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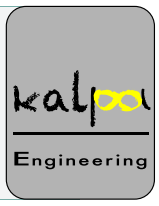

Light Treatment for Healing Burns

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Abstract

This research aims to evaluate the effect of low-level laser therapy (LLLT) on the healing of the burn for the mouse. Four mouses are divided into 4 groups. Group 1, 2, 3 are irradiated by a wavelength of 532nm, 850nm, and 940nm. Group 4 is a control group that has a natural recovery. Low-level laser therapy makes the regenerative process, healing occurs faster, and rehabilitation of mouse activity during treatment.

1 Introduction

Burns are among the most devastating of all injuries. They are healing to leave with sequelae of disability and deformity with outcomes ranging the spectrum from physical and disabilities. The burn is caused by fire, scald burns, electrical burns, radiation, and chemical burns that occur regularly in work, life, especially severe burns caused by fire accidents.1 The healing process of burn wounds induces thermal injury tissue inflammation, edema, hypertrophic, and scar formation.

Currently, there are different methods to reduce the inflammatory process, improvement of cellular nutrition, and repair injured tissue, particularly LLLT. It is used to treat various musculoskeletal conditions, pain control, and wound healing. The effectiveness of this therapy makes stimulating the cell proliferation of fibroblasts, keratinocytes, endothelial cells, and lymphocytes.2

Therefore, this study aims to evaluate the effect of low-level lasers on the treatment of burn wounds on the mouse.

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2 Material and method

Field mouses (Apodemus sylvaticus) have weighed from 90 g to 110 g which are taken care of in the same condition. The dorsal of the mouses were shaved. Each mouse has created the burn by the aluminum bar with a surface area of 1 cm2 at approximately 80 degrees celsius, 20 seconds. They were divided into four groups randomly. The burns are shown in figure 1.

All mouses have undergone random assignment into four groups. The first group is burned and treated with a wavelength of 532nm. The second group is burned and treated with a wavelength of 850nm. The third group is burned and treated with a wavelength of 940nm. And a group of witnesses, burned and are not treated, mice since injuries. The mouse is raised in the following groups, in the same environment as the normal air temperature.

The laser probes which have wavelengths of 532nm, 850nm, 940nm are low-level lasers. Each animal in each low-power laser treatment group is properly irradiated with treatment devices with 532nm, 850nm, and 940nm wavelengths for 2 minutes using a stopwatch. The irradiation technique was by scanning the entire perimeter of the wound. The treatment groups were irradiated two days a day for two minutes at a time. After the projection of the wound, it was imaged over time as the experimental diagram in figure 2. Each animal in each low-power laser treatment group is properly irradiated with treatment devices with 532nm, 850nm, and 940nm wavelengths for 2 minutes using a stopwatch. The irradiation technique was by scanning the entire perimeter of the wound.

