http://dx.doi.org/10.1590/1981-22562018021.170116

Effects of photobiostimulation in the treatment of post-herpetic neuralgia: a case report

Raimundo Nonato Silva Gomes[1]
Larissa Vanessa Machado Viana[1]
Jenniffer de Souza Ramos[1]
Nilza Maria da Nave e Castro[1]
Renata Amadei Nicolau[1]

Abstract

Objectives: to describe the effect of photobiomodulation therapy in the treatment of post-herpetic neuralgia in the elderly. *Case report:* a female patient, 61 years old, 56 kg, 1.67cm tall, sought treatment at the Laser Therapy Center of the Universidade do Vale do Paraíba, in the city of São José dos Campos, São Paulo, Brazil, on October 27, 2015. She had been diagnosed with herpes zoster on September 4, 2015 with complaints of intermittent neuralgia in the long thoracic nerve path and spikes of intense pain (level 10, according to the analogue pain scale). Photobiomodulation was performed with low intensity laser spot irradiations at 20 points around the herpesvirus nerve, with a distance of 2cm between each point. Irradiation was performed at each point after 20 seconds, with 3J/cm^2 per point and total energy of 60 J. At the end of the treatment the pain level was 0 and the patient exhibited a normal sleep pattern (8 hours of sleep). *Conclusions:* Photobiomodulation treated painful discomfort, improved the quality of life of the patient and proved to be an effective, safe and promising treatment, with significant potential to become the therapy of choice in such cases.

Keywords: Herpes Zoster. Elderly. Neuralgia. Low-Intensity Laser Therapy.

[1] Universidade do Vale do Paraíba, Instituto de Pesquisa e Desenvolvimento, Programa de Pós-graduação em Engenharia Biomédica. São José dos Campos, SP, Brasil.

Correspondence
Raimundo Nonato Silva Gomes
E-mail: raigomezz19@gmail.com

INTRODUCTION

The name herpes comes from the Greek *herpein* which means "that emerges unexpectedly," as the condition in its different viral forms may remain latent for years until primary infection breaks out[1].

The varicella-zoster virus (VZV) is a *herpesvirus* that causes chickenpox and remains latent in the nervous system after a primary infection. The reactivation of VZV in the cranial nerve or in the dorsal root ganglion, which propagates along the sensory nerve to the dermatome, leads to painful cutaneous manifestations, a condition known as herpes zoster[2].

The reactivation of *herpesvirus* is closely correlated with the immune system, as the disease mainly occurs in individuals immunocompromised by other diseases, such as cancer, acquired immunodeficiency syndrome, post-transplant immunosuppression and chemotherapy. There is a strong correlation between the increased incidence of herpes zoster (HZ) with increasing age, especially among those over 55 years, as advanced age is associated with a decline in T cell-mediated immune response[1,3].

The clinical picture of HZ is almost always typical. The majority of patients report neuralgic pain prior to skin lesions, in addition to local paresthesia, burning and pruritus, accompanied by fever, headache and malaise. The elemental lesion is a vesicle with an erythematous base. The rash is unilateral, rarely crosses the midline, and follows the path of a nerve. The symptoms emerge gradually, establishing themselves over two to four days[2,4].

Most diagnoses are performed clinically without the need for further tests. Several other skin diseases may appear similar, and should be considered as part of a differential diagnosis. The diagnosis is more likely to be HZ in those with a previous known history of varicella and with the classic manifestations: prodromes of pain, cutaneous eruption and dermatome distribution and neuralgia[1,2].

Neuralgia, the most common symptom in patients with HZ, is characterized by chronic neuropathic pain in the affected nerve pathway. It lasts for at least one month, begins between one and six months after the rash has been cured, and may persist for years. The incidence of post-herpetic neuralgia (PHN) varies between 10% and 20% in immunocompetent elderly persons[5].

