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Sumário:

Prefácio:

Em 2023, o 9º Fórum Internacional de Biofotônica ocorrerá mais uma vez de maneira totalmente virtual. O evento se estenderá por dois dias, durante os quais haverá uma variedade de atividades científicas divididas em três salas simultâneas. A sala principal oferecerá palestras ministradas por especialistas renomados em Biofotônica, provenientes de diversos países, como Brasil, Espanha, Bélgica, Itália e outros. Além disso, duas salas serão dedicadas à apresentação oral dos trabalhos aprovados.

O quarto Fórum de Inovação fornecerá uma plataforma para diversas apresentações, destacando avanços em tecnologia de ponta e atualizações em aplicações clínicas. Também teremos sessões de apresentação de produtos por parte de nossos parceiros. Cada sala contará com moderadores experientes para guiar as discussões.

Em tempos desafiadores, não nos esqueçamos da nossa missão humanitária. Durante o processo de inscrição, você terá a oportunidade de fazer uma doação para o "AdoteDOG", contribuindo para uma causa nobre.

Sua participação e presença serão muito bem-vindas e valorizadas!

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9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

USE OF PHOTOBIOMODULATION PRE-DENTAL ANESTHESIA AND ITS EFFECTS ON ANESTHETIC PAIN REDUCTION AND ANESTHETIC EFFICACY: A CASE REPORT

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Abstract

Dental fear and phobia are widespread worldwide, and the pain associated with local anesthesia is among the most feared by patients. To address this issue, numerous complementary therapies have been studied to enhance the needle insertion protocol and reduce errors in anesthesia repetition. However, there is no universally established protocol to reduce pain during needle insertion. Thus, it was evaluated if the pre-dental photobiomodulation anesthesia of the inferior alveolar nerve block would be able to decrease the puncture pain and also, increase the effect of the anesthetic. A patient was anesthetized in a bilateral random way, one side was used 8J of infrared laser, with wavelength 808nm, 100mW of potency, for 80 seconds, before the local anesthesia application. The other side used a laser sham, with the same technique and anesthesia, but the application was simulated before the procedure. It was found that on the side where photobiomodulation was used, there was a 50% improvement in pain level when compared to sham laser. In the sensitivity tests, it was possible to observe that on the laser side, the anesthesia process occurred more effectively. There was no difference in blood pressure before and after anesthesia on either side. Although the results are based on a single case report, they suggest the hypothesis that photobiomodulation used before anesthesia is an effective therapy in the treatment of anesthesia puncture pain and may accelerate the anesthesia process. Well-conducted randomized double-blind clinical trials are needed to prove the efficacy of this complementary therapy.

Key words: Photobiomodulation, local anesthesia, anesthesia puncture pain

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Porphyrin-associated fluorescence spectroscopy (Photogen®) for the optical diagnosis of dental biofilm in orthodontic treatment: An observational clinical trial

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Abstract

Objective: This study assessed the presence of dental biofilm with fluorescence spectroscopy associated with porphyrin (Photogen®) in users of orthodontic appliances. Methods: : This cross-sectional observational clinical trial included 21 patients with metallic orthodontic fixed appliances.Thepresenceofbiofilmwasevaluatedbyfluorescencespectroscopy (Evince—MMOptics São Carlos- SP, Brazil) with a porphyrin photo-evidence device (Photogen®). Digital images of the buccal surface of the upper anterior teeth (central and lateral incisors and canines) without and with porphyrin were analyzed using the histogram R (red) function in ImageJ software. The results were analyzed using the maximum and mode values of the red pixels from the histograms. The statistical analysis considered the significance level of 5%. Results: : The maximum values and modes of the red pixels were significantly higher in biofilms analyzed by porphyrin-associated optical spectroscopy compared to optical spectroscopy alone. Conclusions: Porphyrin-associated fluorescence spectroscopy was able to detect dental biofilm in the oral environment of patients with orthodontic treatment. This method better evidenced the presence of biofilm on the buccal surfaces of the upper teeth compared to that observed with fluorescence spectroscopy without porphyrin.

Key words: Porphyrin, Orthodontics, Spectroscopy, Fluorescence, Biofilm.

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Low-power blue LED and red laser effects on cell viability and circadian genes mRNA levels in MCF-7 and MDA-MB-231 breast cancer cells

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Abstract

INTRODUCTION: Low-power blue light-emitting diode (LED) and red laser have been used for therapeutic proposals based on photobiomodulation. The effect is triggered after the absorption of radiation by photoreceptors, which leads to molecular, cellular, and systemic responses. The circadian rhythm controls several cellular processes in cycles loops of feedback, being associated with the development and progression of several types of tumors. Cryptochromes participate in the control of the circadian cycle and have ortology with photolyase enzymes that absorb photons in the range of 315-500 nm, which could be a potential target in photobiomodulation therapies. OBJECTIVE: Thus, this work aims to evaluate the effects of radiations emitted by low-power blue LED (470 nm) and red laser (658 nm) on cell viability and mRNA levels of circadian genes CRY1, CRY2, PER1, BMAL1, and CLOCK in breast cancer tumor cells (MCF-7 and MDA-MB-231). MATERIAL AND METHODS: The MCF-7 and MDA-MB-231 cells were exposed to low-power blue LED (5.35 W/cm2, 1500 mW; spot size of 0.28 cm^2) at 640 J/cm^2, low-power red laser (0.77 W/cm2, 100 mW; spot size of 0.13 cm^2) at 9 J/cm^2 and simultaneous low-power blue LED and red laser at 640+9 J/cm^2. After exposure, the cells were incubated (37°C, 48 hours, 5% CO2) for evaluation of cell viability by the WST-1 method and mRNA levels by reverse transcription-quantitative polymerase chain reaction (RT-qPCR). STATISTICAL ANALYSES: Data about cell viability and mRNA levels were analyzed by Kolmogorov-Smirnov to verify normality. The comparison between groups was analyzed by the Kruskal-Wallis test followed by the Dunn pos-hoc test with $p<0.05$ as the lowest significant level. RESULTS AND CONCLUSION: The results suggest that exposure to low-power blue LED and red laser does not alter the cell viability and the mRNA levels from circadian genes in MCF-7 and MDA-MB-231 cells at evaluated fluences.

Key words: LED, laser, photobiomodulation, circadian genes, breast cancer

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Evaluation of alveolar bone preservation after early molar extraction using photobiomodulation combined with scaffold biomaterial grafting: a randomized, triple-blind, clinical study.

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Abstract

Bone graft added to the dental socket immediately after tooth extraction prevents atrophy and deformity of the bone at the site of element loss, enabling rehabilitation with implants. Photobiomodulation accelerates bone healing; stimulates blood flow; activates osteoblasts, decreases osteoclast activity, and improves the integration of the biomaterial with bone tissue. The study aims to develop a protocol for the management and preservation of alveolar bone after the loss of first and/or second permanent molars in patients aged between 8 and 17 years, with an indication for extraction associated or not with 808 nm infrared laser treatment. . Materials and methods: 60 patients aged between 8 and 17 years will be randomized and randomly divided into 4 groups, n= 15: Exo (extraction), Exo+Laser (extraction and laser treatment), Exo+Biomat (extraction with graft biomaterial), Exo+Biomat+Laser (biomaterial extraction and grafting and laser treatment). The biomaterials of choice will be Plenum® OSShp and Plenum® Guide (Brazil), added to the alveolus immediately after molar extraction, groups that will receive the laser (λ = 808 nm, power = 100 mW, radiant energy 3J per point in 3 buccal, occlusal and lingual/palatal points), will receive the irradiation in the surgical act, 48 hours and 10 days after the surgery, in the Exo and Exo+Biomat groups a similar laser device without emission of irradiation will be used, the operator who will apply the laser and the patient will be blind to the device used and the patient will not know whether or not he received the biomaterial. Analysis: computed tomography and intraoral scanning were performed pre-surgery, 3 and 6 months after surgery; to assess bone volume by measuring the height and width of the socket in each group, as well as trabecular bone and the interdental space of the teeth lateral to the missing element. Statistical analysis will be performed using the Shapiro-Wilks test, Student's t-test, or Wilcoxon-Mann-Whitney test for parametric and non-parametric data, respectively, they will be two-tailed and the significance level adopted will be α = 0.05.

Key words: Bone regeneration, laser therapy; photobiomodulation, scaffold biomaterial, alveolar preservation

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Immediate effects of photobiomodulation with low-intensity laser and red wavelengths (660 nm) on suction sore on the lower lip - Case Report

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Abstract

A 23-year-old female patient reports anxiety and the habit of sucking her lip when in a state of stress. Application of a low-intensity laser at red wavelength (660 nm) with 1J, two applications 48 hours apart, in the center of the lesion and four points around the lesion. The aim of the application was analgesia and accelerated tissue repair. To complement the laser application, the patient was instructed to apply gel with 0.2% chlorhexidine + 1% hyaluronic acid, three times a day, for 3 days, that is, from the date of the first application to the day of the second and final application. The result obtained was immediate analgesia, there were no more complaints of pain after the first application. Furthermore, there was total remission of the lesion 48 hours after the injury, with only redness remaining in the area, which disappeared within a total of 72 hours. What could be concluded was that the application of a low-intensity, red-wavelength laser combined with the application of 0.2% chlorhexidine gel with 1% hyaluronic acid was extremely beneficial and useful.

Key words:

laser, chlorhexidine, hyaluronic acid

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

EFFECT OF VASCULAR PHOTOBIOMODULATION ON OROFACIAL PAIN AND TENSION-TYPE HEADACHE POST-COVID-19: PRAGMATIC RANDOMIZED CLINICAL TRIAL

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Abstract

Introduction: Orofacial pain and tension headache were symptoms reported in individuals who contracted COVID-19, including after recovery, and were considered chronic pain. Photobiomodulation can be a resource used to control pain and inflammation, reducing the use of drugs and improving the quality of life of these individuals. Objectives This randomized, pragmatic, double-blind clinical trial aims to evaluate the effect of FBMV on pain relief and quality of life in post-COVID-19 headache. Materials and Methods: Individuals who contracted COVID-19 and had tension headache or orofacial pain for more than 3 months were selected. They were divided into two groups: FBMV Group: received vascular photobiomodulation with a red laser in the radial artery (660 nm, 100 mW, 30 minutes) and the FBMV SHAM group, which received light emission in the radial artery for 30 minutes. The application frequency was once a week, totaling 4 sessions. Effects were measured using the Brief Pain Inventory, Visual Analogue Scale and Headache Impact Test. Data analysis considered two sets of data for comparison between and intra groups, the Per-Protocol analysis. analysis –PP) and analysis by intention to treat (Intention I'm treat –ITT). Data that did not present a normal distribution after the Shapiro-Wilk normality test. The Mann-Whitney, Wilcoxon, ANOVA, chi -square and Fisher's exact tests were used. = 0.05 was considered as the level of statistical α significance. Results: There was a statistically significant difference in pain sensation before and after treatment and between the groups studied (p=0.001). There was no difference in quality of life between the groups, but there was an improvement in sleep (p=0.012), in the ability to enjoy life (p=0.016) and in carrying out activities such as working (p=0.009) and walking (p=0.001) in the FBMV group. Conclusions: FBMV has the potential to reduce pain and benefit individuals' daily activities when compared to control.

Key words: vascular photobiomodulation, COVID-19, tension type headache, long covid, orofacial pain, low level laser

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Light-emitting diode photobiomodulation exerts anti-inflammatory action in murine macrophages stimulated by Bothrops jararacussu venom and isolated PLA2s.

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Abstract

Introduction: Although the treatment currently recommended for snakebite accidents is serum therapy with antivenom, a need for adjunctive therapy to serum therapy for treating the local effects caused by snakebites is reducing local effects is an effort of WHO. Photobiomodulation with laser or LED therapy is one of the primary examples of adjuvant therapy to serum therapy to lessen these local effects caused by snakebite envenoming. The aim: This study aimed to investigate some mechanisms underlying the protective effects of photobiomodulation against B. jararacussu venom and isolated myotoxins. The study also aimed to establish how photobiomodulation with LED therapy decreases local pathological alterations, including inflammatory reaction and necrosis, after Bothrops envenoming using isolated thioglycollate macrophages. Results: Our results showed that LED therapy was able to decrease necrosis cell death, caspase-3 activity, and TNF-a liberation. In addition, LED therapy induces mitochondrial membrane potential and modulates gene expression of lipid mediators. Conclusion: In conclusion, the data of this study support the use of phototherapy as an adjuvant therapeutic approach in combination with serum therapy to mitigate the local effects resulting from snakebite envenoming.

Key words: Keywords: Envenomation, Bothrops jararacussu, LED, toxins, Mediators Inflammatory.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

STUDY OF PHOTOBIOMODULATION IN THE MODULATION OF INFLAMMATION AFTER FRACTIONAL CO2 LASER IN RATS

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Abstract

The aging of the skin and the vast majority of organs is characterized by a progressive loss of functionality and regenerative potential and, consequently, the progressive loss of collagen and other proteins and structures present in the skin. With advancing age, a low-grade chronic inflammation called inflammaging is triggered. It is characterized by serum levels of inflammatory cytokines, such as IL-6, IL-8 and TNF-α, which are not limited to age-related systemic changes, but may also be related to skin aging. For more than twenty years, the fractional CO2 laser, also known as the fractional carbon dioxide laser, has been implemented in surgical and aesthetic practice. Its main function is to trigger collagen denaturation, responsible for tissue contraction (often visible during the procedure) and for the improvement of wrinkles and sagging after treatment. Unlike the action of high-intensity lasers, photobiomodulation (FBM) differs in that it causes varying degrees of excitability that do not lead to the destruction of chemical bonds in the target tissue, it acts mainly on the mitochondria, stimulating the production of energy in the form of adenosine triphosphate (ATP), has the ability to delay, accelerate or inhibit biological responses which can increase cell metabolism and produce effects such as analgesia, tissue repair, among other effects. Therefore, the objective of this study is to evaluate the role of photobiomodulation (FBM) in the inflammatory process and to verify if it is reduced with the use of FBM, collagen production can be reduced and thus the result is impaired. On the other hand, if FBM does not interfere with collagen generation despite the reduction in inflammation, its use can help to minimize the exacerbated inflammatory effects after some types of procedures.

Key words: Laser, photobiomodulation, CO2 , skin, collagen, LED.

Study type: Estudo experimental em animais (Experimental study in animals)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Analysis of Pain After Endodontic Instrumentation of Molars and Premolars in a Single Session Associated With Photobiomodulation: a Randomized Double Blind Controlled Clinical Study

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Abstract

Randomized clinical trials conducted in recent years have demonstrated that photobiomodulation (FBM) modulates postoperative pain in endodontic instrumentation, especially in the first days after the procedure. Although the results are promising, there is still low quality of evidence regarding the best dosimetric parameter applied. The aim of this double-blind randomized controlled clinical study will be to evaluate the effect of FBM on pain after endodontic instrumentation of single-session treatment of maxillary premolars and molars. The sample will consist of 58 participants treated endodontically in a single session and randomly distributed into the FBM Group (n=29): conventional treatment with photobiomodulation (808 nm, power of 100mW, 3J per point, area 1cm^2, in the region of the root apices, 2 points on premolars - one buccal and one palatal; and 3 points on molars - two buccal and one palatal, total energy of 6J and 9J, respectively) and Control Group (n=29): conventional treatment with FBM simulation. As the primary variable of the study, spontaneous pain will be assessed immediately before and 24 hours after completing treatment with the visual analogue scale (VAS). As secondary variables, pain will be assessed at 4h, 8h, 12h, after the procedure, pain on palpation (buccal and lingual) and pain on percussion (vertical and horizontal) which will be analyzed 24hours after the procedure, as well as the amount of analgesics needed (paracetamol) and the impact of oral health on quality of life assessed by the OHIP 14 instrument.

Key words: Keywords: Photobiomodulation, Analgesia, Endodontic Treatment, Pain

Post-operative.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

The use of phototherapy in dental trauma in sport: an integrative review

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Abstract

Introduction: Approximately one third of all dental injuries occur during sports, requiring treatments that increase success rates, such as the use of phototherapy. Objective: To discuss the possibilities of treating trauma absorbed in sports dentistry with a phototherapy approach. Methodology: A search was carried out in the Pubmed database, in English, using the terms “Dental trauma AND Low-Level Light Therapy” and “Dental trauma AND phototherapy”. 140 articles were found, after reading the title, 107 articles were chosen. Of these, 99 were excluded after applying the excluded criteria, 9 of which were literature reviews, totaling 8 studies included. Conclusion: The use of phototherapy in fatal trauma in sports promotes biochemical reactions, leading to the stimulation of tissue components, immunity and reduction of inflammatory processes, and can be considered a promising treatment.

Key words: Trauma in sport; Low-level light therapy; Phototherapy.

Study type: Revisão (Review)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

THE EFFECTS OF ANTIMICROBIAL PHOTODYNAMIC THERAPY (aPDT) WITH NANOTECHNOLOGY-APPLIED CURCUMIN AND 450nm BLUE LED IRRADIATION ON MULTI-SPECIES BIOFILMS IN ROOT CANALS

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Abstract

Objective: This study aimed to evaluate the effectiveness of antimicrobial Photodynamic Therapy (aPDT) utilizing nanotechnology-applied curcumin activated by blue LED (450 nm) on the elimination of microorganisms arranged in multispecies biofilms inside the root canals of extracted human teeth. Design: Forty single-rooted human teeth were used; these were randomized into four experimental groups, each comprising 10 teeth: control group, no treatment; photosensitizer (PS) group, nanotechnology-applied curcumin alone; light group, blue LED used separately; and aPDT group, nanotechnology-applied curcumin activated by blue LED. To carry out the tests, the interiors of the root canals were inoculated with species of Candida albicans (ATCC 90029), Enterococcus faecalis (ATCC 29212), Escherichia coli (ATCC 25922), and methicillin-resistant Staphylococcus aureus (MRSA) (ATCC 43300), using a multispecies biofilm. After the incubation period, the canals were treated according to the experimental groups, with no treatment given in the control group. Results: studied Inasmuch as the antimicrobial effectiveness of aPDT was concerned, it was observed that the greatest reduction in microbial counts using aPDTs was achieved against MRSA (mean reduction = 2.48 Log10 CFU/mL), followed by Escherichia coli (mean reduction = 1.72), and Enterococcus faecalis (mean reduction = 1.65); a reduction greater than 1.5 Log10 CFU/mL showed relevant effectiveness of aPDT against these microorganisms. Of note, aPDT has also shown considerable effectiveness against Candida albicans (mean reduction = 0.71), with a statistical difference in the reduction between the groups. Conclusion: aPDT was effective in reducing all microorganisms examined. The average reduction was greater than 1.5 Log10 in all microorganisms except for Candida albicans.