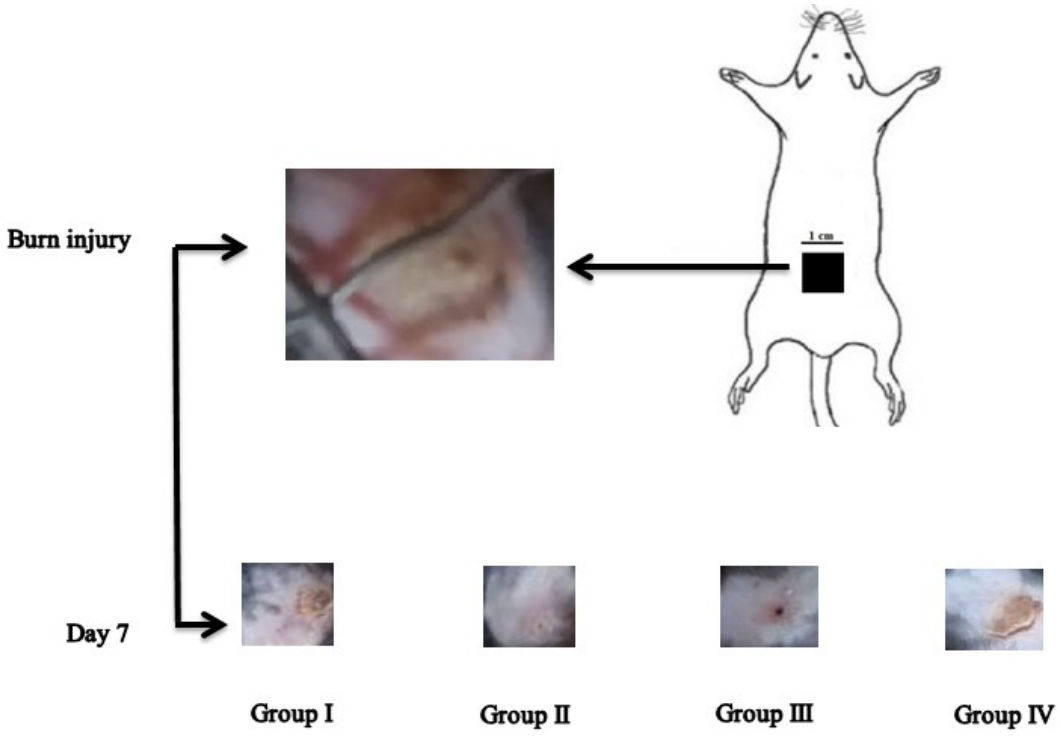
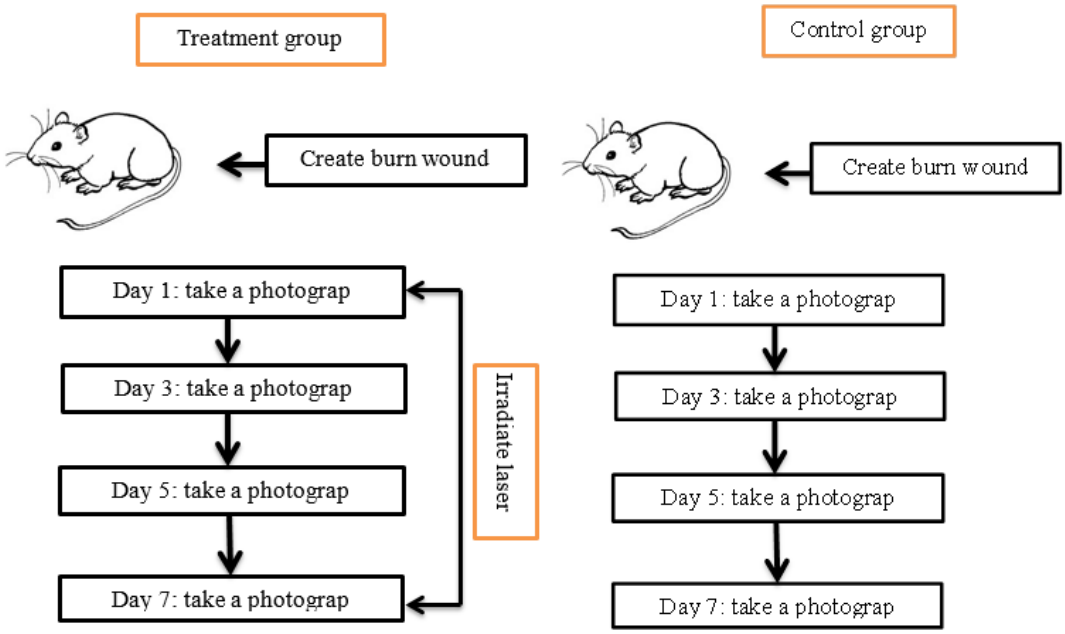


Figure 1: Effect of low-level laser in the treatment of burn wounds in mouses models



3 Result

After the experiments showed that the impact of laser with wavelengths of 532nm, 850nm, 940nm has the effect of helping to recover burn wounds. Helping the process of regenerating and recovering wounds faster, reducing the time for treatment, without inflammation, increasing the activity of mice during treatment.

Group I: 532nm laser wound healing after 8 days of treatment and fastest hair growth rate compared to the remaining groups, but there are scars during treatment. Group II: Laser irradiation with 850nm wavelength helps recover wounds quickly after 7 days of treatment and does not leave scars during treatment. Group III: Laser irradiation with 940nm wavelength to help recover wounds quickly after 7 days of treatment and leave scars during treatment. Group IV: The control group has not healed yet.

4 Conclusion

Healing wounds are a slow process with a high risk of infection and creating a scar, which can lead to large scars and costs related to the wound3. The use of light treatment seems to be a promise in the treatment of wounds. Many studies have previously shown that low-level lasers improve the healing process, reducing inflammation 4-5. However, the effect of low-level lasers is still controversial. Many investigators show the increased injuries and injuries quickly. The same number of studies that do not work on. In our current study, the low-level laser with a wavelength of 532nm, 850nm, 940nm, was acting as such to burn wounds in the mouse model. The low-level laser with wavelengths of 850nm, 940nm has a deep penetration of the skin from 2-3 millimeters due to poor adsorption to water and skin pigmentation. They have a profound effect on the thanks to the bio-stimulatory effect on the healing process increases the production of oxidants, which in turn leads to oxidative damage to lipids, proteins,

and DNA, as well as cellular necrosis, thus impairing the recovery of the tissue to reduce the size of the wound6.

Laser with a 532 wavelength of 532 affects the upper layer and a little bit of an increase in intermediate inflammation such as neutrophils, macrophages to resolve the infection. Besides, some studies also show that the healing process of the wavelength of light is higher than the wavelength of visible light. But according to our experiment, it's quite the opposite. Laser on the wavelength near-infrared gives a better result than the visible wavelength.

Conflicts of Interest

The authors declare no conflicts of interest.

Acknowledgment

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