

Effect of Gender on outcome of Low-Level Laser Therapy (LLLT) Treated Post Burn Immature Scars.

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ABSTRACT

BACKGROUND

Burn is a major problem in low- and middle-income countries, with annual incidence of around 6-7 million per year in India. Post burn immature scars are reversible as well as preventable. Apart from conventional therapy various other measures exist for treatment of these scars, including Low level Laser Therapy (LLLT). No study has been reported from India on effect of gender on LLLT treated post burn immature scars.

METHODS

This is a prospective interventional study to see correlation of gender with effect of LLLT on post burn immature scars. Study was done in single institute with 41 subjects of post burn scars with LLLT for 8 weeks. Effect of LLLT was observed with Vancouver scar scale (VSS) score before and after intervention and observations were correlated with gender of the subjects.

RESULTS

Out of 41 subjects included, male subjects were 34.1% while female subjects were 65.9%. On analysis it was found that mean VSS score of scars at presentation was higher in male subjects (7.7) compared to that in female subjects (6.9). However, improvement in mean VSS score after 8 weeks of LLLT was similar in both genders.

CONCLUSION

Effect of LLLT on immature post burn scars is found to be similar in both genders, but large randomized multicentric trials are required to validate this study.

KEY WORDS

Gender; Low Level Laser Therapy (LLLT); post burn immature scars

1. INTRODUCTION

Burn is a major problem in low- and middle-income countries, with annual incidence of around 6-7 million per year in India. During rehabilitation phase, a burn survivor has to deal with multiple post burn problems, scar being one of them. Post burn scars have significant physical, psycho-social and socioeconomic impact on a burn survivor. A mature scar is flat, soft and supple with color matching with that of the surrounding skin. An immature scar is a red, sometimes itchy or painful and slightly elevated scar in the process of remodeling. Immature scars undergo repeated scar breakdown. This is a major problem in the post burn patients. Post burn immature scars are reversible as well as preventable. Pressure therapy is the conventional treatment of post burn scars. Apart from conventional therapy various other measures exist for treatment of these scars, including Low level Laser Therapy (LLLT). Effect of various adjuvant therapy modalities has not been established for treatment of these scars, and it is important to assess their effectiveness and set standard treatment protocols for these modalities. No study has been reported from India on effect of gender on LLLT treated post burn immature scars [1,2].

2. MATERIALS AND METHODS

This study was done in the Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical education and Research (JIPMER), Puducherry, India. Inclusion criteria was subjects with post burn immature (vascular, raised, non-pliable or itchy) scars. Exclusion criteria were subjects with acute burn wounds (<1month old), age >65 years, with diabetes/ radiation exposure, scars near eyes or >4 square feet area and subjects not willing to participate in the study. Withdrawal criteria was, if patient is not willing to continue with the study. Prospectively post burn patients coming to the plastic surgery outpatient department (OPD) of our institute satisfying the inclusion criteria during August 2018 to October 2019 after obtaining informed written consent were treated with LLLT with following specifications: Gallium Arsenide (GaAs) Diode Red Laser of Wavelength 650 nm with Output power 100 mW, frequency 10 kHz for Duration 125 sec in continuous beam mode at Interval of twice a week (not less than 3 days interval between two therapies) at a distance of non-contact delivery (60cm distance between laser source and scar) (Figure 1 and Figure 2).



Figure 1: Low level Laser therapy (LLLT) equipment

Outcome of LLLT treated patients were correlated using Vancouver Scar Scale (VSS) score before and after the treatment.



Figure 2: Treatment session

3. RESULTS

Total of 41 patients satisfied the inclusion criteria and were analysed (Table 1).

	Frequency	Mean VSS Score before LLLT	Mean VSS Score after LLLT	Difference in mean VSS score
Male	14 (34.1%)	7.7	7.1	0.6
Female	27 (65.9%)	6.9	6.2	0.7
Total	41			

Table-1: Difference in mean VSS score among both Gender

Out of 41 subjects included, male subjects were 34.1% while female subjects were 65.9%. On analysis it was found that mean VSS score of scars at presentation was higher in male subjects (7.7) compared to that in female subjects (6.9). However, improvement in mean VSS score after 8 weeks of LLLT was similar in both genders.