Therefore, the use of low intensity laser treatment (LIL) represents a viable therapeutic approach to PHN treatment. In the health sciences LIL has been consistently employed in clinical practice due to its anti-inflammatory, analgesic and anti-edematous effects and contribution to tissue repair[6]. The effects mentioned also include an acceleration in the process of bone sedimentation and the degranulation of mast cells, as well as promoting an increase in peripheral circulation, vasodilation and fibroblastic proliferation[7].

Therefore, the present case report aimed to describe the effect of photobiomodulation in the treatment of post-herpetic neuralgia in the elderly.

CASE REPORT

The present study was carried out at the Laser Therapy and Photobiology Center of the Universidade do Vale do Paraíba (UNIVAP), in São José dos Campos, São Paulo, Brasil, following approval from the UNIVAP Research Ethics Committee, under protocol No. 1.610.060, on 24/06/2016. Prior to starting treatment, the patient was informed of all the treatment steps and the subsequent description of the clinical case for possible publication. She was invited to sign a Free and Informed Consent Form that guaranteed the safeguarding of her identity and her right to withdraw from the study at any time.

A female patient, aged 61 years, 56kg, 1.67cm tall, born in São Paulo, Brazil, currently residing in the state of Florida, USA, who had refused the use of licit and/or illicit drugs, sought the Laser Therapy Center on October 27, 2015 with complaints of intermittent neuralgia and peaks of intense pain (level 10, according to the analogue pain scale). She described the first symptoms of the disease (severe neuralgia) as having occurred in June 2015 and was diagnosed with HZ on September 4, 2015. The clinical picture of intense neuralgia was maintained.

When she sought the Laser Therapy Center the patient was undergoing the same treatment as prescribed at the time of diagnosis: acyclovir

(400 mg, orally, five times a day for seven days), gabapentin (300 mg every 12 hours) clonazepam (0.5 mg every 12 hours), tramadol (50 mg orally every 12 hours) and dipyrone (500 mg orally every 8 hours) to aid in the treatment of HZ and PHN, without significant effects according to the patient's reports. She complained of neuropathic pain in the long thoracic nerve tract, a site previously proliferated by vesicles characteristic of HZ.

The irradiations were performed by legal and technically qualified professionals using lab coats, goggles, gloves, hats and masks (Figure 1). Sterile gauze soaked in 70% alcohol was used to remove soils from the irradiated site to improve light penetration into the tissue. The apparatus was coated with clear plastic to prevent possible contamination.

Laser therapy was performed at 20 points around the herpesvirus nerve, with a distance of 2cm between each point. The demarcation of the points on the skin was performed with the aid of a hypoallergenic long-lasting, moisture resistant pen. The measurement of the distance between the points was performed with a ruler. Irradiation was performed by the transcutaneous technique (direct contact with the skin), for 20 seconds at each point, with energy of 3J/cm^2 per point, total energy of 60J and a beam area of 0.5cm^2. The laser device used was a cluster of five GaAlA lasers (Clean Line, Brazil) with a wavelength of 654 nm (red) and power of 200mW.

Ten laser therapy sessions were instituted, with two irradiations per week. At the final stage of treatment (the last three irradiations) only one irradiation per week was performed. Pain level[8,9] (Table 1), quality of life (Table 2) and sleep pattern were assessed at each session to accompany the therapy. The pain level was evaluated based on the Analog Pain Scale[8], sleep pattern was evaluated based on a guiding question about the quality and quantity of sleep hours, while quality of life was evaluated through the SF-36[10].

The guiding question was used to evaluate, in each session of the photobiomodulation, the quality and quantity, in hours, of sleep. At the beginning of the treatment (until the third session) the patient reported a maximum of three hours of sleep under the effect of medication (gabapentin, clonazepam and tramadol). In the interval between the fourth and seventh LIL sessions there was a significant improvement in sleep patterns (about five to six hours of deep sleep). Between the eighth and tenth photobiomodulation sessions there was stabilization in sleep patterns, with about eight hours per day of deep sleep.

