

Lower Level Laser as an Adjuvant in the Management of Symptoms of Lymphedema

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How to cite this article:

Nishad. K., Neljo Thomas, Barath Kumar Singh, *et al.*/Lower Level Laser as an Adjuvant in the Management of Symptoms of Lymphedema/J Orth. Edu. 2023;9(1):59-61.

Abstract

The lymphedema is a chronic and progressive disease which is associated with symptoms like swelling, heaviness, pain, discomfort, maceration of interdigital spaces, skin change and frequent skin ulcerations. There is no one single treatment modality that can give 100% therapeutic outcome in patients with lymphedema. Complete decongestive therapy is the gold standard treatment with good therapeutic outcome. In this article we are sharing our experience of using low level laser therapy as an adjuvant in the management of a patient with severe unilateral lower limb lymphedema.

Keywords: Lymphedema; Lower limb; Symptoms; LLLT; Low level Laser.

INTRODUCTION

Lymphedema is a chronic, progressive disease of the lymphatic system characterized by chronic inflammation, adipose tissue deposition, hyperkeratosis, and fibrosis secondary to the accumulation of excessive protein rich fluid in the interstitial spaces. Lymphedema can be primary lymphedema or secondary lymphedema. Primary

lymphedema can be either due to a developmental anomaly of lymphatic system in which the lymphatic vessels are either absent/poorly developed or due to any pathological processes that effect the lymphatic function. Secondary lymphedema develops after infection or any trauma. Lymphedema is characterized by multiple symptoms which include swelling, heaviness, pain, tenderness, repeated infections, and fibrosis which can be disabling for the patient.

Low level laser therapy is proven to be effective as adjuvant therapy in patients with lymphedema following mastectomy with axillary dissection with better results than any conventional treatment. And there is not enough data available for the effectiveness of the low-level laser in the management of symptoms of lower limb lymphedema. In this article we are sharing our experience in treating a patient with low-level laser as an adjuvant therapy.

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Received on: 16.12.2022 **Accepted on:** 02.01.2023

MATERIALS AND METHODS

This study was conducted in the department of Plastic Surgery at a tertiary care center, after getting the departmental ethical committee approval. Informed written consent was taken from the patient. The details of the patient in study are as follows:

A young female with no known co morbidities who is a diagnosed case of stage 4 primary lymphedema over one of her lower limbs, she gives a history of undergoing many treatments for the same, at present she is on intermittent pneumatic compression therapy. Even with the same patient was still getting symptoms like pain, heaviness, soreness, tenderness and recurrent infections.

Low level laser therapy was given to the lowerlimb as once a week, for a total of four sessions, using Gallium Arsenide (GaAs) diode red laser (wave length 650 nm, frequency 10 kHz and output power 100 mW) as a source of low-level laser. The machine delivers continuous beam laser with an energy density of 4 J/cm². Using non-contact delivery of laser in scanning mode with 60 cm distance between laser source and limb. In each session, the limb was given laser therapy for duration of 2 minutes followed by intermittent pneumatic compression for rest of the days.

The patient was evaluated both subjectively and objectively for any improvement of symptoms. Both before the addition of low-level laser therapy and after the 4 sessions of low-level laser. The symptoms that were considered were pain, feeling of heaviness, soreness, limb volume and skin changes.

DISCUSSION

Low level Laser therapy otherwise known as LLLT, is a form of phototherapy that use electromagnetic radiation uses energy much less than that is used for cutting or ablation therapy. Low-level lasers are defined as the lasers with power density less than 500 mW/cm².^{1,2} LLLT produces photochemical and photophysical effects which help in re-establishing cell homeostasis. The light energy is delivered topically in a controlled and safe manner and which is absorbed by chromophores that transform it into chemical energy.⁴ LLLT is used as an adjuvant to conventional therapy with promising results, in patients with chronic ulcers.³ and in patients with lymphedema over upper limb following axillary lymph node dissection for carcinoma breast.

Positive effects of LLLT are, speeds up tissue

RESULT

There were substantial improvements in subjective symptoms like pain, soreness, feeling of heaviness, and skin changes also showed improvement after the low level laser therapy, But no improvement in the limb volume was noted even after addition of low-level laser.



Fig. 1: Low Level Laser given over Lymphedema Lower Limb

repair, decreases inflammation, modulation, and it also helps in pain reduction.⁵

According to the literature, low-energy photo emissions given at a wavelength range of 600nm to 900nm accelerates cell proliferation and wound healing processes.⁶ Its action is thought to: Stimulate respiratory chain components such as flavin and cytochromes which increase adenosine triphosphate (ATP) synthesis,⁷ thus enhancing the rate of mitoses and increasing fibroblast numbers⁸⁻¹², Stimulate collagen and elastin production, leading to better re-epithelialisation¹³, Stimulate microcirculation and dilatation of the capillaries and neovascularisation to increase tissue oxygenation¹⁴, Liberate mediator substances such as histamine, serotonin and bradykinin to influence macrophages, Regenerate lymphatic vessels.

CONCLUSION

The low-level laser therapy is beneficial as an adjuvant therapy in the management of symptoms of lymphedema. But limitation of the study is, it was done on a single patient and needs large randomized control trials to draw a conclusive inference

Competing interest: None

Declarations: Author's contributions:

All authors made contributions to the article

Availability of data and materials: Not applicable

Financial support and sponsorship: None

Consent for publication: Not applicable

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