Key words: Photodynamic therapy, Endodontics, LED, Curcumin, Nanotechnology, Biofilms.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Thermal evaluation of heat absorption in the belly region of ex-vivo pig tongues induced by different surgical instruments - Experimental study protocol

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Abstract

INTRODUCTION: Thermal equipment can be employed in different surgical procedures involving soft tissues, which can reduce certain intraoperative and postoperative complications. High-power lasers, known for their minimally invasive approach, precise incisions, minimal intraoperative bleeding, and surgical site disinfection, are among such tools. The high-power diode laser (808-980nm) has demonstrated its effectiveness, safety, and reliability in continuous and interrupted emission modes during soft tissue surgeries, including lingual frenectomy procedures in infants diagnosed with ankyloglossia. Ankyloglossia is a condition that restricts the free movement of the anterior portion of the tongue and can negatively impact breastfeeding. In some cases where lingual movement is hindered due to frenulum abnormalities, surgical removal of the lingual frenulum becomes necessary. Thermal instruments offer a safe, effective, and conservative option for treating this condition in infants, resulting in reduced patient discomfort. However, the excessive heat generated during the surgical procedure may alter postoperative healing quality and affect the tissue, particularly the fascia. OBJECTIVE: This study aims to thermally assess heat absorption by tissues in the lingual frenum region of ex vivo pig tongues using thermal instruments. METHODS: In a group of 50 ex-vivo pig tongues, the lingual frenum region, which corresponds to the tongue frenum area, will be divided into five groups (n=10). Incisions will be made using various thermal surgical instruments, including electrocautery, an electric scalpel, and a high-power diode laser in both continuous and interrupted modes, following standardized parameters. The surgical incisions will be approximately 1 cm in length and 3 to 4 mm in depth, and they will be performed in a standardized manner by a trained and calibrated operator. The incisions will be made in the lingual frenum region and the surrounding tissue fascia. Temperature measurements will be conducted using a thermographic camera before and after the incisions to evaluate and compare the amount of heat absorbed by the tissue. The collected data will be tabulated and analyzed to compare temperatures across different techniques and parameters.

Key words: laser, scalpel, electrocautery, temperature measurement, healing

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Protocol for the clinical practice of Photobiomodulation in temporomandibular disorders: Assessment of the quality of the Guideline using the AGREE II instrument

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Abstract

The choice of parameters such as wavelength, energy, application time and number of sessions may vary according to the problem and the characteristics of the procedure and the patient. To date, the evaluation of clinical protocols for the application of photobiomodulation in the treatment of muscle pain caused by temporomandibular dysfunction has not been observed, even with clinical evidence of its recommendation for use, as well as the analysis of the degree of applicability, that is, degree of explanation and pragmatism of studies. For this reason, it is necessary to standardize a protocol in accordance with scientific evidence in a way that is accessible to clinicians who do not have familiarity or experience with analyzing evidence from academic studies. Therefore, the present study aims to evaluate randomized clinical trials in people with orofacial muscle pain caused by temporomandibular dysfunction, based on the evidence published to date, to propose a consensus among experts and researchers on the best clinical recommendations for the performing the technique. To this end, protocols of high methodological quality will be identified based on a systematic literature search and quality assessment using the validated instrument, Appraisal of Guidelines Research & Evaluation Instrument (AGREE-II). Following the identification of the studies, a summary of the recommendations for the procedures studied will be carried out. The synthesis will be submitted to a group of experts for evaluation and adaptation in a consensus process using the Delphi methodology. The results of this research will be important to analyze the available clinical trials and levels of evidence and clinical recommendation. The drafting of the protocol will be important for the clinician's decision-making regarding the use of appropriate photobiomodulation parameters for patient treatment.

Key words: Temporomandibular Joint Disorders; Facial Pain, Orofacial Pain, Low-Level Light Therapy, Photobiomodulation

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

EFFECT OF VASCULAR TRANSCUTANEOUS LASERTHERAPY VERSUS LOCAL ON TENSION-TYPE MIGRAINE AND OROFACIAL PAIN IN POST COVID-19: RANDOMIZED CLINICAL TRIAL

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Abstract

Introduction: Orofacial pain and tension headache were symptoms reported in individuals who contracted COVID-19, including after recovery, being considered chronic pain in these cases. Pain sensation control in these cases is mostly achieved through analgesic and anti-inflammatory drugs. However, adjuvant treatments are available that can reduce the amount of drug intake and improve the quality of life of compromised individuals, one of which is photobiomodulation. Using lasers, treatments are successfully carried out to control inflammation and pain, but the parameters and methods of application are not yet firmly established. Objectives: The objective of this research is to evaluate the effect of applying photobiomodulation with red and infrared lasers applied locally and systemically. Methods: 80 individuals who have contracted COVID-19 and have tension headaches and/or orofacial pain for more than 3 months will be selected for convenience. After selection, participants will be randomized into four groups (n=20): (G1) photobiomodulation with infrared laser with local application to pain points and (G2) photobiomodulation with placebo local application, (G3) photobiomodulation with red laser with transcutaneous application in the radial artery and (G4) photobiomodulation with transcutaneous application in the placebo radial artery. Everyone will be treated for a period of 4 weeks with 8 application sessions. The effects will be measured using blood lactate level, Brief Pain Inventory, Visual Analogue Scale (VAS) and Headache Impact Test. Data will be collected weekly before and after treatment and the Analysis of Variance (ANOVA), Tukey paired T test, Kruskal-Wallis or Wilcoxon tests will be applied, depending on the distribution of the data. $\alpha = 0.05$ will be considered as the level of statistical significance.

Key words: photobiomodulation, headache, migraine, orofacial pain, low-power laser.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

INVESTIGATION OF GLUCOSE UPTAKE BY BREAST CANCER CELLS OF DIFFERENT MALIGNANCY GRADES WITH QUANTUM DOT CONJUGATES

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Abstract

The Warburg effect, a phenomenon characterized by increased glycolysis, even in the presence of oxygen, holds significant importance in cancer biology. Due to this behavior, cancer cells have an enhanced glucose uptake to sustain their survival. Understanding how this metabolic change influences cancer cells of different malignancy degrees can provide insights to develop improved treatment and diagnostic strategies for this disease. Thus, in this study, by taking advantage of the unique optical properties of quantum dots (QDs), we prepared a fluorescent conjugate based on 1-thio-β-D-glucose (Glc) and applied it to investigate the uptake profile of this carbohydrate by breast cancer cells of different malignancy grades (MDA-MB-231, T47D, and MCF7). The uptake study was assessed through flow cytometry. Glc was conjugated with QDs based on the affinity of the Glc thiol group for the QD semiconductor surface, and the conjugation was analyzed through Fourier-transform infrared spectroscopy, Zeta potential measurements, and fluorescence correlation spectroscopy. Furthermore, a biological assay developed by our research group, using Candida albicans yeasts coated with concanavalin A, exploring the lectin-carbohydrate affinity, was also performed to further evaluate the conjugation. The set of characterizations confirmed the conjugation. By flow cytometry, with just 15 min of incubation, the most malignant MDA-MB-231 cell line exhibited higher uptake (ca. 67.3%) compared to MCF7 (ca. 28.1%), while T47D showed an intermediate uptake level (ca. 47.9%) compared to the former cell lines. With an extended incubation time of 30 min, increased uptake was observed in all cell lines (ca. 70-90%). Therefore, the Glc-QDs conjugate showed great potential as a tool for understanding the glucose uptake by different cell line types, which is relevant for improving the treatment and diagnosis of cancer disease.

Key words: fluorescence, cancer cells, inorganic nanoparticles, 1-thio-β-D-glucose.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

DRUG XEROSTOMY AND VASCULAR PHOTOBIOMODULATION: CLINICAL CASE REPORT

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Abstract

INTRODUCTION: Xerostomia is the subjective sensation of dryness in the mouth, resulting or not from hyposalivation. Drug xerostomia is a side effect that commonly occurs after starting the use of anxiolytics and antidepressants, and is characterized by the feeling of dry mouth and changes in taste, factors that can affect basic activities, such as speaking and eating. OBJECTIVES: The objective of this work is to report a clinical case. The patient L.R.M.O. 55 years old, female and undergoing psychiatric treatment for anxiety using Fluoxetine, described discomfort due to dry mouth, which led her to seek treatment for her symptom. The chosen therapy was systemic vascular photobiomodulation. The diode laser (EccoFibras®, Campinas, Brazil), with a beam area of approximately 0.04 cm2, wavelength of 660nm, power of 100mW was applied continuously and directly to the topography of the unilateral radial artery for 30 minutes, delivering 180J of energy. This laser is a specific bracelet where the tip of the equipment is attached and there is a light output for the red beam, being considered a painless, non-invasive method. Sessions were held weekly and salivary collections were performed monthly. CONCLUSION: Clinical follow-up showed regression of symptoms, demonstrating that vascular photobiomodulation can stimulate the secretory function of the salivary glands. The performance, however, drew attention due to the patient's level of satisfaction with the increase in flow. The dental surgeon plays an important role in the diagnosis and therapy of this manifestation, aiming to improve the quality of life of patients with xerostomia.

Key words: photobiomodulation, xerostomia, side effects, low power laser

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Application of photodynamic therapy in outpatient and oncological dental care: a case series

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Abstract

Introduction: Dental care in a hospital outpatient setting is an educational and healthcare strategy aimed at addressing the oral health of vulnerable patients. This is crucial because oral issues can increase the risk of both local and systemic infections, which is particularly concerning for patients undergoing cancer treatment, as they often face oral complications due to cancer therapies. A promising approach to address these complications is photodynamic therapy (PDT), which has proven to be effective, especially in the head and neck region. Oral complications not only impair the effectiveness of treatments but also negatively impact patients' quality of life, leading to longer hospitalizations and increased treatment costs. Objective: To report a series of cases using PDT with methylene blue and low-intensity red laser in the treatment of oral mucositis in oncology patients. Methodology: The cases presented were conducted at the Dental Outpatient Clinic of Hospital Napoleão Laureano, A reference center in oncology in the state of Paraíba. PDT employed methylene blue at a concentration of 0.1 mg/mL and a red laser with a wavelength of 660 nm, a power output of 100 mW, energy density of 4 J/cm², and an exposure time of 40 seconds. Results: The case series underscores the crucial role of PDT in treating oral mucositis in oncology patients and emphasizes the significance of the dentist's involvement in multidisciplinary oncology teams. This study highlights the relevance of PDT as an effective therapy and the necessity of interdisciplinary approaches to enhance clinical outcomes and the quality of life of cancer patients.

Key words: Photodynamic Therapy, Oral Mucositis, Oncology.

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Effect of photobiomodulation for analgesia during the expulsion period of labor: double blind, controlled and randomized clinical study trial protocol.

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Abstract

In obstetrics, pain is one of the main concerns of the patient in relation to the parturition process, influencing the decision for cesarean section. During the expulsive period of labor, patients feel intense pain in the vagina and perineum region, describing the burning sensation during the passage of the fetus through this region as a circle of fire. The World Health Organization recommends the humanization of normal delivery care and promotes a series of pharmacological and non-pharmacological recommendations for pain relief during childbirth. They are: epidural anesthesia, massage, bath, exercises, change of position, among others. Photobiomodulation therapy (FBM) is a treatment that has been extensively studied and has grown rapidly due to its analgesic capacity. In this sense, FBM is a promising possibility for pain relief for parturients. This study aims to assess whether FBM is capable of reducing the perception of pain in the vulvar region in pregnant women during the second stage of labor. The Study will take place with patients hospitalized in labor at the Obstetric Center of Hospital Ipiranga in São Paulo/SP. The study will be double blind, randomized and controlled. There will be two groups of 10 patients each. The first group will undergo LED associated with standardized non-pharmacological techniques for pain relief according to the institution's protocol. The second group will receive the same treatment, but with a placebo LED. FMB will be applied when the patient reaches 8 cm cervical dilatation. It will be performed in the semi-sitting position or in the left lateral decubitus position. The cluster with 12 red LEDs will be focused on 5 regions of the vulva resulting in 60 irradiated points with a total application time of 4 minutes. The irradiation method will be by contact and continuous mode. The wavelength will be 658 nm, power of 40 mW per led, energy density of 4 J/cm2 and total energy of 114.4 J in the treatment. The outcome will be the assessment of pain using the visual analogue scale in 5 moments: before and immediately after the procedure, during the second stage (evaluation will be done immediately after birth), 1 hour and 24 hours after delivery. Statistical analysis will consider all variables: quantitative (mean and standard deviation) and qualitative (frequencies and percentages). All statistical tests will adopt a significance level of 5%. The SAS for Windows program version 9.1 will be used.

Key words: light emitter diodo, labor, pain, analgesia, photobiomodulation.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Effect of photobiomodulation on skin flaps: regeneration mechanisms

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Abstract

The skin flap is composed of skin and tissue, used in clinical practice to Tissue reconstruction is a complex procedure that usually causes tissue necrosis. Photobiomodulation (PBM) offers a potential solution by mitigating the inflammatory process and promoting neoangiogenesis, thereby reducing the risk of tissue necrosis. Objective: This study aimed to assess the histological changes in mouse skin tissue following skin flap surgery with the application of PBM. To achieve this, 48 adult male (Balb/C, 20-25g) were divided into two groups: Control (n=24) and Experimental (n=24). Skin flaps were created on the dorsal area of the animals in both groups, with the Experimental group receiving PBM treatment. In contrast, the Control group underwent a simulated application. The PBM, using a low-intensity laser at a wavelength of 660 nm, was applied to the vascular pedicle of the flap with a radiant exposure of 2.25 J/cm2 for a total duration of 20 seconds. Following the treatment, the animals were categorized into three subgroups based on the day of euthanasia, within their respective Control and Experimental groups. Euthanasia took place on the 4th, 7th, and 10th postoperative days. Tissue samples were collected and stained with picrosirius, which were then analyzed through optical microscopy using Nikon 2000 Eclipse 8000 equipment. The images were captured with a Nikon FDX35 camera equipped with a standardized 10x magnification lens, for analyzing collagen birefringence. Results: In the Control group, a reduction in type III collagen was observed within the initial days, accompanied by a notable presence of reddish and darkened birefringence, signifying tissue necrosis. Fibroblast bundles were scarce, and 75% of the mice showed signs of tissue devitalization. Conversely, the PBM laser group displayed early evidence of type III collagen within blood vessels, suggestive of neovascularization. This finding was further supported by the increased presence of type III collagen in mice euthanized on day 10. Notably, both type I and III collagen were present in all images, indicating the presence of fibroblasts. Conclusion: Photobiomodulation effectively countered the necrotic process, promoting the formation of neovascularization, as evidenced by the presence of Type III collagen in cells. This promising result suggests that PBM could be a differentiating factor in the response to scarring in skin flap surgeries.

Key words: Skin flap, photobiomodulation, necrosis, neovascularization.

Study type: Estudo experimental em animais (Experimental study in animals)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Inactivation of Candida albicans biofilm by aPDT applying formulation of methylene blue associated with an anionic polymer

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Abstract

BACKGROUND: Methylene blue (MB) is a widely known cationic photosensitizer that has been used for antimicrobial photodynamic therapy (aPDT). This technique induces cell death through oxidative species generated by irradiation of light at specific wavelength and intensity in the presence of oxygen. The association with sodium dodecyl sulfate (SDS) improves the efficacy of MB-aPDT and two successive applications of the treatment in the biofilm dispersion phase lead to better aPDT action in C. albicans. The addition of a polymer in the formulation increases viscosity and ensures adhesion. AIM: To compare the viability in Candida albicans biofilm treated by aPDT with 0.005% MB associated with 0.25% SDS conveyed in water or acidic formulation with viscosity 110 cP containing anionic polymer, comparing one or two simultaneous applications of aPDT. METHODS: For biofilm formation, C. albicans was cultivated, counted (5x107 cells/mL), plated and incubated at 37°C and 50 rpm for 48 hours. Then, phosphate buffer saline (PBS) was used to wash the biofilms that were exposed to MB 0.005% and SDS 0.25% at pH 5.0 conveyed in water (W_05) or formulation containing Carboxymethyl cellulose (CMC) 0.5% (F_05). Acidic water was used as control (CT) and base formulation (F_Ø) without MB. After 5 min in the dark, the treatments were removed and the biofilm was irradiated with 300 µL PBS (660 nm, 37.3 mW/cm2 and 120.8 J/cm2) for 54 min or with reapplication of treatments in half the time, being irradiated for 2x27 min. Biofilm dilutions were performed and seeded on Sabouraud Dextrose agar to count colony forming units (CFU/mL) after 24 hours of incubation at 37°C. CFU values were analyzed by two-way ANOVA test, followed by the Tukey post test (α=0.05). RESULTS: Significant reductions were found for the MB samples compared to CT and F_Ø. With 1 irradiation cycle of 54 min there was a reduction of around 1 Log CFU/mL. The reduction in groups that received 2 treatments of 27 min of irradiation each was significantly higher, reaching a maximum average reduction of 4.26 Log to F_05 compared to CT, with no difference with W_05. CONCLUSION: The cell inactivation was achieved when using 2 treatments, while 1 irradiation showed insufficient CFU/mL reduction. The polymer in the formulation did not affect biofilm control, being an effective strategy to increase viscosity and adhesion at the applied site, reaching similar inactivation to water solution.

Key words: Photochemotherapy, Methylene blue, Metachromacy, Polymer, Viscosity.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

The use of LED in inflammatory acne: case studies

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Abstract

Introduction - Acne is a dermatosis that affects the Pilo-sebaceous unit, presenting inflammatory and non-inflammatory lesions. Treatment is done through topical and oral products and medications, including retinoids and antibiotics. However, some medications have unpleasant effects, such as redness, dryness of the skin and burning, as well as bacterial resistance. The impacts that acne causes in the lives of patients, leave serious problems such as low self-esteem, depression and suicide. Photobiomodulation with LED is an alternative widely used in the clinical practice of many professionals. It is considered safe therapy without significant adverse effects. Objective : Compare the effect of blue/violet, red and blue and red LED lights combined on inflammatory acne. Method: We studied 40 participants of an ongoing survey. We selected 10 from each group. Group 1 used blue LED (415 nm), group 2, red LED (660 nm), group 3 used blue and red LED (415 and 660 nm); group 4, comparative group, used 20% salicylic acid peeling. The Mask groups received the treatment 3 times a week and the application was made for 7 minutes. Salicylic acid peeling was done twice a month. A roadmap was developed to evaluate the results and they were evaluated by a dermatologist, blind in the study. Results: The general appearance of the skin was better observed in the salicylic acid group with 40% improvement, followed by the red light group, 30%. The appearance of the lesions was considered better in the group that used blue light (45%). The number of pustules improved by 44.44% in the combined blue and red light group. The number of papules had an improvement of 33.33% in the salicylic acid peeling group, 18.88% improvement in the groups that used blue light and blue and red light combined. The treatment group with red light obtained the best result as the improvement of oil, 43.75% improvement of the same. As for erythema, the salicylic acid peeling group had 40% improvement of the picture, followed by blue light, 30%. Conclusion: We observed that all treatment groups presented satisfactory results. Treatments with LEDs demonstrate good efficacy, but still require reliable research, randomized and controlled clinical studies, with a minimum number of participants and who determine a safe parameter in the use of devices and appliances that can be used at home with due security.