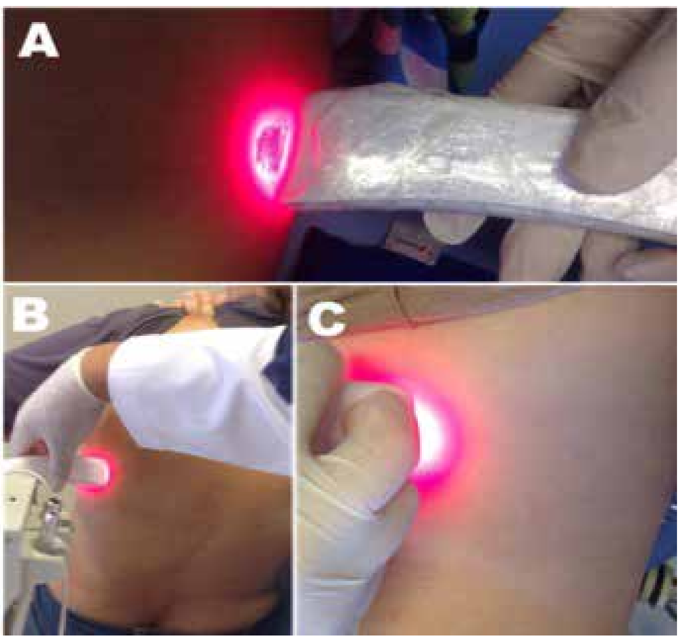

Figure 1. Low intensity laser irradiations. São José dos Campos, São Paulo, 2016.

Table 1. Assessment of pain level (Analog Pain Scale). São José dos Campos, São Paulo, 2016.

Irradiations	Pain Level	Type of treatment
0	9 (continuous pain)	AV + AC + BD + OP + DIP
1st	8 (intermittent pain)	AV + AC + BD + OP + DIP + LIL
2nd	8 (intermittent pain)	AV + AC + BD + OP + DIP + LIL
3rd	8 (intermittent pain)	AV + AC + BD + OP + DIP + LIL
4th	7 (intermittent pain)	AV + AC + BD + OP + DIP + LIL
5th	5 (at night only)	AV + AC + BD + OP + DIP + LIL
6th	5 (at night only)	LIL
7th	4 (at night only)	LIL
8th	3 (at night only)	LIL
9th	2 (at night only)	LIL
10th	0	LIL
Reassessment	0	No treatment

AV: antiviral; AC: anticonvulsant; BD: benzodiazepine; OP: opioid; DIP: dipyrone; LIL: low intensity laser treatment.

Table 2. Assessment of quality of life using SF-36. São José dos Campos, São Paulo, 2016.

SF-36 Domains	Initial assessment	Final assessment
Functional capacity	25	85
Physical aspects	20	90
Pain	0	100
General health status	10	90
Vitality	0	90
Social aspects	30	95
Emotional Aspects	30	85
Mental health	40	90

A value of zero represents the most negative result possible (worse quality of life) and 100 corresponds to the most positive result (better quality of life).

DISCUSSION

The varicella-zoster virus (VZV), a member of *Herpesviridae*, is a highly contagious virus with major neurotrophic potential and which can infect only humans. Herpesviruses have the ability to induce latency in infected organisms and can therefore be reactivated at any time[11,12].

HZ is due to the reactivation of VZV, which remains latent in the sensory or cranial nerve ganglia after primary infection[12]. Primary infection by VZV occurs through the inhalation of aerosols when the virus comes into contact with the mucosa of the upper respiratory system and/or the conjunctiva[13].

HZ transmission, meanwhile, occurs through direct contact with the injured areas of infected individuals. The most common complications of HZ are neurological and ophthalmologic impairment and NPH, which occurs most frequently[2,13].

NPH, which involves pain that lasts after the rash is removed, can continue for many months or even years and may be severe, interfering with the sleep and quality of life of patients[2,12].