4. DISCUSSION

Burn is a major problem globally and has a significantly high incidence in low- and middle-income countries like India [1]. It is one of the major groups of traumas, second after roadside accidents in terms of annual incidence. Estimated incidence of burn injuries in India is around 6-7 million per year [2]. Out of these around 0.15 million people require prolonged rehabilitation [2]. The natural history of burn is not over with wound healing, but it is the starting point of a new set of post burn problems. Post burn problems are local problems associated with scar hypertrophy, contracture, pruritis and disfigurement as well as systemic problems like hyper-metabolic state, nutritional deficiency and anemia. There is a significant psycho-social and socioeconomic impact of post burn problems over burn survivors [3]. Burn victims are in need of support from health-care system during acute burn injury as well as post burn rehabilitation. Problem of burn rehabilitation is further important because most of the burn survivors are of age group 15 to 40 year, which is most productive age group of the

society.² Scar is defined as replacement of normal tissue with fibrous tissue after injury or disease [4]. All wounds heal by scar formation; burn wound is not an exception to that. History of scars dates back to sixteenth century when Amboise Pare first used pressure for the treatment of scars [5]. In 1678 Johnson has mentioned pressure for scar management in his notes [5]. Then in 1790 Petz has given first full medical description of scars [5]. During healing process, the burn wound develops bridge of collagen fibers with a thin epithelium, forming an immature (active) scar [6]. An immature scar is characterized by its red, raised and rigid mass like appearance. Scar becomes flatter, less vascular and more pliable with maturation. Burn scars may take up to two years or longer to mature [6]. There are high chances of hypertrophic scarring in burn wounds [7].

An immature scar should physiologically remodel and mature over time and become more similar to normal skin. Hypertrophic scar (HTS) represents abnormal healing in which scar is stuck in the immature phase [8]. HTS also undergo some amount of remodeling and maturation over time [8]. Clinical spectrum of immature scars includes vascular scars (pink, red or purple colored scars which blanches on pressure), hypertrophic scars (raised from the normal surrounding skin level), inelastic scars (non-pliable) and hyper-pigmented or hypo-pigmented scars. Immature scars may be associated with itching and discomfort to the patient. If these scars are across the joint, it may lead to contracture formation. If these scars are near any natural opening it may cause narrowing of that opening like microstomia, ectropion or nostril contracture. These scars are also cause of various deformities [9,10].

This study shows that there is unequal distribution of gender in subjects coming to plastic surgery out-patient department (OPD) for complaint of problematic post burn scars. It was found that two thirds (65.9%) of them are females. This distribution pattern of gender is multifactorial. Higher incidence of burns in female population and lower rate of OPD follow up by male burn survivors are possible reasons. This data cannot be extrapolated to general population as the inclusion criteria is limited to the subjects coming to OPD only. Higher mean VSS score in male subjects may indicate that post burn male subjects seek healthcare only when scar is worse compared to female subjects. LLLT is found to be equally beneficial in both genders for these scars.

All scars included in present study showed either improvement or no change in VSS score after starting of therapy. No scar worsened after starting of therapy. In present study we did not find any side effect of LLLT on scars. Neither any systemic side effect was observed during study period. LLLT is a safe laser, considered to be a non-heat producing laser. It is classified as laser safety class III b. Shortcomings of present study are that we did not consider categorization of scars based on location of scar, extent of original burn injury, previous operative wound management, and presence of skin graft over the scars. These may be confounding factors contributing to errors. We used scanning mode laser machine, which has advantage of covering large surface area in one sweep. Problem with scanning mode is it decreases power density of the laser due to scattering effect. Also, the power density is variable based on area covered. There is no study correlating gender with outcome of LLLT treated immature scars.

The limitation of the study includes single centre, small sample size & no statistical analysis done.

5. CONCLUSION

Male to female ratio was 1:2 in subjects coming to healthcare OPD for post burn problem scars. Scar was worse in male subjects compared to female subjects at the time of presentation. Effect of LLLT on immature post burn scars is found to be similar in both genders. Large randomized multicentric trials are required to validate these findings.

6. CONFLICTS OF INTEREST

None

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