Effect of low-level laser therapy in the myonecrosis induced by Bothrops jararacussu snake venom.

Abstract
OBJECTIVE:
The aim of this work was to investigate the capacity of low-level laser therapy (LLLT) alone or in combination with antivenom (AV) to reduce myonecrosis induced by Bothrops jararacussu snake venom.
BACKGROUND DATA:
Myonecrosis is the most pronounced local effect caused by B. jararacussu venom. AV therapy and other first-aid treatments do not reverse these local effects.
MATERIAL AND METHODS:
Male Swiss mice were used. Myonecrosis was induced by injection of 0.6 mg/kg of B. jararacussu venom in the right gastrocnemius muscle and was evaluated at 3 or 24 h after venom injection. The site of venom administration was irradiated for 29 s with a low power semiconductor laser (685 nm) at a dose of 4.2 J/cm(2). Intravenous AV therapy (0.5 mL dose) was administered at different times: 30 min before venom injection or 0, 1, or 3 h afterward. Both AV therapy and LLLT treatments were duplicated in mice groups killed at 3 or 24 h.
RESULTS:
B. jararacussu venom caused a significant myonecrotic effect 3 and 24 h after venom injection. LLLT significantly reduced myonecrosis by 83.5% at 24 h ($p < 0.05$) but not at 3 h, and AV therapy alone was ineffective for reducing myonecrosis at 3 and 24 h.
CONCLUSION:
Only LLLT significantly reduced myonecrosis of the envenomed muscle, suggesting that LLLT is a potentially therapeutic approach for treating the local effects of B. jararacussu venom.

http://www.ncbi.nlm.nih.gov/pubmed/21166811

Low-level laser therapy promotes vascular endothelial growth factor receptor-1 expression in endothelial and nonendothelial cells of mice gastrocnemius exposed to snake venom.

Dourado DM, Fávero S, Matias R, Carvalho Pde T, da Cruz-Höfling MA.
Source
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Abstract
Crotalinae snake venoms cause severe local myonecrosis and microvasculature failure at the bite site. We evaluated whether low-level laser therapy (LLLT) could accelerate angiogenesis and myoregeneration in male Swiss mice injected with Bothrops moojeni venom through immunohistochemistry of the vascular endothelial growth factor receptor-1 (VEGFR-1). Envenomed gastrocnemius was either unirradiated (V) or irradiated with HeNe (VHN, 632.8 nm) or GaAs (VGA, 904 nm, 10000 Hz). Animals sacrificed at 3 and 12 h were irradiated once (4 J cm(-2)), at 24 h (twice) and at 3, 7, 21 days (4, 8, 22 times, respectively). At 3 days, LLLT increased angiogenesis (80%:HeNe vs 40%:GaAs), decreased neutrophils and increased proliferation of regenerating cells. However, after 21 days, myoregeneration observed in the VHN group appeared delayed compared with the V group. As LLLT improved revascularization, the suggestive delay in myoregeneration could be a dose-response inhibitory effect caused by multiple irradiations in myogenesis. The immunodetection of VEGFR-1 in neutrophils, macrophages, satellite cells, fibroblasts, Schwann cells and skeletal and smooth muscle fibers (not seen in saline-controls) at only the acute stages of envenoming suggests a mediator role for VEGFR-1 in local alterations. This is the first time that VEGFR-1 expression, and its modulation by

photostimulation, has been demonstrated in endothelial and nonendothelial cells of snake envenomed skeletal muscle.
http://www.ncbi.nlm.nih.gov/pubmed/19530909

The ability of low level laser therapy to prevent muscle tissue damage induced by snake venom.

Doin-Silva R, Baranauskas V, Rodrigues-Simioni L, da Cruz-Höfling MA.

Source

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Abstract

Antivenom therapy has been ineffective in neutralizing the severe local fast developing tissue damage following snakebite envenoming. Herein, some effects of in situ helium neon (HeNe) laser irradiation on rat nerve-muscle preparation injected with Bothrops jararacussu venom are described. The tibialis anterior muscle was injected with venom diluted in 0.9% saline solution (60 microg/0.02 mL) or saline solution alone. Sixty minutes after venom injection, laser (HeNe) treatment was administered at three incident energy densities: dose 1, a single exposure of 3.5 J cm(-2); dose 2, three exposures of 3.5 J cm(-2); dose 3, a single exposure of 10.5 J cm(-2). Muscle function was assessed through twitch tension recordings whereas muscle damage was evaluated through histopathologic analysis, morphometry of area of tissue affected and creatine kinase (CK) serum levels, and compared to unirradiated muscles. Laser application at the dose of 3.5 J cm(-2) reduced the area of injury by 64% (15.9 +/- 1.5%vs 44.2 +/- 5.7%), decreased the neuromuscular blockade (NMB) by 62% (11.5 +/- 2.5%vs 30.4 +/- 5.2%) and reduced CK levels by 58% (from 455 +/- 4.5% to 190.3 +/- 23.4%) when compared with unirradiated controls. Dose 2 showed a poorer benefit than dose 1, and dose 3 was ineffective in preventing the venom effects. Measurements of the absorbance of unirradiated and irradiated venom solution showed no difference in absorption spectra. In addition, no difference in the intensity of partial NMB in nerve-muscle preparation was shown by unirradiated and irradiated venom. The results indicate that the laser light did not alter venom toxicity. We conclude that HeNe laser irradiation at a dosage of 3.5 J cm(-2) effectively reduces myonecrosis and the neuromuscular transmission blocking effect caused by B. jararacussu snake venom. Thus, low level laser therapy may be a promising tool to minimize the severity of some of the local effects of snake envenoming.

Effect of low-level laser therapy in the inflammatory response induced by Bothrops jararacussu snake venom.

Barbosa AM, Villaverde AB, Guimarães-Souza L, Ribeiro W, Cogo JC, Zamuner SR.

Source

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Abstract

This article reports the effect of low-level laser therapy (LLLT) on the edema formation and leukocyte influx caused by Bothrops jararacussu snake venom as an alternative treatment for Bothrops snakebites. The inflammatory reaction was induced by injection of 0.6 mg/kg of B. jararacussu venom, in gastrocnemius muscle. Cell influx and edema were evaluated at 3 or 24h after venom injection. Mice were irradiated at the site of injury by a low-level laser (685 nm) with a dose of 4.2J/cm(2). A therapy that combines LLLT and antivenom was also studied. B. jararacussu venom caused a significant edema formation 3 and 24h after its injection, and a prominent leukocyte infiltrate composed predominantly of neutrophils at 24h after venom inoculation. LLLT significantly reduced edema formation by 53% and 64% at 3 and 24h, respectively, and resulted in a reduction of neutrophils accumulation ($P<0.05$). The combined therapy showed to be more efficient than each therapy acting separately. In conclusion, LLLT significantly reduced the edema and leukocyte influx into the envenomed muscle, suggesting that LLLT should be considered as a potentially therapeutic approach for the treatment of the local effects of Bothrops species.

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18439641
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