The recommended treatment is with antiviral medications, the most common of which are aciclovir, valaciclovir and fanciclovir. These three drugs have proven effective at reducing the formation of new lesions, accelerating the resolution of existing lesions and reducing the intensity of acute pain. Valaciclovir and fanciclovir appear to be more effective in the treatment of HZ than acyclovir[2,14].

While there is consistent evidence that oral acyclovir is ineffective in reducing the incidence of NPH, there is insufficient evidence for the recommendation of other antivirals for this purpose[14].

Pain is a common complication of HZ, and its management varies according to its intensity and duration and the characteristics of the patient. Opioids are usually used for more intense pain, while for mild pain non-steroidal anti-inflammatory drugs can be administered. Pruritus is also a common symptom, and can be treated with the use of calamine[14,15].

Medications recommended to minimize the severe pain associated with NPH include tricyclic antidepressants (amitriptyline, nortriptyline and imipramine), anticonvulsant agents (gabapentin and pregabalin), opioids, topical lidocaine (lidocaine patch), and capsaicin. Combined therapies with anticonvulsants and tricyclic antidepressants, or with opiates and anticonvulsants, have been shown to be more effective than monotherapy. However, even in these cases the pain may remain[16].

Conventional antiviral, antidepressant, anticonvulsant, opiate and anti-inflammatory therapy, however, is not completely effective in treating signs and symptoms caused by VZV in HZ. LIL, therefore, is studied as an alternative treatment modality and/or coadjuvant[9,16].

LIL therefore offers a safe treatment modality that is generally free of deleterious effects. Due to the athermal nature of the lasers used in LIL there are no reports of adverse effects related to this therapy[17,18].

The biomodulation mechanism of LIL has been associated with the activation of the mitochondrial respiratory chain, resulting in a signaling cascade that promotes cell proliferation and cytoprotection. Evidence suggests that cytochrome c-oxidase is the major biomodulator[7]. The anti-inflammatory and analgesic response is related to a mechanism involving the inhibition of arachidonic acid and the consequent reduction of the production of prostaglandin E2, as well as factors of pro-inflammatory cytokine modulation[17,18].

In the present case, positive results were obtained for the reduction of neuralgia, both in improvement of quality of life and sleep patterns. Other studies have found similar evidence when highlighting the effects of photobiostimulation[1,3,5].

Photobiostimulation in the infrared region has been widely reported in scientific and clinical settings because of its positive effects on NPH reduction. The results found in this case corroborate clinical studies that highlight the anti-inflammatory and analgesic action of the laser applied to patients with NPH[3,6,18].

A review carried out with 11 scientific studies demonstrated the potential of LIL as a viable means for the treatment of HZ, since there was a significant reduction in the main complications (pain, sleep and rest) related to NPH[17,18]. However, in order to be properly used and to achieve satisfactory results it is essential to understand the technique, its operating principle, HZ itself and the peculiarities intrinsic to each patient[9,19,20].

CONCLUSION

Photobiostimulation treated the discomfort of pain, improved the quality of life of the patient and proved to be an effective, safe and promising treatment, with potential to become the therapy of choice in such cases. Therefore, the photobiostimulation protocol adopted in this case report was effective and demonstrated its therapeutic capacity in neuralgia. With the aim of standardizing the parameters of photobiostimulation used in this study, further research involving more participants is recommended.