Key words: acne, blue light, red light, phototherapy

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Evaluation of the efficacy of antimicrobial photodynamic therapy in teeth with Molar Incisor Hypomineralization (MIH): Pilot Study

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Abstract

Introduction: Molar incisor hypomineralization (MIH) is a qualitative defect in the development of tooth enamel and occurs during the mineralization phase. This condition affects at least one permanent first molar and can also affect permanent incisors. Patients with MIH are at increased risk for caries, hypersensitivity, and restoration failures. Objective: Evaluate the effect of antimicrobial photodynamic therapy (aPDT) on the decontamination of permanent teeth with Molar incisor hypomineralization (MIH) associated with active caries lesions in dentin. Methods: Eleven selected teeth were randomly divided into two groups. G1: Selective chemical-mechanical removal of carious tissue with papacarie, followed by aPDT; G2: selective removal of carious tissue, followed by aPDT. The following laser parameters were used: 100 mW, 6J, 60 seconds, 3571mW/cm2 and 214J/cm2. As a photosensitizer, 0.005% methylene blue gel was used with a pre-irradiation time of 3 minutes. The collected samples were analyzed for the number of total microorganisms and after incubation for 48 hours, the colony forming units (CFUs) were counted and transformed into CFUs/mL for comparison between groups. Results: The data were subjected to statistical analysis for normal samples, using Student's t test to compare group means, with a significance level ($p<0.05$). Data analysis: No statistical differences were observed between the groups ($p=0.494$). Conclusion: Antimicrobial photodynamic therapy with the parameters used, was effective in decontaminating molar teeth with MIH, with no statistical difference between the groups.

Key words: Molar Incisor Hypomineralization, MIH, photodynamic therapy, laser, PDT

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

PHOTOBIOMODULATION AS A NON-INVASIVE THERAPY IN POSTMENOPAUSAL WOMEN WITH URINARY INCONTINENCE

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Abstract

BACKGROUND: Urinary incontinence is a common condition in postmenopausal women, affecting between 25% and 45% of them and leading to significant social, psychological, and economic consequences. AIM: To evaluate the effects of photobiomodulation on urinary loss and pelvic pressure in postmenopausal women with urinary incontinence. METHODS: We conducted a randomized, double-blind, placebo-controlled pilot study with women over 50 years of age in postmenopause with urinary incontinence. The study received approval from the Ethics Committee of Nove de Julho University (Opinion No. 5.628.333). Participants were randomly assigned to two groups: Group A received photobiomodulation treatment with an externally applied diode laser in the vaginal area, while Group B (placebo) had the laser deactivated. Both treatments were administered over four weeks. The Treatment Group received four sequential applications of the DMC diode laser (808 nm), with 4J of energy per point, a power of 100mW, power density of 510mW/cm², and a beam area of 0.2cm², totaling eight points in the vaginal area, with each application lasting 40 seconds. Ten patients participated in the pilot study. The 1-hour Pad Test was conducted before and after the intervention, with participants placing a pre-weighed absorbent pad in their underwear and performing simulated everyday activities. After the activities, the absorbent pad was weighed on a precision scale to classify urinary losses. To assess the pelvic floor muscles, we used a biofeedback device that measures vaginal pressure in mmHg through an air-inflated probe, recording vaginal pressure during maximal muscle contraction for 5 seconds and minimum pressure during relaxation of contractions, before and after the intervention. RESULTS: We observed significant differences in urinary loss between the groups ($p = 0.02155$). In the photobiomodulation group, there were significant differences before and after treatment ($p = 0.0085$), but not in the placebo group ($p = 0.0747$). No significant differences in pelvic pressure were found between the groups ($p > 0.05$). Detailed analyses within each group also did not reveal significant differences in pelvic pressure before and after treatment ($p > 0.05$). CONCLUSION: Photobiomodulation significantly reduced urinary loss in postmenopausal women with urinary incontinence, although it had no impact on pelvic pressure.

Key words: Menopause, Photobiomodulation, Urinary Incontinence.

Study type: Ensaio Clínico (Clinical Trial)

Application of Antimicrobial Photodynamic Therapy in the regression of labial herpes simplex lesion

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Abstract

INTRODUCTION: Herpes simplex virus (HSV) is a recurrent viral infection that can be classified into type 1 (HSV-1) and type 2 (HSV-2). HSV-1 predominantly affects the head and neck region and is transmitted through infected saliva or active perioral lesions. Treatment is based on the use of topical and/or systemic antivirals; however, regular use of these medications can lead to microbial resistance. Antimicrobial Photodynamic Therapy (aPDT) is a well-tolerated technique with minimal adverse effects that acts through a visible wavelength. Upon absorption of the photosensitizer, it reaches an excited state, which reacts with local tissue oxygen, causing microbial inactivation or death. OBJECTIVE: To report the effects of aPDT on labial herpes simplex lesions in the vesicular phase through a case report, contributing to professional knowledge regarding the clinical regression of lesions and associated symptoms. METHODOLOGY: A clinical case was conducted at the School Dental Clinic of the Adventist University of Bahia (FADBA), with approval from the Ethics Committee (CEP 4.604.269). DATA ANALYSIS: A 20-year-old female patient sought dental care with complaints of local discomfort and cosmetic damage. According to the clinical examination, the patient reported during the anamnesis that she was a carrier of HSV-1 and that it manifested as perilabial lesions during emotional stress. The approach involved a single session of aPDT, which included lesion perforation, application of 0.01% methylene blue for 5 minutes, followed by the use of low-power laser at the following settings: 100mW power, 600 nm wavelength, 0.028 cm^2 spot size, 3 J of continuous and punctual application for 30 seconds, and an energy density of 107.14 J/cm^2. The patient reported immediate comfort after aPDT application. She was followed up at 24h, 48h, 72h, and 96h, with complete regression of the lesions observed 96 hours after the initial application, along with complete alleviation of painful symptoms.

Key words: Labial herpes simplex, Photodynamic therapy, Viral infection.

Study type: Relato de caso/Serie de casos (Case report/Case series)

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Effects of photobiomodulation on ovarian function in an experimental model of polycystic ovary syndrome in rats

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Abstract

Polycystic Ovary Syndrome (POS) is a complex gynecological condition often associated with infertility and various metabolic risks, including the development of type II diabetes mellitus, dyslipidemia, cardiovascular disease, hypertension and metabolic syndrome. Several theories may explain the pathophysiological mechanisms involved in POS, which include: neuroendocrine defects, androgen synthesis/metabolism and/or action, cortisol metabolism, insulin action and/or secretion, and defects in lipid metabolism, as well as chronic subclinical inflammatory processes Conventional treatment involves drugs including metformin, orlistat and statins, but the long-term benefits are not completely clear; in addition they induce some side effects. In this sense, photobiomodulation (PBM) emerges as a promising therapy since it exerts important anti-inflammatory effects. Thus, the aim of this study will be to evaluate the effects of photobiomodulation on ovarian function in an experimental model of polycystic ovary syndrome. For this purpose, female Wistar rats will be used, submitted or not to POS induction by intramuscular administration of a single dose of estradiol valerate (2mg/0,2 ml) and treated or not with PBM (810 nm 100mW, 150s) in two points: right side and left side of the ventral surface. We will investigate clinical parameters such as: body weight, ovarian weight, quantification and gene expression of cytokines in ovarian homogenate, analysis of sex hormones, glucose and cholesterol. Considering that POS is a multifactorial disease that can induce infertility, the search for new treatments without side effects and at a lower cost is relevant.

Key words: Polycystic Ovarian Syndrome, PCOS, Photobiomodulation

Study type: Estudo experimental em animais (Experimental study in animals)

EFFECT OF PHOTOBIOMODULATION ON THE SALIVARY GLANDS OF PATIENTS WITH HYPOSALIVATION INDUCED BY THE USE OF BENZODIAZEPINES: DOUBLE-BLIND RANDOMIZED PLACEBO-CONTROLLED CLINICAL STUDY

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Abstract

Introduction: Depression is the most common mental illness and antidepressants are the first line of treatment for most patients with depression. This class of therapy is inevitably associated with side effects and adverse reactions, and hyposalivation is a symptom that seems to be common to all of them. Saliva performs multiple functions and plays a vital role in protecting the health of the soft and hard tissues of the oral cavity. Reductions in salivary flow are most often manifested as symptoms of dry mouth, and this subjective complaint is called xerostomia. Although xerostomia is the most frequent indication of reduced salivary production, it is not invariably associated with hyposalivation. Users of antidepressant drugs have a number of important systemic and oral complications, including hyposalivation. Low-intensity laser has been shown to improve salivary flow in patients with hyposalivation due to diabetes, Sjogren's syndrome, chronic kidney disease and patients undergoing chemotherapy and radiotherapy for head and neck cancer. Objective: This randomized controlled clinical trial aimed to evaluate oral symptoms related to salivary gland function and mucosal condition in depressed patients, as well as the effects of photobiomodulation on salivary flow. Material and method: Forty-eight participants were included in the protocol, after signing the Informed Consent Form (ICF), they underwent anamnesis, physical evaluation and questionnaires on self-perception of oral health and symptoms related to salivary gland function and were then divided into two groups: Photobiomodulation (FBM) (n = 24) ; they had their major salivary glands irradiated with a diode laser (808nm, 4J per point, 40s) and placebo (PCB) (n = 24) , who were subjected to a simulation, where the application protocol was repeated, but with the laser switched off, we carried out pre- and post-treatment sialometry to compare saliva volume and biochemical analysis, where we measured total proteins and calcium. Results: We observed an increase in salivary flow, as well as an increase in biochemical elements such as calcium and total proteins. Conclusion: this study showed that photobiomodulation brought about a significant improvement in volumetric and biochemical parameters in the samples analyzed.

Key words: photobiomodulation, low-intensity laser, hyposalivation, depression, anxiety.

Study type: Ensaio Clínico (Clinical Trial)

COMBINATION OF PHOTOMODULATION THERAPY AND HYALURONIC ACID IN AN IN VITRO MODEL OF PHOTOAGING IN KERATINOCYTES AND FIBROBLASTS

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Abstract

Introduction: From 2010 to 2050, there will be a significant increase in the elderly population in developing countries, with a projected increase of 250%, meaning that almost a quarter of the population will be 60 years or older. Aging is an inevitable process, but understanding its implications for health is essential. Factors such as sun exposure, smoking, and alcohol accelerate skin aging, damaging cells, and emphasizing the importance of preventive care for a healthier life. Research indicates the efficacy and safety of the simultaneous approach of HA (Hyaluronic Acid) fillers with laser or LED therapies in rejuvenation. Objective: This study aims to evaluate the effect of the combination of photobiomodulation therapy and hyaluronic acid in an in vitro model of photoaging using UV light and cigarette smoke extract on keratinocytes and fibroblasts. Methodology: Keratinocytes and fibroblasts will be incubated at 37°C and 5% CO2 until they reach sub-confluence, and then they will be irradiated with UV light for 24 hours. After this period, cigarette smoke extract (2.5%) may or may not be added, and irradiation with the laser (diode laser, 660nm, average radiant power 30 mW, exposure time 180 s) and/or Hyaluronic Acid (0.1 mg/ml) may or may not be applied. After an appropriate incubation time, the cells will be diluted and plated in 24-well plates, and the assay will be performed in triplicate. Analysis: Cell viability and proliferation assay (MTT), quantification of IL-1β, TNF-α, IL-6, IL-10, IL-8, TGF-$\boldsymbol{\beta}$ (ELISA), determination of glutathione peroxidase (GPx) activity, superoxide dismutase (SOD) enzyme, and catalase, as well as collagen quantification, will be performed. Data will be analyzed, and graphs will be generated using GraphPad Prism 5.0 software. Data will be subjected to One-way ANOVA followed by the Newman-Keuls post-test for comparison between groups.

Key words: Keywords: Hyaluronic acid, fibroblasts, photoaging, keratinocytes, photobiomodulation therapy.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

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The impact of photobiomodulation in conjunction with disodium dexamethasone phosphate on the expression of inflammatory cytokines and nitric oxide in activated M1-profile macrophages

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Abstract

"M1-polarized macrophages are crucial players in inflammation, pivotal in the immune response to infections, tissue damage, and cellular stress, influencing various stages of tissue repair through their secretory products. Disodium dexamethasone phosphate (FD-Dexa) is a widely used anti-inflammatory drug in clinical practice, but its effectiveness comes with the risk of numerous side effects, especially at higher doses and with prolonged use.Photobiomodulation (PBM) has shown promise in attenuating inflammation through various mechanisms, including macrophage modulation towards an anti-inflammatory phenotype (M2), which promotes inflammation control and tissue repair. Both PBM alone and its combination with corticosteroids have the potential to affect inflammatory cytokine expression by M1 macrophages.This study aims to assess the impact of PBM, with or without FD-Dexa, on the secretion of inflammatory cytokines and nitric oxide synthesis in M1-polarized macrophages. J774 macrophages will be divided into the following groups: (1) Control - untreated J774 cells, (2) M1 - J774 cells activated to M1 phenotype, (3) M1 + PBM - M1-activated J774 cells subjected to PBM, (4) M1 + FD-Dexa 2µM, (5) M1 + FD-Dexa 4µM, (6) M1 + PBM + FD-Dexa 2µM, and (7) M1 + PBM + FD-Dexa 4µM. Duplicate analyses will be conducted for each group.J774 macrophages will be activated to M1 phenotype using DMEM supplemented with 10% FBS, 1% antibiotic-antimycotic solution, LPS (1µg/mL), and IFN-ɣ (0.2µg/mL), followed by a 2-hour incubation at 37°C with 5% CO2. PBM groups will be irradiated using a 780 nm Aluminum Gallium Arsenide laser (70 mW, 17.5J/cm2, 1J). FD-Dexa (2µM and 4µM) will be added to the respective groups, and all cells will be incubated for 24 and 48 hours at 37°C with 5% CO2. After incubation, culture medium will be collected, total protein quantified using a Nano spectrophotometer (Nanodrop), and levels of IL-6, IL-1β, TNF-α, and nitric oxide (NO) synthesis will be analyzed using ELISA and the Griess method. Experiments will be conducted in triplicate, and data will be subjected to statistical analysis."

Key words: Key words: J774 macrophages, dexamethasone, inflammation, photobiomodulation, nitric oxide, cytokines.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Study of photobiomodulation in the skin collagen production after fractional CO_2 laser in rats

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Abstract

Skin aging is characterized by a progressive loss of functionality and regenerative potential. With increasing life expectancy, people are becoming more concerned about their appearance, increasing the demand for facial treatments. For nearly 15 years the fractional CO2 laser was considered the gold standard for facial treatment, however it is no longer being widely used due to the long skin recovery period and the risk of serious side effects. Aesthetics professionals have used photobiomodulation (PBM) to increase circulation and lymphatic drainage and mainly because of its anti-inflammatory effects after procedures with the potential to generate inflammation. However, most procedures that generate inflammation are also collagen inducers. Thus, it is plausible to admit that if the inflammatory process is reduced with the use of PBM, collagen production may be reduced and thus the result may be impaired. Thus, therapeutic resources that minimize the side effects of fractional CO2 lasers are relevant. Therefore, the objective of this study will be to evaluate the role of PBM in the collagen production after the fractional CO2 in the skin. For this purpose, male Wistar rats will be submitted to CO2 laser injury on the skin and treated or not with PBM. After 21 days, the collagen production as well as mechanical properties of skin will be evaluated. This study will bring scientific evidence on the association of PBM with the CO2 laser.

Key words: Co2fractional, laser, collagen, photobiomodulation

Study type: Estudo experimental em animais (Experimental study in animals)

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Blue LED Increases L929 Fibroblast Cell Viability

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Abstract

Introduction: Fibroblasts, as stromal cells, are accountable for the synthesis and modification of the extracellular matrix, and they occupy a pivotal role in the wound healing process. Operating within various tissues, these cells are responsible for contractions that aid in wound closure, and this function is contingent upon their phenotypic differentiation. Recent studies that have been published using photobiomodulation (PBM) with low-level lasers or LEDs have demonstrated enhanced proliferation, differentiation, influence at mitochondrial and reticular activity. Nonetheless, a comprehensive understanding of the ideal dosimetric parameters for photobiomodulation (PBM) to promote wound regeneration has not yet been attained. Objective: Therefore, this study aims to assess different dosimetric parameters of blue LED light on the viability of L929 fibroblast cells. Methods: The fibroblast L929 cells line (mouse) was cultured in a proliferation medium composed of Dulbecco's modified Eagle medium (DMEM, Vitrocell, Campinas, SP, Brazil) supplemented with 10% fetal bovine serum (FBS, Vitrocell, Campinas, SP, Brazil) and 1% antibiotic–antimycotic solution incubated (HEPA class 3110, Thermo Electron Corporation, OH, USA) at 37 °C in a humidified atmosphere with 5% CO2. The cells were removed from the culture flask and centrifuged. The L929 cells were divided into the experimental groups: Control, 4 J, 6 J and 8 J. The PBM treatment using blue LED (Quantum, Ecco ®, 470 nm, 400 mW, 10 s, 15 s and 20 s and total energy of 4, 6 and 8 J, respectively) were performed at the bottom of Falcon tubes. The cells were plated (2 x 104) in 96-well culture plates and submitted to MTT (3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide) assay for evaluation of cell viability after 24 and 48 h of incubation. Results: The results showed that, after 48 hours, there was a higher cell viability in the 8 J group compared to the 6 J group. However, at the 24-hour mark, the experimental groups showed no statistically significant differences. Conclusion: In conclusion, the blue LED applied with 8 J was capable of time-dependent stimulating L929 cell viability.

