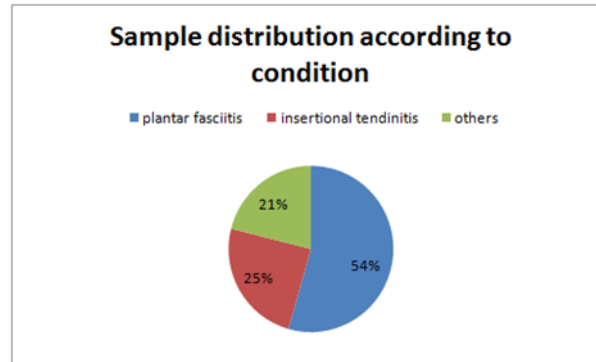
Day 2: Noncontact;8W/cm²; continuous/8 minutes over targeted areas of foot and ankle.

Day 3: Noncontact;9W/cm²; continuous/8 minutes over targeted areas of foot and ankle.

Day 4: Noncontact;10W/cm²; continuous/8 minutes over targeted areas of foot and ankle.

Statistics

Figure 1: Sample distribution according to condition



Total sample=57

Comparison of Pre and Post Pain scores for all conditions using paired t-test.

Pre pain scores mean= 7.97

Post pain scores mean= 4.15

P value <0.05 considered highly significant.

Condition wise pre post comparison

Condition	Average Pre mean	Average Post mean	P value
Plantar fasciitis	7.94	3.84	0.00
Achilles tendinitis	8.29	6.14	0.00
Others	8.00	2.14	0.00

P value <0.05 considered highly significant.

Results

- Figure 1 shows that plantar fasciitis and achilles insertional tendinitis were more common conditions among the total sample.
- Highly significant p value in t-test comparison proves that LASER was effective in reducing pain scores after 4 sessions of LASER.
- Condition wise pre post comparison with t-test also shows efficacy of LASER treatment.

Discussion

The present study showed that LASER was effective in reducing pain in acute and chronic ankle and foot conditions. Low level LASER therapy was applied for four sessions to all presenting common ankle and foot conditions including plantar fasciitis, Achilles tendinitis, haglund's deformity, flat feet, chronic ankle instability, etc.

The statistical analysis of pre and post treatment pain scores suggested that LASER can significantly relieve pain in ankle and foot conditions. The results of our study are consistent with the findings of previous studies that have studied the effect of Low-level LASER therapy in plantar fasciitis and other individual ankle and foot conditions^{3,4}.

Wei Wang et³ al in their systematic review and meta-analysis on the clinical efficacy of Low-level LASER therapy in plantar fasciitis have mentioned certain mechanisms of action such as Peripheral Neural blockade, enhancement of peripheral endogenous opioids, suppression of central synaptic activity, inhibition of histamine release, modulation of neurotransmitters, promotion of ATP production, reduction of muscle spasm and increased production of anti-inflammatory cytokines.

There have been certain inconsistencies reported in several studies regarding the dosage of LASER. In our study, there were progressively increasing dosages of LASER over a standard of 4 sessions taken consecutively over three to four days. Improvement in pain scores suggests that four sessions can be kept as a standard protocol for several of the mentioned ankle and foot conditions.

Study by James Jastifer et al⁴, on Low level LASER therapy for the treatment of chronic Plantar fasciitis have given six sessions of LASER therapy over a span of three weeks and have shown that there was substantial improvement in pain and functional scores in individuals evaluated over a period of three to twelve months.

Dovile, et al 2020⁵, compared the effect of high intensity LASER therapy (HILT) versus LLLT in the management of individuals with plantar fasciitis. Their primary outcome was the Visual Analogue scale (VAS). Individuals were randomised in two treatment groups. Statistical analysis showed that pain reduced in both the treatment groups but was inconclusive during group comparison.

In 2018, Banu et al ⁶, studied the effect of HILT vs LLLT in the management of plantar fasciitis in a Randomised controlled trial. This study was similar in design to the one done in 2020 and treatment but it showed better results in the HILT group.

Both the above-mentioned studies combined LASER with home based stretching exercises and use of silicon insoles. They proved the efficacy of LASER in reducing pain similar to the present study, but population was limited to individuals with plantar fasciitis. Our study included a much wider population with both acute and chronic conditions of the foot and ankle. Individual condition analysis also showed significant results thereby proving the objective of the present study.

Low level LASER therapy is thought to enhance leukocyte infiltration, macrophage activity, collagen deposition, cellular proliferation and neovascularization. Thereby, LASER promotes local healing and tissue remodeling^{3,4}. These mechanisms have been suggested to improve the common ankle and foot conditions recruited in our study such as chronic ATFL injuries leading to chronic ankle instability, Achilles tendinitis, Haglund's deformity and some cases of flat feet.

Conclusion

In the present study, individuals with acute or chronic Plantar fasciitis, Achilles tendinitis, flat feet, ankle instability and other conditions benefitted from 4 sessions of LASER given consecutively and pain scores improved significantly.

LASER is an effective tissue healing modality in reducing pain in acute and chronic ankle and foot conditions by promoting soft tissue healing.

Limitations

There were certain limitations in our study. Long term follow up could not be taken. There were some dropouts or individuals who could not complete all four sessions.

There was no control group for appropriate comparison of results.

Future scope of studies

Randomized controlled trials are needed to prove efficacy of LASER over a control group.

Also, short- and long-term efficacy and functional outcomes need to be studied in future research.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgement

Please acknowledge the contributors and make sure authors must obtain permission to acknowledge whose name is mentioned in the given section.

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