REFERENCES

1. Reggiori MG, Allegretti CE, Scabar LF, Armonia PL, Giovani EM. Laser therapy for herpes simplex treatment in HIV patients: case report. Rev Inst Ciênc Saúde. 2008;26(3):357-61.
2. Coelho PAB, Coelho PB, Carvalho NC, Duncan MS. Diagnóstico e manejo do herpes-zóster pelo médico de família e comunidade. Rev Bras Med Fam Comunidade. 2014;9(32):279-85.
3. Schmader KE, Dworkin RH. Natural history and treatment of herpes zoster. J Pain. 2008;9(Suppl. 1):3-9.
4. Brasil. Mistério da Saúde. Acolhimento à demanda espontânea: queixas mais comuns na Atenção Básica [Internet]. Brasília, DF: MS; 2012 [acesso em 20 mar. 2017]. (Cadernos de Atenção Básica; nº 28; vol. 2). Disponível em: http://www.saude.pr.gov.br/arquivos/File/Caderno28volII.pdf
5. Portella AVT, Souza LCB, Gomes JMA. Herpes-zoster and post-herpetic neuralgia. Rev Dor. 2013;14(3):210-15.
6. Ferreira DC, Martins FO, Romanos MTV. Impact of low-intensity laser on the suppression of infections caused by Herpes simplex viruses 1 and 2: in vitro study. Rev Soc Bras Med Trop. 2009;42(1):82-5.
7. Prockt AP, Takahashi A, Pagnoncelli RM. Uso de terapia com laser de baixa intensidade na cirurgia bucomaxilofacial. Rev Port Estomatol Cir Maxilofac. 2008;49(4):247-55.
8. Bottega FH, Fontana RT. A dor como quinto sinal vital: utilização da escala de avaliação por enfermeiros de um hospital geral. Texto & Contexto Enferm. 2010;19(2):283-90.
9. Fonseca DC, Galdino DAA, Guimarães LHCT, Alves DAG. Avaliação da qualidade do sono e sonolência excessiva diurna em mulheres idosas com incontinência urinária. Rev Neurociênc. 2010;18(3):294-99.
10. Adorno MLGR, Brasil-Neto JP. Avaliação da qualidade de vida com o instrumento sf-36 em lombalgia crônica. Acta Ortop Bras. 2013;21(4):202-7.
11. Bostikova V, Salavec M, Smentana J, Chlibek R, Kosina P, Prasil p, et al. Genotyping of varicella-zoster virus (VZV) wild-type strains isolated in the Czech Republic. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2011;155(4):379-84.
12. Vazzoller RMS, Fernandes RD, Sena RMM, Senna AM. Tratamento do herpes simples por meio da laserterapia: relato de casos. Rev Cient ITPAC. 2016;9(1):1-11.
13. Lobo IM, Santos ACL, Santos Júnior JÁ, Passos RO, Pereira CU. Vírus varicela zoster. Rev Bras Med. 2015;72(6):231-8.
14. Chen N, Li Q, Yang J, Zhou M, Zhou D, He L. Antiviral treatment for preventing nerve pain after shingles (postherpetic neuralgia). Cochrane Database Syst Rev. 2014;(2):1-3.
15. Cohen JI. Herpes Zoster. N Engl J Med. 2013;369(3):255-63.
16. Dubinsky RM, Kabbani H, El-Chami Z, Boutwell C, Ali H. Practice parameter: treatment of postherpetic neuralgia: an evidence-based report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology. 2004;28;63(6):959-65.
17. Abreu EMC, Nicolau RA. Terapia a laser de baixa intensidade na regeneração do tecido nervoso após lesão medular. Rev Neurociênc. 2015;23(2):297-304.
18. Gomes RNS, Gomes VTS, Nicolau RA. Tratamento da neuralgia pós-herpética. Sci Med. 2016;26(2):1-6.
19. Oliveira ECSS, Marinelli NP, Santos FJL, Gomes RNS, Galindo Neto NM. Perfil epidemiológico dos presos de uma central de custódia de presos de justiça. Rev Enferm UFPE on line. 2016;10(9):3377-83.
20. Gomes RNS, Gomes VTS, Gomes MS, Reis EG, Cardoso JC, Conceição FR, et al. Aplicações neurológicas da espectroscopia Raman. Rev Eletr Acervo Saúde. 2017;Supl. 8:578-83.

Received: August 01, 2017
Reviewed: December 06, 2017
Accepted: January 24, 2018