Key words: Fibroblast, Viability, blue LED.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

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Interaction between red and infrared wavelengths reduces pain and inflammation caused by the Bothrops leucurus snake venom - Preliminary results

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Abstract

Introduction: The majority of snakebites in Brazil are caused by snakes of the genus Bothrops and in the Northeast region B. leucurus is the predominant specie. Photobiomodulation is considered promising in the treatment of local lesions caused by botropic venom, but there is a need for studies regarding the association of red and infrared wavelengths in this context. Aim: to evaluate the effects of photobiomodulation on the nociceptive mechanical threshold (NMT) and variation in thermography in mice subjected to inoculation with Bothrops leucurus snake venom. Methodology: 80 mice were used, divided into 4 groups: positive control (PC), negative control (NC), treated with infrared laser - λ=808 nm (IG) and treated with red laser - λ= 660 nm + infrared - λ=808nm (RIG). Each group was subdivided according to the evaluation time (24h and 72h). The venom was inoculated into the right gastrocnemius muscle at a dose of 0.6mg/kg in the PC, IG and RIG and saline solution in the same volume in the contralateral muscle and the NC received the same volume of saline solution in both and after 30 minutes , irradiated with a diode laser (0.1W, CW, 0.1 cm2 spot, DE: 10J/cm²) in the treated groups and laser turned off in the controls. The NMT was defined as the minimum force necessary to provoke a paw withdrawal reflex, performed using a digital analgesimeter using the increasing pressure method, 24 and 72 hours after inoculation and in clinical thermography the mice were sedated and positioned in the prone position at 1 meter away from the thermograph (FLIR Thermal ®) to measure temperatures in the pelvic limbs. Nociceptive thresholds were analyzed using the two-way ANOVA test, followed by the Bonferroni test and data from thermographic analysis were subjected to the ANOVA test, followed by the Tukey test ($p<0.05$). Results: Photobiomodulation significantly reduced the pain caused by the venom in the treated groups at both times evaluated and RIG showed a threshold closer to baseline when compared to IG. When evaluating the thermal image of the inoculated muscle, RIG showed lower values at 24 and 72 hours after irradiation in relation to PC, while IG showed a reduction in temperature in the limb only 72 hours after venom inoculation. Conclusion: Therefore, the effectiveness of the treatment in modulating pain and inflammation caused by botropic venom is advocated, with lasting effects and more significant results resulting from the association between wavelengths.

Key words: photobiomodulation, botroic accident, analgesia, thermography

Study type: Estudo experimental em animais (Experimental study in animals)

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Effects of low-power lasers and LEDs on telomere stability in breast cancer cells

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Abstract

INTRODUCTION: Breast cancer is the type of neoplasm that most affects women worldwide. Radiation emitted by low-power lasers and LEDs has been used for therapeutic purposes based on photobiomodulation. However, the molecular mechanisms involved in photobiomodulation induced by such radiations as well as such effect depends on the conditions of irradiation and biological system. Studies point out that telomere maintenance and length could be involved in the photobiomodulation effect. However, the participation of this mechanism in the photobiomodulation effect on cancer cells is not understood yet. OBJECTIVE: Thus, this study aimed to evaluate the mRNA levels from genes related to telomere maintenance and telomere length in breast cancer cells exposed to low-power red laser and blue LED. METHODOLOGY: MCF-7 and MDA-MB-231 cells were exposed to red laser (658 nm) at fluences of 23, 46, and 69 J/cm2 (0.77 W/cm2, 100 mW; spot size of 0.13 cm^2) and blue LED (470 nm) at fluences of 160, 321 and 482 J/cm2 (5.35 W/cm2, 1500 mW; spot size of 0.28 cm^2), alone or simultaneously, in continuous emission mode. After exposure, the relative levels of mRNA of genes involved in telomere maintenance (TRF1 and TRF2) and telomere length were evaluated by RT-qPCR and qPCR, respectively. RESULTS: In the MCF-7 cells, the combined exposure of the red laser with the blue LED significantly reduced ($p<0.05$) the relative levels of TRF1 mRNA. However, exposure to red laser and blue LED alone significantly ($p<0.05$) increased the relative mRNA levels of TRF1 and TRF2, respectively. Thus, in the MDA-MB-231 cells, exposure to the low-power blue LED, alone or simultaneously, significantly decreased ($p<0.05$) the relative levels of TRF1 mRNA, and the low-level red laser alone also significantly ($p<0.05$) reduced the relative levels of TRF2 mRNA. Exposure to red laser and blue LED combined significantly ($p<0.05$) increased telomere length in MCF-7 cells. However, exposure to the red laser and blue LED, alone or simultaneously, significantly decreased ($p>0.05$) the length of telomeres in MDA-MB-231 cells. CONCLUSION: Our findings suggest that photobiomodulation alters the mRNA levels of genes involved in telomere maintenance, and telomere length.

Key words: Breast cancer, photobiomodulation, telomere

Study type: Estudo experimental em in vitro (Experimental study in vitro)

PHOTOBIOMODULATION IN THE REPAIR OF SKIN WOUNDS: CLINICAL AND HISTOLOGICAL STUDY IN RATS

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Abstract

The goal of this study is to evaluate the tissue reparation from secondary intention wound healing in rats. This research was sent to and approved by the Ethical Animal Use Commision (CEUA) of the State University of Paraíba (UEPB) in Campina Grande-PB. Methods: 60 male albino rats of the Wistar lineage were used 250g and was 10 weeks old. An excisional skin wound in the dorsal region measuring 0.6mm in diameter and four experimental.groups were formed through simple randomization. Control Group (simulated treatment with a turned-off device), the Red Group (λ=660 nm, 100 mW, 1J per stitch, 10 second) (n=15); the Infrared Group (λ=808 nm, 100 mW, 1J per stitch, 10 seconds) (n=15); the Combined Group: Red and Infrared (λ=660 nm, 100 mW, 1J + λ=808 nm, 100 mW, 1J) (n=15): irradiated simultaneously, with subgroups of 5 animals for each eutanasia period (03, 07, and 14 days after the wound). After the animals were euthanized, in their respective predefined days, the Wound Contraction Index (WCI) was evaluated, the specimen was removed, and its tissue cuttings were submitted to hematoxylin-eosin (HE) and toluidine blue (TBO) staining. The largest wound retractions occurred in the 14-day period, compared to the other periods analyzed. The amount of inflammatory cells decreased at the end of the period evaluated, the number of mastocytes varied, and the re-epithelialization process in the groups was also completed at the 14-day mark. The largest wound retractions occurred in the 14-day period when compared to the other studied intervals. These results were statistically significant between the following groups: Control and Combined (p=0,09); Control and Red (p=0,09); Infrared and Control (p=0,09); Infrared and Red (p=0,09). Furthermore, the amount of inflammatory cells decreased at the end of the evaluated period, specially in the Combined and Infrared groups. The quantity of mastocytes varied and at the end of the 14 days, statistically significant results were found in the Infrared and Control groups in MCT3 (p=0,11) and in the Infrared x Red groups also in MCT3 (p=0,12). The re-epithelialization process on the groups was also completed on the 14th day. Conclusion: The results of the study, combined with the lack of previous research on these parameters, highlight the need to prioritize and deepen this field. This research elucidates the importance of increasing the precision of photobiomodulation in the tissue repair of wounds.

Key words: Laser, Wound, Rats, Repair.

Study type: Estudo experimental em animais (Experimental study in animals)

PHOTO-PHYTOTHERAPY WITH GREEN LIGHT AND POLYPODIUM LEUCOTOMOS EXTRACT FOR MELANOMA TREATMENT: IN VIVO STUDY

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Abstract

Introduction: melanoma skin cancer has the highest mortality among its common types. Tumor melanin absorbs green light (525 nm) killing tumor cells by generating endogenous reactive oxygen species (ROS). Polypodium Leucotomos (PL) extract also has antitumor properties. Objective: propose a photo-phytotherapy against melanoma through the combination of PL and Green Light (525 nm). Methodology: among thirty-five C57BL6 mice (ethical No 763426), six groups were selected: G1 (light); G2 (PL); G3 (tumor + light); G4 (tumor + PL); G5 (tumor + PL+ light); G6 (tumor). In order to induce cancer, 7,12-dimethylbenz[a]anthracene and croton oil were used. The animals exposed to green light (532nm) underwent 7 sessions of irradiation at intervals of 48 hours, at a dose of 100 J/cm2, using the equipment at bio Lambda (São Paulo). PL administration was before irradiation. Body mass, temperature, oximetry and cardiac heart were examined for by INFRARED HomeMade equipment. Average tumor size (TAS) were quantified using a caliper and ImageJ software, respectively. Skin samples were collected from all groups for histopathological and immunohistochemistry analysis. Statistical analysis was performed using GraphPad Prism 9®. Results: body mass, oximetry, temperature and heart rate did not change for all groups. Skin damage was not observed in negative groups (G1 or G2) whereas G6 group (melanoma) showed an evolution of carcinogenesis. The size of all challenged tumors decreased. A significant reduction of 80% was observed in the G5 group (PL+light). A histological and immunohistochemistry assay confirmed these findings. Conclusion: further investigation of the photo-phytotherapy model with green light and LP is necessary for the treatment of melanoma.

Key words: Melanoma, green light, Polypodium leucotomos.

Study type: Estudo experimental em animais (Experimental study in animals)

Evaluation of dual application of photodynamic therapy—PDT in Candida albicans

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Abstract

This study aimed to evaluate, in vitro, the efficacy of photodynamic therapy - PDT using dimethyl methylene blue zinc chloride double salt (DMMB) and red LED light on planktonic cultures of Candida albicans. The tests were performed using the ATCC 90,028 strain grown at 37 °C for 24 h, according to a growth curve of C. albicans. The colonies were resuspended in sterile saline adjusted to a concentration of 2 × 108 cells / mL, with three experimental protocols being tested (Protocol 1, 2 and 3) with a fixed concentration of 750 ηg/mL obtained through the IC50, and energy density 20 J/cm2. Protocol 1 was carried out using conventional PDT, Protocol 2 was applied double PDT in a single session, and Protocol 3 was applied double PDT in two sessions with a 24 h interval. The results showed logarithmic reductions of 3 (4.252575 ± 0.068526) and 4 logs (2.669533 ± 0.058592) of total fungal load in protocols 3 and 2 respectively in comparison to the Control (6.633547 ± 0.065384). Our results indicated that double application in a single session of PDT was the most effective approach for inhibiting the proliferation of Candida albicans (99.991% inhibition).

Key words: LED; Dual application, PDT

Study type: Estudo experimental em in vitro (Experimental study in vitro)

Preventive Vascular Photobiomodulation on Collagen Deposition in an Acute Muscle Injury Model

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Abstract

INTRODUCTION: Skeletal muscle is a highly dynamic tissue with remarkable regenerative and adaptive capabilities. This tissue comprises muscle fibers, sarcoplasm, and connective tissue components arranged around the muscle fibers, specifically known as the endomysium, perimysium, and epimysium. Structural components within skeletal muscle, such as connective tissue and sarcoplasm, hold pivotal roles in the intricate process of muscle regeneration. This process is of significant importance in the context of recovering from muscle injuries, which may lead to functional limitations and discomfort. Studies in the literature indicate that photobiomodulation (PBM) is an effective therapeutic approach that influences the inflammatory process, reduces myonecrosis, and increases muscle fiber diameter and cross-sectional area. The use of vascular photobiomodulation (VPBM) has proven effective, particularly in cases where it is challenging to predict the location and extent of muscle injuries, thereby reducing application time. Objective: Therefore, the aim of this study was to investigate the effects of VPBM applied prior to the induction of acute muscle injury in rats on total collagen deposition. Methods: Fifteen Wistar rats were divided to the following experimental groups: (1) Control; (2) Injury; (3) Preventive VPBM + Injury Group. The animals were submitted to cryoinjury to their anterior tibial muscles (TA). VPBM treatment was administered once, 24 hours before the cryoinjury procedure, with irradiation on the tail artery/vein (AlGaAs, 780 nm, 40 mW, 10 J/cm², 3.2 J) performed in transcutaneous way. Euthanasia was conducted on the second day following the induction of injuries. TA muscle samples were collected, processed histologically, and stained with Picrosirius Red. The total collagen area was measured using ImageJ software. The results were subjected to statistical analysis (ANOVA/Tukey). Results: The results exhibited a consistent organization and distribution of collagen, with a significant increase observed in the Injury group in comparison to the Control group. The Preventive VPBM + Injury group consistently maintained results similar to those of the Control group. Conclusion: In conclusion, preventive VPBM positively modulated collagen deposition in muscle tissue during the repair process following acute injury, although further studies are needed to gain a better understanding of the VPBM mechanism, especially regarding the optimal dosimetric parameters.

Key words: inflammation, skeletal muscle, collagen, vascular photobiomodulation, low-light laser

Study type: Estudo experimental em animais (Experimental study in animals)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Monte Carlo and heat diffusion simulations of the effects of morphological and physiological parameters for photobiomodulation dosimetry planning applied to orofacial disorders.

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Abstract

Orofacial diseases are among the pathological conditions that most affect the quality of life. Photobiomodulation (PBM) has gained increasing acceptance by the medical community. The Monte Carlo (MC) method is considered the gold standard for modelling laser clinical procedures such as PBM for extraoral therapies. However, the effect of several biological tissue characteristics, including skin phototype and body mass index (BMI), hasn't been carefully addressed. A careful inspection of these variables is important for effective dosimetry planning. Development of a simulation model to describe the effects of morphological and physiological parameters, including BMI and Fitzpatrick skin, on laser light fluence distribution and temperature spatial-temporal evolution. The model describes the settings of a typical oral PBM treatment protocol for pain relief. The simulation model comprises two main stages: an optical modeling computational stage and a thermal diffusion stage. The optical part comprises a four-layer skin model, with geometrical/optical properties representative of different Fitzpatrick skin types and BMIs. A customized computer program was adapted from the MC and heat diffusion modules of MCMatlab by Marti et al, to yield a database of light distributions and temperatures. An extensive simulation study was conducted for laser light sources with 660 nm and 808 nm and 6.0 J per application point. For the entire span of Fitzpatrick skin phototypes and selected fat layer thicknesses, the tissue layer heat depositions were studied. With increasing fat layer thickness, less amount of light can reach the muscle, mainly due to scattering. Epidermal heat deposition varies with wavelength and skin type, but not with BMI, while muscle dose is affected by both BMI and skin type. For the worst-case scenario (red laser, skin type VI), the epidermal temperature can reach 59ºC. A simulation model of the effects of BMI dependent skin structure, Fitzpatrick skin type and the relevant hemodynamic parameters on laser light fluence distribution and temperature spatial-temporal evolution was developed. The study reveals the importance of laser wavelength and skin phototype in the determination of epidermal heat deposition. Caution must be taken when planning the application of PBM laser protocols to higher skin phototypes, to avoid painful or other adverse reactions to laser therapy.

Key words: Monte Carlo technique, laser therapy, photobiomodulation, Fitzpatrick skin phototypes

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Assessment of the effects of laser auriculotherapy on smell and taste dysfunctions post-COVID-19 - Experimental study protocol.

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Abstract

In COVID-19 there is an intense inflammatory process in different organs and systems, during and after COVID-19 (CV). There are a large number of individuals with CV sequelae, characterized by different symptoms that together are called chronic or long COVID, which can affect the central nervous, respiratory, muscular, cardiac, vascular and sensory systems such as changes in smell or taste, which interfere on the quality of life of individuals. In Traditional Chinese Medicine, there is the stimulation of systemic (Traditional Acupuncture) and regional (Auriculotherapy) acupoints, aiming at energetic rebalancing through the release of neurotransmitters and chemical mediators. In auriculotherapy (AT) there is a correlation of organs at points in this region. The AT is performed in physical and emotional imbalances, such as stress, anxiety, depression, inflammation, and pain. In laser AT, acupoints could be stimulated via laser phototherapy, which is an alternative, promising modality with increasing application in the clinic. This study will evaluate the effects of AT in the treatment of smell and taste dysfunctions after CV. The study will be conducted after approval by the CEP. Participants must have a positive PCR exam or self-test for CV, be treated, be over 18 years old, both sexes, sign the informed consent form, and not have undergone any prior treatment. Participants will be randomly divided into groups: G1 (AT) AT with mustard seeds; G2 (ATL) AT with low power laser (Laser Duo, MMOptics, Brazil) (808 nm, 3 J, 100 mW, 100 J/cm2); G3 (ATL placebo) ATL as in group 2, with a barrier at the exit of the laser beam; G4 (ATL tip) as in group 2, using an acupuncture tip (808 nm, 3 J, 100 mW, 42.9 J/cm2). In all groups, AT will be performed by the same researcher, in contact with the skin, at acupoints in the ear, weekly, totaling 10 sessions. Participants will be assessed at the beginning and end of treatment using the Quality-of-Life Test (TQV) (SF-36), and evaluated by anamnesis and Sensory Assessment Tests (TAS) of smell and taste, using standardized models (bitter, sour, sweet, spicy, salty) and the Likert scale of points, before and after each session. The data will be analyzed using relevant statistical tests, to observe the effects of TA on smell and taste dysfunction and their repercussions on quality of life.

Key words: acupuncture, auricular acupuncture, COVID-19, laser, anosmia, algesia, hyposmia, hypogeusia.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

Randomized clinical trial comparing the violet light emitting diode system and other tooth whitening techniques

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Abstract

Introduction:Tooth whitening with violet LED is a promising technique to enhance smile aesthetics, delivering effective results. This technique has garnered attention due to its ability to reduce post-treatment sensitivity.Aim: to evaluate, through a clinical trial, the effectiveness and sensitivity of tooth whitening techniques using violet light emitting diodes (LED), compared with other whitening techniques. Methodology: 75 patients were selected to undergo tooth whitening, randomly distributed into five different treatment groups: G1 (35% hydrogen peroxide), G2 (35% hydrogen peroxide + Green LED), G3 (35% hydrogen peroxide at 35% + Blue LED), G4 (35% hydrogen peroxide + Violet LED) and G5 (Violet LED). Sensitivity measurement was recorded using the Visual Analogue Scale (VAS) from 0 to 10; tooth color measurement was performed before (T0) and after 30 days of whitening treatment (T1) using Easyshade Advance 4.0 Vita - Wilcos® dental spectrophotometer. Statistical analysis was performed using the Fisher and Kruskal-Wallis exact test at significance level of $p < 0.05$. Results: the enamel whitening effect was observed in all groups, with significant changes in G1. With regard to sensitivity, no statistically significant differences were found between groups. Conclusion: In G5, no participant reported post-whitening sensitivity, suggesting that treatment with violet LED showed the best sensitivity outcomes, changing the enamel color one more tone on the color scale.

Key words: Tooth whitening, Dental enamel, Hydrogen peroxide,LED.

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Advances in the Management of Radiodermatitis: Photobiomodulatory and Topical Therapies - Case Series

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Abstract

Cancer is a growing global problem. The main treatments, such as radiotherapy and chemotherapy, often cause side effects, including radiodermatitis (RDT), which varies from erythema to necrosis, affecting the patient's quality of life and treatment, as there is still no clear consensus on which treatment It is best for preventing and treating RDTs. To present 4 cases of successful treatment of RDT in cancer patients, using PDT, FBM and topical therapies. Retrospective study with 4 patients with RDT, treated with FBM, PDT and topical therapies, at the Hospital Universitário do Interior de São Paulo. In all cases, the wound was cleaned with 0.1% liquid PHMB for 10 minutes to remove dirt that interfered with the treatment of the injury. In FBM, the wavelength (ʎ) 660 nm was used , 1-3J, 2-3 times a week. In PDT, irradiation with ʎ 660 nm and 9J per point, with a distance of 1cm between the points, occurred after the application of the photosensitizer (PS) 0.01% Methylene Blue in the area of the lesions. PDT was used in all cases, with a maximum of 4 applications at minimum intervals of 48 hours. We evaluate injuries with the Radiation scale Therapy Oncology Group (RTOG) and pain with the Visual Analogue Scale (VAS). The research was approved by the Ethics Committee (nº 61694722.9.0000.5411) and registered with Clinical Trials (NCT05557825). The patients presented RTOG, ranging from grade 2 to 4. Two patients sought the service after completing radiotherapy, while the other 2 arrived between the 20th and 25th radiotherapy sessions. We observed improvements in the lesions in 3 of the 4 cases after the first 3 sessions, resulting in complete healing of the lesions. In the case where 10 treatment sessions were required, the patient had grade 4 RDT, requiring the addition of antibiotic therapy and temporary suspension of radiotherapy. In addition to the improvement in injuries, a reduction in pain was noted throughout the treatment, reflected by the decrease in the pain scale reported by patients. It is important to highlight that none of the patients had side effects during treatment. The association of multiple techniques proved to be effective in improving RDT, with complete healing, pain reduction and absence of adverse effects. The use of FBM associated with PDT and topical coverage was efficient in healing radiodermatitis and preventing worsening of the reported cases.

