Case Report

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Role of Low-Level Laser Therapy (LLLT) in Management of Scald Burns

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Abstract

Scald burn wound is a common problem encountered by plastic surgeon. There various causes due to which the wound becomes non healing and fails to heal. However there is no well-established method that can acceleratethe wound healing rate. Various modalities are used to accelerate the rate of healing, like platelet rich plasma, local infiltration of insulin, irritant substances, laset therapy *et al.* This article highlights the role of low-level laser therapy in management of scald burns.

Keywords: Burns; Scald burns; Management; Wound healing; Low Level Laser Therapy.

INTRODUCTION

Adult wound healing comprises of three stages: the inflammatory phase, the proliferative phase, and the remodelling phase. These 3 stages have to occur in sequentially to result in healing of wound. Wound bed preparation is a new concept and can be summarized with the acronym T.I.M.E, T for tissue: non-viable or deficient. I for infection/ inflammation, M for moisture balance.[1] E for epidermis which was changed later to E for edge. scald wounds are difficult to manage and forms an important part of plastic surgery practice.[2] The wound bed preparation is an important part of wound healing in a chronic wound and includes supplementation of growth factors and facilitating vascular growth into the wound for a faster healing. The modality chosen here is low level laser therapy (LLLT). It is said to facilitate wound healing by improving collagen synthesis, neovascularization etc.

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MATERIALS AND METHODS

This study was conducted in the department of Plastic Surgery at 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: Alleged history of scald burns with history of accidental immersion of hand into hot tea on 15/6/23 at 4.30PM at home (Fig. 1)

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After debridement LLLT, (Fig. 2) was given to the burn area in each session. Gallium Arsenide (GaAs) diode red laser of wavelength 650 nm, frequency 10 kHz and output power 100 m W was used as a source of LLLT. It is a continuous beam laser with an energy density of 4 J/cm2. Machine delivers laser in scanning mode (non-contact delivery) with 60 cm distance between laser source and wound. In each session, the wound was given laser therapy for duration of 125 second followed by non-adherent dressing. Regular LLLT was given once every three days for a total of 6 session. It was also supplemented with various modalities like prolotherapy, autologous platelet rich plasma, insulin therapy



Fig. 1: At the time of admission

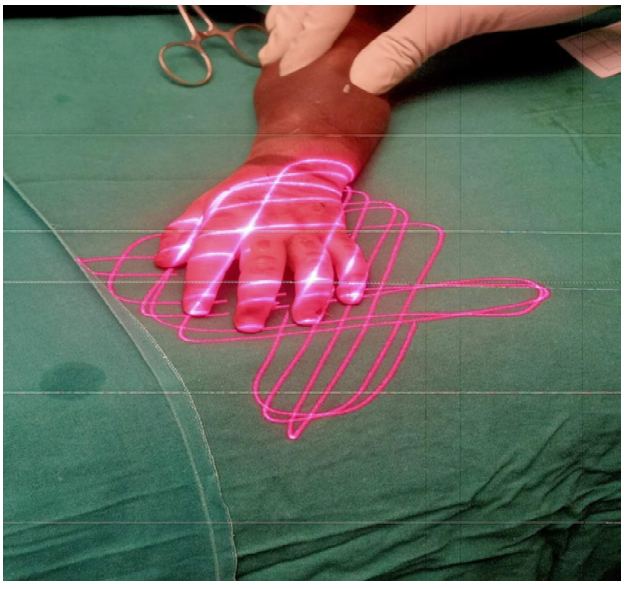


Fig. 2: low level laser therapy over burn surface

RESULTS

The wound due to scald burns healed completely (Fig. 3,4). LLLT is found feasible as adjuvant modality of wound healing in scald burns.



Fig. 3: Healed palmar aspect of hand



Fig. 4: Healed dorsum of hand

DISCUSSION

LASER can be abbreviated as "light amplification by stimulated emission of radiation". Low-level lasers have a power density at less than 500 mW/cm. It is defined as low level laser as the energy used is very much less than that is used for cutting,

ablation therapy. Low-level laser therapy (LLLT) is used as an adjuvant to available therapy, especially in patients with acute and bloody ulcers.[3] LLLT is a form of phototherapy that uses electromagnetic radiation capable of generating energy to interact with living tissues. It produces photochemical and photophysical effects and does not produce heat, with the intention of reestablishing cell homeostasis. Essentially, light energy is delivered topically in a controlled manner and is absorbed by photo-absorbers (chromophores) that transform it into chemical energy.[4]

Positive effects include acceleration of tissue repair, improved formation of granulation tissue, accelerated wound contraction, decreased inflammation, modulation, and pain reduction.[5]

According to the literature, low energy photo missions given at a wave length of 600 nm to 900 nm can accelerate cell proliferation and the wound healing processes.[6] It is thought to: Stimulate respiratory chain components such as flavin and cytochromes which increase adenosine tri-phosphate (ATP) synthesis,[7] thus increasing the rate of mitoses and increasing fibroblast numbers, promote collagen and elastin production, leading to better re-epithelialization, Stimulates microcirculation and dilatation of the capillaries and neovascularisation to increase tissue oxygenation, release mediator substances such as histamine, serotonin and bradykinin to influence macrophages, rejuvenate lymphatic vessels.

Limitations:

The study was done on a single patient and needs large population based study to apply in practice.

CONCLUSION

LLLT have qualities that make it possible to preserve the integrity and moisture of skin. LLLT is far more efficient and less expensive than the other treatments that are now accessible in terms of the quality and speed of wound healing. LLLT plays a vital role in healing of burns wound with the added advantages like minimal adverse effects, affordable, easily available and clinically proven. Therefore, we thoroughly recommend use of LLLT in management of scale burns. No negative effects noted with LLLT.

Authors' contributions

All authors made contributions to the article

Availability of data and materials

Not applicable

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None

Consent for publication

Not applicable

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