Key words: Laser Therapy; Radiodermatitis ; Oncology; Radiotherapy; Nursing care.

Study type: Relato de caso/Serie de casos (Case report/Case series)

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Amber photobiomodulation compared to tranexamic acid for the treatment of melasma

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Abstract

Introduction: Melasma is a chronic, recurrent acquired pigmentation disorder, characterized by symmetrical hyperpigmented macules on sun-exposed areas of the face and impacts the self-esteem of affected individuals. Objective: To evaluate the effectiveness of photobiomodulation (PBM) with amber light in the treatment of melasma, comparing it to tranexamic acid (TXA), as studies demonstrate the reduction of tyrosinase and inhibition of signaling pathways associated with melasma with PBM. Method: This controlled, randomized, double-blind trial involved two groups. Group one received active PBM and a placebo cosmetic for home use, while group two received sham PBM and topical liposomal TXA for home application. PBM was administered weekly over 12 weeks, during which the cosmetic was also applied at home. Exclusion criteria included use of oral contraceptives, intrauterine devices, hormone replacement therapy, autoimmune diseases, or recent facial treatments in the three months prior to the study. Melasma severity was measured by the Physician's Global Assessment (PGA), and participants' quality of life was measured by the MELASQoL-BP questionnaire. Evaluations occurred at the study's outset, the sixth week, and upon treatment completion. The study received approval from the ethics committee of Universidade Nove de Julho under number 5,332,384 on April 5, 2022, and the clinical trial registration number is NCT05326997, dated April 14, 2022. Statistical analysis was conducted using SPSS version 22, with a significance level set at 5%. Results: The PGA revealed melasma improvements in both groups, with a median score of 4 [4-5] for PBM and 4 [3-4] for TXA. No significant differences were observed between the two treatments based on the Mann-Whitney test. A score of 4 represents slight improvement, approximately 25%, with noticeable evidence of remaining hyperpigmentation. The total points on the MelasQoL questionnaire demonstrated enhanced quality of life for participants, as indicated by reduced scores (47.9 ± 15.6; 37.0 ± 17.0; and 19.3 ± 11.5 for PBM; 46.6 ± 12.9; 38.1 ± 9.7; and 26.8 ± 13.6 for TXA at the study's outset, the sixth week, and after treatment completion, respectively). This reduction was significant after the sixth week of treatment in both groups, though no difference in quality of life was observed between the two groups. Conclusion: PBM appears to be equally effective in treating melasma when compared to 5% liposomal TXA.

Key words: chloasma, LLLT, LED

Study type: Ensaio Clínico (Clinical Trial)

Photobiomodulation in dental implant stability and post-surgical healing and inflammation. A randomized double-blind study.

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Abstract

Background: The aim of this randomized clinical trial was to evaluate the effect of diode laser photobiomodulation (PBM) on post-surgical healing, inflammation and implant stability. Methods: Forty dental implants were inserted into 13 patients. The implants were randomly divided into two groups. The test group (PBM+) underwent two sessions of PBM (combined diode laser of 630 and 808 nm), the first of which after surgery, and the second, 7 days after the surgical procedure. The control group (PBM−) received simulated laser treatment. The implant stability quotient (ISQ) was determined immediately after the surgical procedure, and 7 days, 4 and 8 weeks later. Post-surgical inflammation was assessed following the criteria described by Bloemen and Cols. Healing was calculated using the healing index (HI). Results: No differences were found in terms of the mean values of implant stability between the test and control groups over time. Only two of the implants (18.2%) from the PBM− group were classified with the maximum healing index (HI = 5), whereas in the PBM+ group, nine implants (45%) were classified with the aforementioned index (P<0.0001). Using the logistic regression, it was determined that the non-application of the laser in the PBM− group caused an OR of 4.333 times of presenting inflammation (IC95% 1.150–16.323; P = 0.030). Conclusions: The application of 808 nm infra-red laser for bone tissue, and 630 nm for mucosal tissue in two sessions is considered to be an effective way of reducing inflammation and improving early healing. More studies are needed to confirm these results.

Key words: mucosal healing, mucosal inflammation, osseointegrated dental implants, photobiomodulation

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Low-power red laser and ultraviolet LED irradiation on Saccharomyces cerevisiae and plasmid DNA

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Abstract

INTRODUCTION: Therapeutic protocols based on non-ionizing radiation from low-power sources, as low-power lasers and LEDs (light-emitting diodes), have been proposed for treatment and prevention of many diseases and conditions based on photobiomodulation (PBM). New protocols based on PBM through simultaneous irradiation to lasers and LEDs have also been proposed. Although PBM is widely described for application in several therapeutic protocols, its effects on genomic stability remain not fully understood. Previous studies have indicated changes in DNA in response to irradiation with low-level therapeutic lasers, sublethal damage in bacterial cells has also been observed and these effects have been associated with production of reactive oxygen species. Until now, there are no known studies that have assessed the PBM-induced effects by simultaneous laser and LED irradiation in Saccharomyces cerevisiae cultures, a unicellular fungus that is widely used to evaluate the genotoxic potential of chemical and physical agents. OBJECTIVES: This study aims to assess effects of an ultraviolet A LED and a low-power red laser on S. cerevisiae cellular viability and DNA damage in pUC19 plasmids. METHODS: Cultures of S. cerevisiae FF18733 (wild type) and CD138 (deficient in oxidative DNA damage repair), in the exponential growth phase, were irradiated with ultraviolet A LED (390 nm; 1.5, 3.0 and 6.0 J/cm2) and red laser (660 nm; 5.3, 10.6 and 21.2 J/cm2) alone and simultaneously, incubated for 72h at 30°C, and after that the number of colony forming units were counted in order to determine the survival fractions. The pUC19 plasmids were irradiated at the higher and lower fluences and submitted to agarose gel electrophoresis. RESULTS: Results showed neither significant difference between treatments and control survival fractions, nor significant changes in electrophoretic profile of plasmids. DATA ANALYSIS: The comparison among the groups was carried out by analysis of variance with $p<0.05$ as lower significant level. CONCLUSION: These results indicate that the irradiation with ultraviolet A LED and low-power red laser, at the fluences evaluated, did not induce changes of cellular viability in S. cerevisiae cultures proficient and deficient in repair of oxidative damages, and did not induce single and double DNA strand breaks in plasmids.

Key words: DNA repair, laser, light-emitting diode, photobiomodulation, yeast.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Photobiomodulation as a Treatment Method for Psoriasis Wounds: An Experience Report

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Abstract

Introduction: Psoriasis is a chronic, autoimmune, inflammatory dermatological condition with a multifactorial origin. Classified as a dermatological disorder, it involves an inappropriate immune activation of T lymphocytes, leading to an increased release of inflammatory cytokines. This, in turn, results in the hyperproliferation of keratinocytes in the epidermis and the thickening of the stratum corneum. Psoriasis typically manifests as dry, erythematous-scaly, reddish plaques in areas prone to trauma, often causing pain and burning sensations. While topical medications are effective in controlling inflammation, as the condition progresses, photobiomodulation plays a crucial role in regulating epidermal hyperproliferation and promoting apoptosis of T lymphocytes. Objective: This report aims to elucidate the application of photobiomodulation in the treatment of psoriasis in a patient participating in the "Outpatient Assistance for Wound Treatment" extension project. Experience report: A patient with psoriasis on the plantar region of the lower limbs was referred for treatment within the framework of the "Wound Treatment Assistance Outpatient Clinic"extension project. Following an anamnesis conducted by the project's overseeing professor, a treatment protocol was established. This protocol involved immersing the patient's lower limbs in a footbath with water and soap containing ketoconazole. Subsequently, blue LED (Light Emitting Diode) therapy with bactericidal properties was administered during one minute. Finally, high-frequency equipment was utilized to aid in the healing process during five minuts. Results: After two weeks of treatment, which included four photobiomodulation sessions, a noticeable improvement in the patient's skin condition was observed. This improvement was characterized by a reduction in the appearance of "cracks" and a decrease in the burning sensations. Conclusion: Photobiomodulation is a viable and recommended treatment option for psoriasis. When an appropriate protocol is employed, it can yield positive results in less than a month.

Key words: photobiomodulation, psoriasis, treatment

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Photobiomodulation in Bell´s Palsy: A Case Report

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Abstract

INTRODUCTION: The World Health Organization defines health as encompassing not only the absence of disease but also optimal physical, mental, and social well-being. Facial appearance plays a pivotal role in interpersonal relationships, relying on non-verbal communication. Peripheral Facial Paralysis (PFP) or Bell´s Palsy is a condition caused by facial nerve damage, resulting in facial paralysis and impacting aesthetics and psychosocial well-being (SOUZA et al, 2015). Photobiomodulation (PBM) has been used to manage inflammation and also for skin rejuvenation (MOTA, 2023). When employing low-intensity laser therapy, PBM is a valuable intervention that enhances nerve tissue metabolism and promotes nerve function, contributing to the treatment of facial paralysis (LIZARELLI, 2018). OBJECTIVE: This case report details the treatment of PFP using PBM, the effects and its impact on the patient's bio psychosocial well-being. METHOD: A 27-year-old man presented with left hemiparalysis and pain in the left posterior cervical region. After 7 days of medication (Prednisolone 40mg, Acyclovir 400mg, Alginac 1000mg) without improvement, PBM was administered (660 and 808 nm, 2J/point each, 100 mW, 20s, Elite-DMC). The red laser was applied to the temporal, zygomatic major and minor, marginal mandibular, and cervical regions, while the infrared laser targeted the temporal, supra auricular, submandibular, and posterior cervical ganglia. Five sessions were conducted 72 hours apart, with a follow-up over 5 weeks. RESULTS: Following the initial session, the patient displayed improvements in pain, smile, eyebrow arching, and eye closing. PFP was nearly completely resolved, enabling more symmetrical facial expressions at the end of the treatment. The patient reported significant satisfaction with the outcomes and enhanced social interaction. CONCLUSION: PBM represents a promising tool in treating PFP, aiding in the restoration of facial functions and expressions, and enhancing an individual's self-esteem and social integration.

Key words: BELL'S PALSY, PHOTOBIOMODULATION, PERIPHERAL FACIAL PARALYSIS

Study type: Relato de caso/Serie de casos (Case report/Case series)

PHOTODYNAMIC THERAPY METHYLENE BLUE-BASED IN BREAST TUMOR CELLS

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Abstract

Photodynamic therapy (PDT) can be an alternative treatment for several cancer types due to its selectivity and cytotoxicity to malignant tissues. Nowadays there is consensus that different cell death, such as apoptosis, necrosis, autophagy, and necroptosis, is a consequence of tumor nature, photosensitizer concentrations and types, and low-power laser parameters used in PDT. So, studies involving these variants are important for understanding the cell death triggered and possible resistance mechanisms caused by PDT. The aim was to investigate PDT, using methylene blue (MB) as a photosensitizer, the expression of apoptosis gene-related (caspase-3 and -6, Bax, and Bcl-2). 4T1 breast tumor cell line was cultured in RPMI medium supplemented with 10% fetal bovine serum (FBS) and 1% antibiotic at 37°C and 5% CO2. MB was dissolved in RPMI medium at concentrations 25 and 50µM, filtered and the cells were incubated for 30 min at 37°C. Subsequently, MB solution was removed, the plates were washed and a new RPMI medium was added. Irradiation was carried out with a low-power red laser (660nm - AsGaAl) in the following parameters: power 100 mW, energy density 100 Jcm-2, energy per point 2.8 J, continuous wave emission mode, and exposure time 28s. Five groups were performed: control, MB 25, MB 50, PDT 25, PDT 50. After 24h, RNA was extracted from 1x106 cells using Trizol, cDNA was performed according to the manufacturer's instructions, and the expression of caspase-3, caspase-6, Bax, and Bcl-2 was evaluated using real-time PCR. B-actin was used as an internal control gene. ANOVA and Tukey post-test were used for statistical analyses. Bax was increased after both PDT treatments ($p<0.05$); Bcl-2 was significantly decreased only PDT 25 while Caspases-3 and -6 were not altered by PDT treatments ($p>0.05$) when compared with control and MB groups. The intracellular unbalance between Bcl-2 and Bax indicates that the apoptosis process may be triggered. Such gene alteration was dependent on MB concentration. PDT may alter the gene expression of Bax and Bcl-2 after PDT using methylene blue at concentrations (25 and 50 µM), but it was not able to modify both caspase gene expressions.

Key words: Keywords: Photodynamic therapy; low-level laser; Breast tumor cell; Methylene blue

Study type: Estudo experimental em in vitro (Experimental study in vitro)

Evaluation of combined photobiomodulation, ultrasound and manual therapies in the treatment of lateral epicondylitis - experimental protocol.

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Abstract

Introduction: Lateral epicondylitis presents as microlesions and inflammation at the tendinous insertion of the forearm extensor muscles onto the humerus' lateral epicondyle. Diverse therapeutic strategies aim to alleviate pain and restore function. Notably, biophysical advancements have recognized Photobiomodulation (PBM) with Low Power Laser as pivotal in inflammation modulation and tissue regeneration. Ultrasound's thermal and mechanical properties, combined with manual therapies encompassing manipulative techniques, stand as promising therapeutic interventions. Objective: This clinical study will aim to perform a combined analysis of PBM, ultrasound, and manual therapies in the treatment of lateral epicondylitis. Methodology: Post approval by the Human Research Ethics Committee, the study will enlist 40 adults, both genders, diagnosed with lateral epicondylitis. Upon signing the Informed Consent, participants will be randomized into two cohorts: G1 (n=20) will receive combined FBM therapies using low-power laser, ultrasound (RECUPERO, MMOptics), and manual techniques; whereas Group 2 (n=20) will undergo placebo sessions with inactive equipment. Participants will be evaluated regarding the range of movement speed (goniometer), muscle strength (dynamometer), and pain (visual analog scale) at times: a- before the first intervention; b- halfway through the application of the therapeutic protocol; c- simultaneously with the end of the last session; d- six months after the last session. The Nordic Musculoskeletal Symptom Questionnaire (NMQ) will be applied in steps a, c, and d. The protocols for FBM by RECUPERO will be characterized in terms of Frequency - 1MHz, Intensity - 0.5W/cm2, pulsed mode, 100 Hz, 660 and 808 nm wavelengths, 4 to 5 minutes, and 48 to 60 J. The entire regimen will comprise 10 sessions, conducted biweekly on alternate days. The data collected will be analyzed individually and intergroups. In the individual analysis: evolution of the therapeutic intervention for everyone, comparing the data from qualitative and quantitative techniques at collection time a with the participant's own times b, c, and d, and for the NMQ comparison between times a, c and d. In intergroup analysis: the calculation of means and standard deviations of individual data will be carried out for each group. The data obtained will receive statistical treatment with a significance level of $p < 0.05$.

Key words: Keywords: lateral epicondylitis, photobiomodulation therapy, manual therapy, ultrasound, shock waves

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

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Skin color influences photobiomodulation therapy

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Abstract

Introduction: Photobiomodulation therapy (PBMT) aiming to treat biological tissues located below the skin needs to be applied transcutaneously. In this process, light interacts with several chromophores, including melanin that is one of the main light absorbers in superficial tissue. Light absorption by melanin occurs significantly at wavelengths at the red range spectrum, and its influence becomes increasingly smaller in the infrared range. The increased density of melanin particles present in individuals with dark skin (higher phototypes), promotes greater absorption of light photons that in turn can attenuate the penetration and reduce the quantity of photons delivered at depth, affecting the desired therapeutic light dose. In this context, to deliver light to subcutaneous tissues, it is necessary to consider the skin phototype and the parameters used in PBMT. Objective: To examine the behavior of red and infrared light in different skin phototypes. Methodology: This is a clinical trial with 24 male volunteers, between 18 and 39 years old, allocated equally into 3 groups based on the skin phototypes classified by the Fitzpatrick scale (white – phototypes I and II; brown – phototypes III and IV; black – phototypes V and VI). PBMT at red (660nm) and infrared (808nm) wavelengths was applied at the region of the vastus medialis of the dominant thigh, with a power of 100mW, for 30s, 3J. Light penetration was measured with a PowerMeter PM100D (Thorlabs®) equipped with an S130C sensor, with its center positioned 2 cm from the irradiated area. Results: 24 volunteers were included in the study (8 white, 8 brown and 8 black). The average age was 22.4 years. There was a significant difference in light penetration between individuals from the three groups, at both wavelengths (RED: WHITE (88.7 μW) x BROWN (46.3 μW) - $p<0.001$; WHITE x BLACK (8.1 μW) - $p<0.001$; BROWN x BLACK - $p=0.002$. INFRARED: WHITE (298.5 μW) x BROWN (203 μW) - $p=0.011$; WHITE x BLACK (59.8 μW) - $p<0.001$; BROWN x BLACK - $p<0.001$. Conclusion: Our results suggest that skin phototype should be considered as a fundamental factor in the penetration of light through human skin in PBMT, with direct implications for dosimetry recommendations.

Key words: Photobiomodulation, Penetration, Skin Phototype.

Study type: Ensaio Clínico (Clinical Trial)

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Optical Clearing Agent and Skin Phototypes: Implications for Photobiomodulation

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Abstract

Introduction: Photobiomodulation therapy (PBMT) consists of the application of light in the range from red to near infrared spectrum for therapeutic purposes. The effects of PBMT on biological tissues depends on light-tissue interactions, which in turn depends on the penetration of light through human skin. Several studies have investigated the effects of optical clearing agents (OCAs) with chemical penetration enhancers (CPEs) to mitigate light reflection and scattering in biological tissues and thus increasing the depth of light penetration. However, there are no studies in humans that have combined these approaches, and also considered skin color (phototype) that impacts the light penetration through the skin. Objective: To verify whether the application of an OCA-CPE mixture improves the light penetration of PBMT through the skin in humans. Methodology: This is a clinical trial with 24 male volunteers, between 18 and 39 years old, allocated equally into 3 groups based on the skin phototypes classified by the Fitzpatrick scale (white – phototypes I and II; brown – phototypes III and IV; black – phototypes V and VI). The volunteers were first submitted to PBMT without intervention (BASELINE), at red (660nm) and infrared (808nm) wavelengths, at the region of the vastus medialis of the dominant thigh, with a power of 100mW, for 30s, 3J. Light penetration was measured with a PowerMeter PM100D (Thorlabs®) equipped with an S130C sensor, with its center positioned 2 cm from the irradiated area. The intervention was then carried out applying 1 mL of OCA-CPE to the vastus medialis region, with an action time of 10 minutes, followed immediately by new irradiation and measurement of the light penetration. Results: 24 volunteers were included in the study (8 white, 8 brown and 8 black). The average age was 22.4 years. There was a significant increase ($p = 0.03$) in light penetration in brown individuals in the red (660 nm) after application of OCA-CPE (BASELINE = 46.36 µW; OCA-CPE = 49.18 µW; +5.92 %). In the other groups there was no significant improvement ($p > 0.05$). Conclusion: Our results suggest that the application of OCA-CPE before PBMT with red light in brown individuals can discreetly improve light penetration and enhance physiotherapeutic treatment.

Key words: Photobiomodulation, Optical Clearing Agent, Skin Phototype.

Study type: Ensaio Clínico (Clinical Trial)

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NEW EFFECTIVE TREATMENT TO COMBAT JAW OSTEONECROSIS: LASERTHERAPY AND MAGNETOTHERAPY

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Abstract

Introduction Bisphosphonates are medications that inhibit bone resorption. Their prescription was initially restricted to diseases that interfered with bone metabolism, but they have now been prescribed to treat osteoporosis and even cases of osteopenia, causing serious adverse effects, such as Bisphosphonate related osteonecrosis of the jaw (BRONJ). To help repair this process, studies demonstrate that Photobiomodulation with low level laser therapy (LLLT) and magnetotherapy have been applied due to their anti-inflammatory, anti-edematous, analgesic and healing effects. Objective of this study was to evaluate the response of these energy-based devices, as adjuvants to the surgical treatment of BRONJ. Methods A pilot, prospective, controlled clinical trial was carried out, with eight patients divided into three groups, treated surgically to remove osteonecrosis. In Group 1 sham, no treatment was performed as the devices were turned off. Group 2, LLLT was applied after surgery and in Group 3, the magnetic field at the same time. Results: The biochemical evaluation of the inflammatory process showed greater blood oxygenation due to the increase in Hemoglobin, a decrease in viscosity due to thrombocytopenia and in C-reactive protein in the first 72 hours, in addition to a reduction in the leukogram in the Laser and Magneto Groups in relation to the placebo. The reduction in the levels of Creatine phosphokinase and lactic dehydrogenase in the Laser and Magnet Group in relation to the Placebo Group, suggest an acceleration of the healing process. Placebo Group showed dehiscence after 7 days in 100% of cases, while the Laser Group had 33.3% with partially closed sutures and the Magneto Group had complete closure in all patients. When comparing bone repair through analysis of tomographic density by the Hounsfield Unit after 60 days, the Magnetotherapy group obtained the best result, with a 40% increase in bone density compared to the other groups. In the assessment of pain, Photobiomodulation and Magnetotherapy interfered in the reduction of postoperative pain, when, according to assessment by the visual analogue scale, they reduced the sensation of pain in the 7th postoperative period, compared to the Placebo group. Conclusion: Photobiomodulation and Magnetotherapy demonstrated safety and efficacy in the treatment of BRONJ, by reducing phlogistic signs, faster healing and reducing post-operative morbidity

Key words: Keywords: Bisphosphonates, osteonecrosis of the jaw, photobiomodulation, low level laser theraphy, pulsed magnetic field

Study type: Ensaio Clínico (Clinical Trial)

USE OF LASER IN DENTISTRY: Quality of life for the population

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Abstract

Introduction: Low-level laser therapy in dentistry is considered an auxiliary option in current offices in the most diverse specialties and high-power lasers are primary options when available in the most diverse specialties. The laser is a light source with different wavelengths, giving it excellent therapeutic properties. Objectives: To use photobiomodulation therapy as an adjuvant in conventional treatments for patients referred to the Dentistry Course at UFMA, favoring pain relief, acceleration of tissue healing, and laser therapy in patients who need it according to their indications. As well as, to train students in the dental field in patient care and knowledge of laser technology. As well as using high-power laser photoablation therapy in surgical procedures, providing better postoperative care to patients, with less possibility of pain, fast recovery, and with less possibility of inflammation. Methodology: The Project was developed at the School of Dentistry Clinic of the Federal University of Maranhão (UFMA) on the Bacanga Campus, with the participation of scholarship students, volunteers, and professors of Dentistry of this Institution. The selected patients were submitted to laser applications in sensitivity lesions, canker sores, trismus, and paresthesias. Before the applications, patients were informed through lectures and educational orientations about the importance of the treatment. Results: The patients received care according to the clinical needs that fit the indications proposed in the project following predefined clinical protocols, presenting an excellent result in the resolution of their cases. Conclusion: Low-level laser treatment should be based on an individual clinical protocol for each patient. It is necessary to have knowledge not only of the inherent pathology, through a detailed anamnesis and adequate clinical examination but also of the laser equipment used, for its mechanism of action, aiming at an adequate dosimetry for the success of the treatment.

Key words: Low-Level Laser Therapy, Laser Therapy, Light.

Study type: Projeto de extensão

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Evaluation of the effects of auriculotherapy in side effects of post-COVID-19 in the sense of smell and taste - Experimental protocol.

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Abstract

Introduction: During COVID-19 infection there is an intense inflammatory process in different organs and systems. There is a significant number of patients with after-effects of COVID-19, characterized by different symptoms that are grouped together and are called chronic or long COVID, which can affect the central nervous system, respiratory system, muscles, heart, vascular system and changes in smell or taste, which interfere with the quality of life of individuals. In Traditional Chinese Medicine, there is the stimulation of systemic (Traditional acupuncture) and regional (Auriculotherapy) acupoints, aiming at energetic rebalancing through the release of neurotransmitters and chemical mediators. In auriculotherapy (AT) there is a correlation of organs at points in this region. AT is used in physical and emotional imbalances, such as stress, anxiety, depression, inflammation, and pain. In laser AT, acupoints are stimulated via laser phototherapy, being an alternative, promising modality with increasing application in the clinic. Objective: This study will aim to evaluate the effects of different AT modalities in the treatment of changes in smell and taste after CV. Methodology: The study will be conducted after approval by the CEP. Participants must have a positive PCR exam or self-test for CV, be treated, be over 18 years old, both sexes, sign the informed consent form, and not have undergone any prior treatment. Participants will be randomly divided into groups: G1 (AT) AT with mustard seeds; G2 (ATL) AT with low power laser (Laser Duo, MMOptics, São Carlos, Brazil) (808 nm, 3 J, 3.33 W/cm2); G3 (ATL placebo) ATL as in group 2, with a barrier at the exit of the laser beam; G4 (ATL tip) as in group 2, using an acupuncture tip (808 nm, 3 J, 1.43 W/cm2). In all groups, AT will be performed by the same researcher in contact with the ear skin at acupoints, weekly, totaling ten sessions. Participants will be assessed at the beginning and end of treatment using the Quality-of-Life Test (TQV) (SF-36) and evaluated by anamnesis and Sensory Assessment Tests (TAS) of smell and taste, using standardized models (bitter, sour, sweet, spicy, salty) using the Likert scale of points, before and after each session. The data will be analyzed using relevant statistical tests, to observe the effects of different AT modalities on sensory changes in smell and taste and their repercussions on quality of life.

Key words: acupuncture, ear acupuncture, COVID-19, laser, anosmia, algesia, hyposmia, hypogeusia.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

Photobiomodulation Therapy for the Treatment of Dentin Hypersensitivity: A Case Report

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Abstract

Introduction: Dentin hypersensitivity refers to the heightened sensitivity of vital dentin. Its symptoms can be observed when there is stimulation through extreme temperatures, such as hot or cold triggers, tactile stimulation, contact with certain substances, or osmotic variations. These triggers induce more pronounced responses due to the exposure of dentinal tubules, which are left unprotected due to specific events. Photobiomodulation therapy emerges as an alternative in managing dentin hypersensitivity, owing to its antinociceptive role. This therapy functions by the lasers' ability to reduce the permeability of neuronal membranes, altering sodium and potassium concentrations, thereby acting on pain control. Objective: To report the use of photobiomodulation therapy in the treatment of a patient diagnosed with dentin hypersensitivity, describing the procedure and protocols, as well as discussing its advantages and disadvantages, along with the results obtained. Case Report: A 28-year-old male patient sought the dental school clinic at the Federal University of Maranhão (UFMA) due to pain in some teeth and difficulty in consuming cold liquids. After clinical examinations, it was found that the patient had non-carious cervical lesions in some dental elements, with dentin exposure, resulting in dentin hypersensitivity. Using the Visual Analog Scale (VAS), the patient rated his pain from moderate to severe after evaporative tests performed with a triple syringe. Based on these findings, a treatment plan was developed, involving irradiation with a low-power 808nm Diode laser at 100 mW, 2 J for 20 seconds at each point, covering three points in the cervical region and one in the apical region of each tooth with pain. After five sessions with 48-hour intervals, an application of fluoride varnish was performed. Results: After completing the treatment, a new test using the Visual Analog Scale was conducted, and all dental elements received ratings in the mild pain range. Additionally, tooth 15 required a restoration, which was performed using glass ionomer cement. Conclusion: The application of photobiomodulation therapy, as demonstrated in the clinical case, was established as a safe and effective alternative, representing a minimally invasive intervention with significant results. This resulted in pain reduction and improved the patient's quality of life.

Key words: Photobiomodulation, Dentin, Hypersensitivity, Laser.

Study type: Relato de caso/Serie de casos (Case report/Case series)

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PHOTOBIOMODULATION THERAPY EFFECT ON A PATIENT WITH TEMPOROMANDIBULAR DYSFUNCTION: CASE REPORT

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Abstract

INTRODUCTION: Temporomandibular dysfunction (TMD) is described as an abnormality affecting the temporomandibular joint, as well as the muscles involved in mastication and related structures. Among the available therapeutic options, the use of photobiomodulation (PBM) stands out, showing promising prospects by providing immediate relief of symptoms and enabling the patient to resume their activities in a short period of time. OBJECTIVE: To report the effects of PBM treatment on a patient diagnosed with TMD. METHODOLOGY: A 24- year-old female patient presented at the "Laser Therapy in Dentistry" extension project conducted at the Federal University of Maranhão/Brazil, with severe bilateral facial pain and headaches. During the clinical examination, it was observed that the patient experienced clicking, crepitus, presence of dental wear, and pain in the upper trapezius, temporomandibular joint (TMJ) region, anterior temporal region and masseter. Through the anamnesis and clinical examination, the diagnosis of TMD was established. Therefore, the protocol applied for the case consisted of 6 J of energy for 60 seconds at 100 mW of power in the infrared range (808nm) per point, twice a week. The patient reported significant pain improvement as early as the second session, with pain levels decreasing to 5 on the VAS scale. At the end of the 10 planned sessions, the patient reported discontinuation of analgesics for pain control and demonstrated improvement in muscle tension and movements. Thus, it was concluded that PBM therapy proved to be effective in reducing the painful symptomatology of this patient after the 10 sessions.

Key words: Temporomandibular dysfunction, photobiomodulation, pain

Study type: Relato de caso/Serie de casos (Case report/Case series)

Alternative and promising in vivo study model for investigating the antimicrobial efficacy of photodynamic therapies

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Abstract

INTRODUCTION: Photodynamic therapy (PDT) is an alternative therapy that has been used to combat infections caused by different types of microorganisms. However, some aspects involving this therapy have not yet been fully elucidated. In order to contribute to research, alternative animal study models to vertebrates have been used, such as the invertebrate host Galleria mellonella. This model has demonstrated to be effective for the study of host-pathogen interactions, toxicity analyzes and for investigating the antimicrobial activity of various compounds and, therefore, has been widely used for studies involving PDT. OBJECTIVE: to synthesize the knowledge acquired to date about PDT using the G. mellonella host model with the aim of contributing to future studies using this alternative model. METHODOLOGY: a review was carried out in the Web of Science database on G. mellonella and PDT using the search key "(ALL= (galleria mellonella)) AND ALL= (Photodynamic Therapy)". RESULTS: 20 articles were found, 16 of which were experimental studies and were the subject of this review. Among the studies evaluated, the majority, 13 studies, evaluated the action of PDT on G. mellonella and 3 studies evaluated only the toxicity of photosensitizers on G. mellonella. The analysis methods used included the larval survival assay, quantification of hemocytes, hemolymph fungal load and spectrophotometric absorbance test to evaluate the penetration of photosensitizers into microbial cells. Studies with Candida albicans were the most prevalent and the most used photosensitizer was methylene blue. All studies demonstrated efficacy in PDT treatments for infections induced in G. mellonella, prolonging the survival of larvae, promoting an increase in the number of hemocytes in the hemolymph and reducing the number of viable microbial cells. Toxicity tests, in turn, were useful for establishing safe doses of photosensitizers. CONCLUSION: PDT has great potential as a safe and effective antimicrobial tool against different pathogens and G. mellonella has demonstrated to be an important host for studies evaluating strategies based on visible light and also evaluating the toxicity of new photosensitizers.

Key words: Photodynamic Therapy, Animal Use Alternatives, Invertebrates, Laser Therapy

Study type: Revisão (Review)

Mammary Tuberculosis: case report with adjuvant treatment to photobiomodulation

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Abstract

INTRODUCTION: Tuberculosis (TB) in the breasts is a tuberculous infection of the breast tissue. The incidence is considered low, ranging from 0.1% to 0.52%. Concomitant to drug treatment, low-level laser (LLL) was applied for tissue healing. OBJECTIVE: To describe the actions of stomatherapy to control clinical symptoms, tuberculosis skin lesions in the breasts, and their healing. METHODS: The study of the experience of adjuvant treatment of tuberculosis in the breasts after admission of a 45-year-old female patient CM in our service complained of abrupt and aggressive onset of lesions in the region of the right breast with extensive edema, swelling and hyperemia, later becoming ulcerative, painful with bloody and purulent exudation with subcutaneous nodules. The patient initially presented with classic signs of mastitis. No chronic diseases. The treatment in the intensive phase lasted 2 months and in the maintenance phase 4 months, and the initial topical management in the wound area of approximately 25 cm² was used with antiseptic Polyhexanide aqueous solution in the gauze for 10 minutes, followed by the calcium alginate dressing associated with collagen in plaque, once a day. Punctual application of the low-level laser with dosimetry of 2 j/cm² of the wound area with the red laser with a wavelength of 660 nm in the center of the ulcerations and in the surrounding region; applications with infrared laser with dosimetry of 7 j/cm² and wavelength of 880 nm, 2 times a week. The patient had a total of 14 sessions, about 2 months with the adjuvant treatment offered at the specialized outpatient clinic by the stoma therapist.RESULTS: Target dose was achieved to control the effects of the disease using diode laser with a power of 100 milliwatts in a punctual manner and dosimetry of 2 joules per cm² 2 times a week in conjunction with appropriate topical therapy and home guidance. Assertiveness about the choice and periodicity of the changes in the topical therapy used, according to the weekly specialized evaluation. CONCLUSION: Reaching the target dose to control the clinical signs of the disease linked to wound care, topical therapy and photobiomodulation proved to be effective in the treatment, providing relief of pain and the appearance of the wound bed and at a lower frequency compared to conservative treatment with antibiotic therapy alone.rter periodicity compared to conservative treatment with antibiotic therapy alone.

Key words: Latent tuberculosis, photobiomodulation, stomatherapy.

Study type: Relato de caso/Serie de casos (Case report/Case series)

Photobiomodulation as a therapeutic approach in the control of blood pressure in individuals with type 2 diabetes mellitus: A study protocol

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Abstract

Introduction: Type 2 diabetes mellitus (DM2) is a chronic and multifactorial condition that may cause cardiovascular complications and double the chances of elevated blood pressure (BP). In this context, photobiomodulation (FBM) has been investigated as a non-invasive and non-pharmacological therapy for the treatment of DM2 and, more recently, blood pressure control, an area that has several studies in animal models, but clinical trials are still scarce. Objective: To analyze the effects of photobiomodulation on BP in DM2 individuals through ambulatory blood pressure monitoring (ABPM) before and after whole-body irradiation using a panel of LEDs (light-emitting diodes) with infrared wavelength range. Systolic and diastolic BP will be analyzed, as well as the variation in BP over 24 hours after whole-body irradiation. Methodology: 36 volunteers, aged 50 to 70 years old, diagnosed with DM2, hypertensive and/or normotensive, will participate in the study and will be randomly allocated into two equal groups: sham and panel. Volunteers will undergo 6 whole-body photobiomodulation sessions (74 LEDs of 850 ± 10 nm, 36.13 mW/cm2, 10 min, 21.67 J/cm2) over 2 weeks, with 3 sessions per week, on non-consecutive days. BP measurement will be taken before and after the photobiomodulation intervention. During the intervention period, BP will be monitored using the MAPA device on three days (first, eighth and last). The data will be analyzed for normality of distribution and a significance level of 5% will be adopted for intra and inter group comparisons.

Key words: Keywords: diabetes, photobiomodulation, blood pressure, nitric oxide

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

POLYCYSTIC OVARY SYNDROME: PHOTOBIOMODULATION AS A POTENTIAL TREATMENT

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Abstract

INTRODUCTION: Polycystic ovary syndrome (PCOS) is an endocrinopathy that doesn't have a cure, causing several problems such as hormonal dysregulation, infertility, inflammation, and pain. As regards the treatment, there are studies based on the photobiomodulation technique (PBM). For that reason, this study aims to identify PBM as a potential candidate for the treatment of PCOS through a literature review. METHODS: The articles were searched in the PUBMED database and the keywords with a filter from 2015 to 2022, being Photobiomodulation therapy and Polycystic ovary syndrome, with 4 results, polycystic ovary syndrome, and ROS, with 72 results, polycystic ovary syndrome, and oxidative stress, with 408 results, photobiomodulation and inflammation, with 277 results, Pathogenesis and polycystic ovary syndrome with 3.912 results and photobiomodulation and neoplasm, with 131 results. RESULTS AND DISCUSSION: PCOS is an inflammatory condition that generates oxidative stress (OS), which is the imbalance between oxidants and antioxidants, resulting in high levels of reactive species of oxygen which can harm the function of granulosa cells (GCs) and oocyte quality. PBM can be used as a treatment because it has anti-inflammatory and analgesic functions. The OS generated in PCOS is the result of inflammation; therefore, PBM can be a potential treatment for PCOS. The use of PBM as a treatment for inflammation - which decreases bradykinin levels - is already observed since these are the factors for the oxidation-reduction imbalance, damaging the GCs. Furthermore, according to Oubiña (2019), it was found that PBM modulates follicular development without changing the ovary reserve, decreasing apoptosis in GCs and improving oocyte quality in mature female mice. However, additional studies on PBM are necessary, as despite the anti-inflammatory effect, PBM can increase OS through the activity on cell proliferation; including an increase in the growth of cancer cells. Therefore, PBM can be a potential candidate for treating PCOS, if the absence of neoplasms is confirmed. CONCLUSION:Based on this literature review, PBM is a good future candidate for treating infertility and improving the inflammatory condition caused by PCOS. Nevertheless, it is not possible to conclude any alteration or stimulation of a cancerous clinical condition, and further studies are required.

Key words: Photobiomodulation therapy and Polycystic ovary syndrome, polycystic ovary syndrome and ROS, polycystic ovary syndrome, oxidative stress, photobiomodulation and inflammation, Pathogenesis and polycystic ovary syndrome, photobiomodulation and neoplasm.

Study type: Revisão (Review)

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Use of Transcranial Photobiomodulation during Speech Therapy in a patient with Autism Spectrum Disorder

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Abstract

Summary: This report demonstrates the potential therapeutic effects of using transcranial low-frequency Infrared Laser in patients with autism spectrum disorder during speech therapy. The patient, a 4-year-old girl, received a medical diagnosis of autism with level 3 support, non-verbal, inappropriate, self-injurious behaviors, presence of food selectivity and no use of pharmacological medication. Autism is a neurodevelopmental disorder that begins in early childhood and continues into adulthood. The main characteristics include difficulties in communication, social interaction, restricted and repetitive behaviors.I bring up the importance of transcranial photobiomodulation in speech therapy, as an effective potential treatment option for improving communication, language and behavior in patients with autism, an option that certainly deserves further investigation. Methodology Transcranial photobiomodulation (tPBM) is a new and safe technique, a neuromodulatory, light-based procedure that involves exposing neural tissue to a low fluence of light and at wavelengths ranging from red and infrared (600 to 1100 nm) through direct application to the scalp. Protocol: 10 sessions of Transcranial Photobiomodulation were applied, divided into 1 session per week. There are 8 (2 irradiations at each point) irradiated points on the head (show a drawing), 6J IV protocol - DMC Therapy Plus equipment. Results: After the first session, the family reported an improvement in behavior. The patient remained calmer and focused on activities, accepting new toys and improving eye contact. After the second session, the patient begins "pointing with the index finger" to request new requests. Afterwards, babbling and attempts at consonant/vowel vocalization appeared in a playful and imitative situation. After the fourth session, the mother reports reduction of disruptive/self-harmful behaviors and better acceptance of limits and routine. In the fifth session, the patient begins to vocalize with communicative intent, reducing echolalia and stereotypies. Between the sixth and tenth sessions, the patient increases the time spent sitting performing focus, attention and memory activities. Time increased from 4 seconds to 2 minutes. Conclusion: This report presents the successful use of Transcranial Photobiomodulation as a therapeutic resource combined with Speech Therapy, in the treatment of patients with Autism Spectrum Disorder. appears to be an ideal treatment option for autism.

Key words: Keywords: photobiomodulation, infrared laser, autism, speech therapy, non-invasive, non-pharmacological treatment.

Study type: Relato de caso/Serie de casos (Case report/Case series)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

EVALUATION OF THE EFFECT OF PHOTOBIOMODULATION ON PARESTHESIA CAUSED BY EXDODONTICS OF THIRD MOLARS: A REVIEW OF THE LITERATURE

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Abstract

INTRODUCTION: Paresthesia is a local neurosensory dysfunction that consists of loss of sensitivity due to damage to peripheral nerve fibers, which can be transient or definitive. This condition has been associated with more complex extractions of third molars, where the inferior alveolar nerve is the most affected due to its proximity to the dental structures. Therefore, low-power laser photobiomodulation has been proposed as an auxiliary treatment of choice for nerve rehabilitation in these cases, but its clinical effect still needs to be further investigated. OBJECTIVE: To carry out a literature review on the effect of using low-power lasers in the treatment of post-extraction paresthesia of third molars. METHODOLOGY: A narrative review of the literature was carried out using the Virtual Health Library (VHL) and MEDLINE (PubMed) databases, using the descriptors “laser therapy”, “paresthesia” and “oral surgery”, where 136 articles were selected that were in accordance with the established theme, published between 2006 and 2022, for final reading and review. RESULTS: Paresthesia can be avoided through well-planned planning, choosing the correct surgical technique, and analyzing image exams. However, when it occurs mainly due to more complex surgeries with osteotomy, most cases demonstrate spontaneous sensory return within 90 to 180 days. Thus, the use of a low-power laser showed effectiveness in accelerating cellular biostimulation, which results in progressive sensory regeneration in relation to pain and tactile perception in a gradual, non-invasive, and painless way compared to other conventional treatments, in addition to reducing local inflammatory mediators. and improve myelin production capacity, contributing to the restoration of normal function of the injured nerve. CONCLUSION: Therefore, photobiomodulation therapy has been shown to be effective in the auxiliary treatment of paresthesia after third molar surgery, however it suggests the need to carry out new clinical studies to establish more precise protocols for using the laser in these cases.

Key words: Paresthesia, Laser Therapy, Oral Surgery.

Study type: Revisão (Review)

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Evaluation of Photodynamic Therapy on cutaneous American Leishmaniasis wounds

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Abstract

Introduction: Cutaneous American Tegumentary Leishmaniasis is considered a disease of great relevance to public health around the world. Objective: This study aimed to evaluate the effects of Photodynamic Therapy (PDT) on the healing of LCA wounds. Methodology: This is a case report (Ethical Approved: 5.901.332) related to a patient undergoing conventional treatment for confirmed LTA in facial region. The research was conducted at the Health Surveillance Division, Santarém, Pa. The light source (MSRED, Medical) has an emission wavelength of 630 nm (red), composed by 35 LEDs, reaching an area irradiation of 20 cm², power density of 30 mW/cm². The lesion was first cleaned (with 0.9% saline solution), afterwards, the photosensitizer, 1% methylene blue, was applied, waiting for 10 minutes for it to dry. The LED source device was used for 25 minutes, reaching an energy density of 50 J/cm2 in the lesion area. After each session, the lesion was closed with a standard dressing (only gauze and tape). The sessions took place over two days, with 15-day intervals between them, with image records being taken weekly during the 20 days of drug treatment. Analyzes were carried out according to the clinical characteristics of the wound. Results: 32-year-old patient, from a rural area, Amazon. On the first day of treatment the injury was assessed considering the size and main characteristics of the wound. The lesion appeared in the mental region of the face. Among the main characteristics of the lesion found were: Stage 3 ulcerated lesion, single, irregular in shape, measuring 3 cm in length and 2 cm in width, with raised and dry edges, infiltrated with hyperemia around it and a granular bottom. After evaluating the wound, cleaning, PDT application, image recording and closure with a dressing were carried out. On the second day of treatment, stage 3 ulcerated lesion, with raised and dry edges, there was a reduction in infiltration, with hyperemia around it and a granular background. After evaluating the wound, cleaning was carried out, the second session of PDT was applied, image recording and closure with a dressing. One week after the second application, the lesion was already closed with the presence of established dermis tissue, without infiltrations and with good coloring aspects. Conclusion: Use PDT was beneficial in 25 minutes in LCA wounds, demonstrating a promising future for complementary alternatives for individuals affected by LCA.

Key words: photodynamic therapy, american cutaneous leishmaniasis, wound.

Study type: Relato de caso/Serie de casos (Case report/Case series)

EFFECTIVENESS OF PHOTOBIOMODULATION THERAPY AND PHOTODYNAMIC THERAPY IN THE TREATMENT OF ORAL MUCOSITIS – A LITERATURE REVIEW

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Abstract

INTRODUCTION: Oral Mucositis (OM) is defined as a complication of antineoplastic therapy, being a side effect of patients undergoing radiotherapy and chemotherapy for malignant tumors of the head and neck. It is characterized by inflammation in the mucosal region, which can cause painful ulcers and wounds in cancer patients and can affect eating and swallowing. Thus, Photobiomodulation Therapy (PBMT) and Photodynamic Therapy (PDT) have been used as promising therapies in the preventive and curative treatment of oral mucositis. OBJECTIVE: To carry out a literature review on the benefits of PBMT and PDT in the treatment of oral mucositis. METHODOLOGY: A narrative review of the literature was carried out using the Virtual Health Library (BVS), MEDLINE (PubMed), Google Scholar and SciELO databases using the descriptors “oral mucositis”, “oral neoplasms”, “laser therapy” , “photodynamic therapy”. In total, 20 articles published between 2006 and 2021 were analyzed, with only 12 being used for this review. Articles outside the established theme were discarded. RESULTS: The use of low-power laser through PBMT proved to be a non-invasive treatment with a preventive and curative nature, being a great ally in reducing the painful symptoms caused by OM injuries, also acting in accelerating the tissue repair process. However, the results found in the literature are variable and dependent on the wavelength, power and duration of treatment, with no standardization of protocols. Furthermore, PDT also proved to be an option for the treatment of OM, through the use of photosensitizers, such as methylene blue, being an alternative for cases that are difficult to repair, where there is the presence of local contamination. CONCLUSION: Therefore, PBMT with low-power laser and PDT have been effective in the treatment of oral mucositis, providing analgesia, modulating inflammation and accelerating the healing process, increasing the quality of life of patients undergoing chemotherapy and radiotherapy. However, for this treatment to be successful, knowledge about the pathology, professionals qualified in laser therapy and the use of protocols with appropriate parameters for each case are necessary.

Key words: Stomatitis; Mouth Neoplasms; Laser Therapy; Photochemotherapy.

Study type: Revisão (Review)

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Photobiomodulation therapy and its effects on peripheral sensitivity in patients with type 2 diabetes mellitus: study protocol

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Abstract

Introduction: A common but much neglected condition in clinical practice is diabetic neuropathy (DN), especially in patients with type 2 diabetes mellitus (DM2). One of its first and main symptoms is a decrease in peripheral sensitivity, with the presence of allodynia and hyperalgesia, which progresses to complete loss of sensitivity in distal parts of the body, often in the feet. These alterations have implications in the quality of life and functionality of these people, which is why it is important to consider ways to prevent and treat DN. Objective: To verify if the peripheral sensitivity of people with DM2 improves after intervention with whole-body photobiomodulation therapy (PBMT) using an LED panel (74 LEDs of 850 ± 10 nm, 36.13 mW/cm2, 10 min, 21.67 J/cm2). Methods: Thirty-six volunteers, aged between 50 and 70 and diagnosed with DM2, will be recruited and randomly divided into two groups: panel and sham. For 2 weeks, the volunteers will receive 6 sessions of photobiomodulation on non-consecutive days, using a panel of LEDs in the infrared range to irradiate the whole body. They will be assessed on the first and last days of the intervention using the Semmes-Weinstein monofilament sensitivity test. The data will be analyzed according to normal distribution and the significance level will be of 5%.

Key words: Keywords: diabetes; photobiomodulation; diabetic neuropathy; neuropathic pain.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

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Gellan gum as a photosensitizer carrier system for application in antimicrobial photodynamic therapy against fungal infections

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Abstract

Antimicrobial photodynamic therapy (aPDT) is an alternative for the treatment of oral candidiasis. This study developed a carrier system for the photosensitizer methylene blue (MB) in gellan gum (GG) hydrogels, a non-toxic exopolysaccharide, evaluating the release rate of MB as a function of time, absorption spectroscopy, optical shield formation and photodynamic and antifungal properties against Candida albicans. The tests used 0.6% (w/v) and 1.0 (w/v) GG hydrogels containing MB. aPDT was applied to C. albicans in planktonic and biofilm cultures and the effects evaluated in CFU/mL. The material was also tested in a burn model infection in Galleria mellonella with results evaluated by health index and survival curve. There was a total release of MB in 12 minutes by the GG0.6% hydrogel and 75% by the GG1.0% hydrogel after 25 minutes. The spectroscopy scan detected an absorption peak at a wavelength of 660 nm for both hydrogels tested. No optical shield formation was observed by the hydrogels when compared to the aqueous form. aPDT of GG0.6% and GG1.0% containing MB on planktonic cultures resulted in a total and significant reduction in fungal cells. In biofilms, the significant microbial reduction achieved by the system's aPDT was approximately 1 log (CFU/mL). The GG0.6% was capable of improving larvae survival up to 50% and total health index to 60%. It is concluded that the gellan gum system as a carrier for methylene blue was able to maintain the optical, release and photoinactivation properties on Candida albicans.

Key words: photodynamic therapy, hydrogels, methylene blue, biofilms, Candida albicans, gellan gum

Study type: Estudo experimental em animais (Experimental study in animals), Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

EFFECT OF PHOTOBIOMODULATION IN AN EXPERIMENTAL IN VITRO MODEL OF ASTHMA-COPD OVERLAP

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Abstract

Background: Asthma and Chronic Obstructive Pulmonary Disease (COPD) are chronic inflammatory pathologies, with high prevalence and of great impact on the quality of life of patients. Those who show features of both diseases may be affected with the Asthma-COPD Overlap (ACO). Although this syndrome has been increasingly recognized, its clinical characteristics, diagnostic criteria and treatment are still not well defined. Therefore, studies are needed so that this group of patients is identified and treated appropriately. The treatment of ACO is based on behavioral and pharmacological measures, which initially include the use of glucocorticoids. Objectives: The objective of the study was to evaluate the effect of photobiomodulation (PBM) with laser on the inflammatory process in an experimental in vitro model of ACO. Methods: The study consisted of 6 groups: 1) human bronchial epithelial cells (BEAS-2B) - negative control; 2) BEAS-2B cells treated with dexamethasone; 3) BEAS-2B cells irradiated with laser; 4) BEAS-2B cells stimulated with cigarette smoke extract (CSE) + House Dust Mite (HDM) - positive control (ACOS group); 5) BEAS-2B cells stimulated with EFC + HDM and treated with dexamethasone; 6) BEAS-2B cells incubated with EFC + HDM and irradiated with laser. After 24 hours, cytokines in the cell culture supernatant were quantified. Results: There was a reduction in the pro-inflammatory cytokines TNF-α, IL- 1β, IL-6, IL-4, IL-5, IL-13, IL-17, IL-21, IL-23, and an increase in IL- 10 and IFN-γ in cells from the laser-irradiated ACO group when compared to the positive control group. Conclusions: With these results, we can suggest that photobiomodulation acts in the modulation of inflammation observed in ACO, and may be an option in the treatment of the disease.

Key words: asthma-COPD overlap, Low level laser, cytokines, photobiomodulation.

Study type: Estudo experimental em in vitro (Experimental study in vitro)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

BENEFITS OF PHOTOBIOMODULATION THERAPY FOR PATIENTS UNDERGOING HEAD AND NECK CANCER TREATMENT

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Abstract

BACKGROUND: Head and neck cancer is the sixth most common type of cancer worldwide, encompassing neoplasms that develop in the oral cavity, nasal region, pharynx, and larynx. Traditional methods such as radiotherapy and chemotherapy are employed for treating these conditions. Photobiomodulation therapy (PBMT) serves as an adjunctive approach in the therapy of patients undergoing oncological treatment, as it offers various health benefits for cancer patients. AIM: To assess the benefits obtained from PBMT in patients undergoing head and neck oncological treatment. METHODS: A literature search was conducted in the Google Scholar, Scielo, and PubMed databases. The keywords used were "laser therapy" and "head and neck cancer". Studies in both Portuguese and English from the period of 2013 to 2021 were selected. In the scientific articles, patients undergoing oncological treatment received PBMT using red wavelength for accelerated wound healing and infrared, which penetrates tissues more deeply, for inflammation modulation and analgesia. This method was utilized as an alternative for treating adverse effects in the oral cavity caused by radiochemotherapy. The laser was applied intra- and extra-orally. RESULTS: Radiotherapy and chemotherapy induce adverse effects that affect the oral cavity of patients, with oral mucositis being the most commonly reported infection. Therefore, PBMT proved to be an effective auxiliary treatment in combating Oral Mucositis (OM) due to its potential for photobiomodulation. Additionally, a positive outcome was also observed in the improvement of another side effect: xerostomia. CONCLUSION: PBMT is beneficial and emerges as a strong ally in the mitigation and improvement of side effects in the oral cavity of head and neck cancer patients, also performing an efficient role as a preventive method for oral mucositis in these patients.

Key words: Low-Level Laser, Head and Neck Neoplasms, Stomatitis

Study type: Revisão (Review)

Preventive vascular photobiomodulation decreases inflammatory cytokines in muscle injury animal model

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Abstract

Introduction: Vascular photobiomodulation (VPBM), also known as modified ILIB (Intravascular or Intravenous Laser Irradiation of Blood), has demonstrated its efficacy in addressing systemic diseases, metabolic disorders, and immune system functions. While literature suggests that local photobiomodulation therapy (PBM) with low-level lasers can influence muscle repair and key inflammatory cytokines involved in the regeneration process, the specific effects of VPBM on muscle tissue remain less established. Objectives: This study aimed to assess the impact of VPBM on IL-1 β and IL-6 levels in rats with acute muscle injuries. Methods: Male Wistar rats were randomly divided into four groups: Control, Injury, Non-Injuried+VPBM, Previous VPBM+Injury, and Injury+VPBM after. Animals received VPBM using an AlGaAs diode laser (780 nm, 40 mW, 0.04 cm2, 3.2 J, 80 s) on the tail artery/vein. Subsequently, the rats were submitted to a cryoinjury on the tibialis anterior muscles (TA) and were euthanized at 1, 2, 5, and 7 days post-injury. TA muscle samples were collected, and the protein expression of IL-1B and IL-6 was determined by ELISA. Results: In the Injury+VPBM after group, IL-1β and IL-6 protein levels were higher at 1, 2, and 5 days compared to the other experimental groups. The Previous VPBM+Injury group exhibited lower IL-1 β and IL-6 levels in comparison to the Injury and Injury+VPBM after groups on day 1 and maintained similar cytokine production levels at 2, 5, and 7 days compared to the Non-Injuried+VPBM group. Conclusion: VPBM was effective in reducing IL-1 β and IL-6 protein expression during the muscle repair process, with more pronounced results observed when preventive VPBM was administered.

Key words: Vascular photobiomodulation, modified ILIB, muscle injury, protein expression, IL-1β, IL-6

Study type: Estudo experimental em animais (Experimental study in animals)

Evaluation of the efficacy of 8% vs 16% methyl aminolevulinate topic application followed by red light irradiation regimen in the treatment of facial actinic keratosis: a randomized controlled clinical protocol

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Abstract

The multifocality and unpredictability of actinic keratosis lesions with the potential progression to squamous cell carcinomas, and metastasis risk, make the selection of a therapeutic regimen a challenge. Additionally, the increasing incidence, associated economic costs, and impact on quality of life have leads the investigation of new protocols for the treatment of this serious skin condition. For these reasons, the aim of this study is to compare the efficacy of topical application of 8% and 16% methyl aminolevulinate (MAL) followed by red light irradiation in two therapeutic regimens of 1 hour and 3 hours in the treatment of facial actinic keratoses with a 3-month follow-up. One hundred and sixty participants will be randomized into 4 groups: G1 (control) MAL 16% with 3 hours of incubation, G2 (experimental) MAL 16% with 1 hour of incubation, G3 MAL 8% with 3 hours of incubation, and G4 MAL 8% with 1 hour of incubation. All irradiations will be performed with LED 630nm, 160mW/cm2, and 300W of power. The primary outcome will be the clinical resolution of the lesion in relation to the number of lesions within a 30-day period. Secondary outcomes will include the overall improvement of photo-damaged skin with actinic keratosis, side effects such as pain, erythema, edema, and desquamation after treatment and at 7 and 30 days, and the recurrence rate of treated actinic keratoses during the 3-month follow-up period. We will use the Kruskal-Wallis test for non-parametric data and ANOVA for parametric data. The P value will be set at 0.05.

Key words: Actinic Keratosis, Photodynamic Therapy, Methyl Aminolevulinate.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

LOW-LEVEL LASER PHOTOMODULATION IN FACIAL NERVE PARALYSIS: INTEGRATIVE LITERATURE REVIEW

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Abstract

INTRODUCTION: The activities performed by an individual are dependent on nervous stimuli promoted by the interaction between the central and peripheral nervous systems. Both are composed of nerve cells called neurons, which can have sensory and/or motor functions. In the context of the facial complex, the facial nerve, the seventh cranial pair (VII), stands out. It has a mixed action, with an important role in taste, secretory activity of salivary glands, and motor activity of facial muscles. The configuration of its superficial branches may be subject to trauma, which can lead to facial paralysis. In such cases, low-level laser therapy (LLLT) emerges as a promising treatment alternative for certain degrees of nerve damage. OBJECTIVE: To review the literature regarding the application of LLLT in cases of facial nerve paralysis. METHODS: This is an integrative review based on articles from the last 5 years, conducted on the PubMed platform in April 2023, using DeCS/MeSH descriptors with the boolean operators "AND" and "OR." After applying inclusion and exclusion criteria, a total of 12 articles were selected. RESULTS: Trauma to maxillofacial structures can be considered the leading cause of facial nerve injuries, followed by cutting, crushing, and high-impact injuries that can lead to neurotmesis, axonotmesis, or neuropraxia. LLLT has proven to be an excellent alternative for treating facial paralysis, offering a painless and non-invasive approach. It promotes increased functional activity of the damaged nerve, prevents and reduces degeneration in motor neurons, and contributes to axonal growth and myelination. Significant variation in LLLT dosimetry was observed among studies, with wavelengths ranging from λ = 660 to 830 nm, a power of 100mW, irradiance of 3 to 4 W/cm2, energy density of 4 to 100J/cm2, typically applied at 3 points with 1 cm spacing, 2 to 3 times per week, for a minimum of ten sessions. CONCLUSION: In analyzing the information presented, LLLT appears to be a valid alternative in cases of facial nerve injury, especially in cases of superficial origin and neuropraxia, demonstrating a good ability to alleviate and/or reverse facial paralysis.

Key words: Laser Therapy, Facial Paralysis, Facial Nerve.

Study type: Revisão (Review)

Evaluation of the Inflammatory and Hemorrhagic Processes After Treatment of Experimental Envenomation by Metalloproteinase Isolated from Bothrops jararacussu Venom Using Photobiomodulation (LED)

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Abstract

Introduction: Annually, Brazil records approximately 14 cases of snakebites per 100,000 inhabitants. Snakebites from the Bothrops genus often result in severe local damage. The standard treatment involves the administration of antivenom serum, which neutralizes most of the circulating venom but does not address the local damage. Objective: This study aims to evaluate the effects of LED photobiomodulation therapy on the inflammatory and hemorrhagic processes caused by the metalloproteinase (BjussuMP-II) isolated from Bothrops jararacussu venom. Methodology: The research was conducted on male Swiss mice, which received injections of BjussuMP-II or PBS into the gastrocnemius muscle, followed by treatment with serum and/or LED. After 3 hours, blood samples were collected for biochemical analyses, and intravital microscopy was used to examine muscle blood vessels. Some groups received BjussuMP-II intradermally and underwent the same treatments. Analysis of variance followed by the Tukey test was conducted for group comparisons. Results: The results indicated that BjussuMP-II caused significant myotoxicity in the untreated and serum-treated groups, while the LED-treated group showed no differences compared to the control, demonstrating the efficacy of photobiomodulation in treating myotoxicity. Intravital microscopy revealed the presence of rolling and adherent leukocytes on vascular endothelium in groups that received BjussuMP-II and were untreated or received serum, indicating inflammation. The LED treatment continued to excel in reducing these inflammatory findings. Furthermore, the measurement of hemorrhagic halos confirmed that LED treatment and the combination of treatments significantly reduced hemorrhagic areas compared to untreated groups. Conclusion: This study concludes that LED photobiomodulation was the most effective treatment for addressing myotoxicity, inflammation, and hemorrhage resulting from exposure to the metalloproteinase BjussuMP-II from Bothrops jararacussu venom.

Key words: Snakebites, Treatment, Photobiomodulation, LED

Study type: Estudo experimental em animais (Experimental study in animals)

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The use of photobiomodulation, low-frequency ultrasound and transcutaneous electrical muscle stimulation to improve body contouring: a controlled, randomized, double-blind, single-center clinical trial

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Abstract

INTRODUCTION: Various noninvasive aesthetic procedures have been performed independently or in combination to enhance body contouring. Among then, photobiomodulation (PBM) and low-frequency ultrasound (LOFU) stand out. Both are associated with increased release of intracellular lipid content from adipocytes. In this study, we added transcutaneous electrical muscle stimulation (TEMS) to the protocol was used to increase fat oxidation and energy consumption. OBJECTIVE: The objective of this study was to compare the effects of PBM, LOFU and TEMS applied individually or in combination on the abdominal circumference. METHODS: This controlled, randomized, double-blind, single-center clinical trial was based on the use of infrared LED (830±20nm; 71mW/cm²;127.8J/cm²) and LOFU (30kHz/3MHz,2.5W/cm²) alone or in combination, associated with TEMS (2500Hz, 30bps, 50%). In each session, participants received 30 minutes of PBM, with subsequent treatment with LOFU for 20 minutes and ending with 20 minutes of TEMS. The treatment protocol consisted of eight sessions, held twice a week for 4 weeks. For statistical analysis, a significance level of 5% was adopted. Clinical trials registry: NCT05155683. RESULTS: A total of 79 participants were included, who were distributed among the following groups: (A) PBM + LOFU sham + TEMS (n=19); (B) PBM sham + LOFU + TEMS (n=19); (C) combined treatment + TEMS (n=20); (D) combined treatment sham + TEMS (n=21). Significant reductions in abdominal circumference were observed in all groups after the treatments except in Group D (-1.47±0.686, p= 0.036; -2.59±0.686, p= 0.001; -1.87±0.758, p= 0.017; -1,49±0.757, p=0.054, respectively). Differences between the groups were also noted (B-D: -1,1 [-1.56 - -0.64]; B-C: 0.725 [0.25 – 1.19]; A-B: -1.12 [-1.57 - -0.67]) with Group B exhibiting the most significant reduction of 1 cm compared to other treatments. CONCLUSION: This study revealed an improvement in body contouring across all groups, irrespective of the treatment protocol, from a statistical perspective. However, these improvements may be considered clinically insignificant. Therefore, further exploration of alternative approaches with stronger evidence it is necessary to explore other approaches that present a greater evidence degree to achieve satisfactory results in clinical practice, while investigations into different parameters of PBM and LOFU are necessary to establish the action of these techniques more concisely on adipose tissue.

Key words: adipose tissue, cavitation, localized fat reduction, low-level light therapy, phototherapy

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

TREATMENT OF HERPES LABIALIS WITH PHOTODYNAMIC THERAPY: RANDOMIZED CONTROLLED, DOUBLE-BLIND CLINICAL TRIAL WITH 12-MONTH FOLLOW-UP

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Abstract

Herpes simplex lesions are usually treated with acyclovir. Despite decreasing symptoms, it does not prevent the recurrence of lesions and it has an uncomfortable and not esthetic 1-week treatment. Antimicrobial photodynamic therapy (aPDT) is known to have numerous advantages, among which the reduction in remission time also does not cause viral resistance. Therefore, the objective of this study was to compare aPDT with acyclovir in the healing time of herpes simplex lesions. Patients who presented herpes lesions in the vesicle or ulcer phase were included in the study and were randomly divided into two groups: Control group - ointment acyclovir (4 times a day for 7 days) + aPDT simulation, Experimental group - placebo ointment acyclovir + aPDT (0.005% methylene blue, 660nm, 100mW, 120J/cm2, 3J per point – only one application) The primary outcome was the lesion resolution time in days. Secondary outcomes were assessment of recurrence (in months); pain assessed by visual analog scale (VAS); local temperature by a digital thermometer and virus quantification by PCRq. All evaluations were performed at baseline and after 3 and 7 days after the application of aPDT or its placebo. The virus quantification was collected at baseline and 3 days. The questionnaire to evaluate the impact of treatment on quality of life was applied at baseline and after 7 days. Long-term follow-ups were performed at 1 month, 6 months, and 1 year for the quality of life and recurrence assessment. Results: There was no difference in the resolution time of the lesions (p=0.718), pain on the third day (p=0.039), and temperature (p=0.217 third day, p=1.00 seventh day) among the studied groups. In the quantification of the virus, HSV-1 qPCR values increase on day 3 for both aPDT and acyclovir groups (P=0.018 and 0.017, respectively), but in the saliva, there was an increase in the amount of HSV on the third day after treatment with acyclovir and a decrease in the aPDT group (0.043). Conclusion: There was no difference regarding the time for lesion resolution in the analyzed groups or for the other clinical outcomes analyzed. In the quantification of the HVS in saliva, there was a decrease in the aPDT group on the third day. It is important to note that aPDT could be a promissory treatment because it seems that it is not inferior to the gold standard. Future studies with a major sample size could test alternatives to this uncomfortable and not esthetic 1-week treatment.

Key words: photodynamic therapy, cold sores, herpes simplex, photobiomodulation, laser

Study type: Ensaio Clínico (Clinical Trial)

Laserpuncture in the Treatment of Temporomandibular Disorder: An Efficacy and Safety Study

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Abstract

Introduction: Temporomandibular disorder (TMD) is a set of clinical signs and symptoms that involve the temporomandibular joint (TMJ), masticatory muscles and associated structures, characterized mainly by the presence of pain, sounds in the joint (clicking), and irregular mandibular function or limited. Among the non-pharmacological therapeutic options for the treatment of TMD, the use of laserpuncture stands out, which combines the knowledge of acupuncture within the practices of Traditional Chinese Medicine (TCM), associated with phototherapy with low-power lasers aimed at stimulating acupoints. , replacing needles, traditionally used in TCM, favoring a painless treatment for patients with signs and symptoms of TMD. Objective: The objective of this study will be to evaluate the effects of laserpuncture and traditional acupuncture with a new protocol in the treatment of TMD.Methodology: The study will be carried out after approval by the CEP. This is a prospective, randomized, double-blind clinical trial, in which 30 volunteers will participate, with signs and symptoms of TMD, who will be randomly divided into 2 groups: Laserpuncture Group (GLP) (n=15, low-power laser treatment (Therapy EC, DMC, São Carlos, Brazil) (660 nm, P=100 mW, 30 s, 3 J/point); Traditional Acupuncture Group (GAT) (n=15 , treatment with acupuncture needles). In both groups, acupuncture points VB3, E7, ID19, bilaterally and IG4, CS6, TA5, IG11, P6, R3, E43, B60, F3, BP10; R5, F3, E40 will be stimulated , PB6. 10 treatment sessions will be carried out, with an interval of 7 days, between one session and another. Volunteers will be evaluated before any treatment (T1), after 5 (T2) and 10 (T3) sessions. The range of mandibular movement, as well as the intensity of pain in the masticatory system will be evaluated. All data obtained in this research will be subjected to the most appropriate statistical analysis after data collection. It is expected that both laserpuncture and traditional acupuncture will be effective in reducing pain and increasing excursive and protrusive mandibular movement in patients with TMD. Laserpuncture can be suggested as a suitable alternative, as it is a non-invasive technique, meaning it does not involve needles penetrating the skin, which can be an attractive option for people who are afraid of needles, or who wish to avoid the sensation of painful discomfort during treatment.

Key words: Keywords: acupuncture, laserpuncture, photopuncture, temporomandibular disorder, TMD.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

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APPLICATIONS OF HIGH POWER DIODE LASER IN BIOPSY: A LITERATURE REVIEW

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Abstract

Introduction: To carry out appropriate treatment of a soft tissue injury in the human oral cavity, it is essential to obtain an accurate diagnosis of the pathology and, to this end, the standard approach to obtaining this is by performing a biopsy. Among the options for the procedure in question, laser therapy provides both the patient and the professional with a therapeutic alternative compared to conventional methods.Objective: To analyze the applicability of the diode laser to perform biopsies without compromising the diagnosis of the histopathological examination and its advantages over conventional methods for the patient. Methodology: Descriptive study of the narrative literature review type, in which searches were conducted through scientific articles, using the Google Scholar, PubMed and LILACS databases, focusing on journals published between the years 2019 and 2023. Results and Discussions: The high-power diode laser emits beams with different wavelengths, the most common for soft tissue surgical procedures being found in the range of 810-980 nm. Its use results in a clean surgical field, with excellent visibility, promoting a more precise and controlled approach. This is particularly beneficial for precisely defining the area of intervention, especially in highly vascularized tissues of the oral cavity. Furthermore, it is effective for controlling infections and eliminating bacteremia. Although there are doubts about the possibility of causing thermal damage to tissue samples, impairing histopathological analysis, more recent research demonstrates that lasers provide remarkable preservation of samples, with minimal impact on surgical margins due to thermal damage. Regarding the postoperative period, excellent hemostasis is demonstrated, the low number of cases with pain or inflammation, low consumption of analgesics, in addition to better coagulation that eliminates the need for sutures and favors effective healing by second intention. Conclusion: Through this review, it is exposed that the diode laser is effective in excising lesions, allowing excellent hemostasis, without the need for suturing, surgical access to the lesion and easy handling, in addition, it does not interfere with the histopathological analysis of the specimen, enabling an accurate and It also provides the patient with a good postoperative period.

Key words: Biopsy, excision, Diode Lasers

Study type: Revisão (Review)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

PHOTOBIOMODULATION TOPIC AND SYSTEMIC ON THE BONE REPAIR PROCESS IN AN EXPERIMENTAL MODEL OF OSTEOPENIA.

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Abstract

Osteoporosis mainly affects postmenopausal women due to the marked decrease in Bone Mineral Density (BMD), leading to a greater occurrence of fractures and difficulty in healing. With increasing life expectancy, osteoporosis can be considered a public health problem, generating significant costs for prevention, surgeries and long-term treatments. Among the treatments, Photobiomodulation Therapy (PBM) can contribute positively and has been widely studied to determine effective protocols for osteogenesis. Objective: To evaluate the effects of FBM treatment on repair mechanisms in an experimental model of bone injury in osteopenic rats. Materials and Methods: Wistar rats will be randomly distributed into groups without (CTL) or with ovariectomy (OVX), with bone lesion without treatment (OVX+L) or with photobiomodulation (OVX+PBM), in the following parameters (Local PBM: 808nm, 100mW, 6J, 60s or SYSTEMIC PBM: 808nm, 100mW, 180J, 1800s). The animals will be euthanized 30 days after the injury and blood and bone samples will be collected for analysis: Biochemistry – ALP (alkaline phosphatase) and (acid phosphatase-TR); Molecular – RT-PCR (RANKL/OPG); Histological (HE) and Functional (cyclic flexion test).

Key words: Photobiomodulation Therapy (PBM), Osteoporosis, Biomechanical Property, Ovariectomy

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

Photobiomodulation therapy on the reduction of the inflammatory process and pain control in an experimental model of induced rheumatoid arthritis.

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Abstract

Rheumatoid arthritis (RA) is classified as a chronic inflammatory disease of the joints, due its systemic autoimmune alterations, which lead to progressive irreversible degenerations of the cartilage and bones involved in the joints. RA affects about 0.5% to 1% of the global population, predominantly women. Experimental studies "in vivo" have shown that through photobiomodulation (PBM) therapy, the inflammatory modulation has been shown to be positive. The purpose of this study is to verify an "in vivo" sample in order to evaluate the effects of PBM therapy on the control of the inflammatory process and pain in an experimental model of RA. In the methodology of this work, it will be used male Wistar rats that will be divided into 4 groups: CTL (control), RA NT (Rheumatoid Arthritis not treated), RA LP (Rheumatoid Arthritis treated with local photobium), and RA VP (Rheumatoid Arthritis treated with vascular photobium systemic effect). For the induction of RA, the parameters of a previous study will be used, where the animals received 2 intradermal + systemic injections of the lesion-inducing solution on days 0, 7 and 21. For the groups to be treated, Local PBM (808nm; 6J; 100mW) and Vascular PBM (808nm; 180J; 100mW), will be introduced after the last induction. It will be noticeable in the histological analysis of tissue organization and inflammatory infiltrate; Functional tests (Allodynia and mechanical properties); Biochemical/Molecular analysis (RT-PCR, Inflammatory mediators and Receptors involved in pain). The statistics that will be used: Means of the MPD and ANOVA (one-way) with Tukey's post hoc.

Key words: Photobiomodulation; Rheumatoid Arthritis; Cartilage; Inflammatory Process; Pain; Mechanical Properties.

Study type: Estudo experimental em animais (Experimental study in animals)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

RANDOMIZED CLINICAL TRIAL OF THE ACTION OF LOW-LEVEL LASER THERAPY ON HIP ABDUCTOR CHAIN MUSCLE STRENGTH AND EPITHELIAL HEALING AFTER HIP ARTHROPLASTY

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Abstract

INTRODUCTION: When conservative treatments prove ineffective, hip osteoarthritis (OA) may necessitate total hip arthroplasty (THA). Surgical procedures can lead to tissue trauma and evoke an immune response. Low-level laser therapy (LLLT) has demonstrated its effectiveness in tissue repair by modulating the inflammatory process and facilitating pain relief. OBJECTIVE: This study aims to assess the impact of LLLT on postoperative healing and muscle strength within the hip abductor chain in patients with coxarthrosis. METHODS: This randomized clinical trial evaluated the effects of LLLT on postoperative healing after Total Hip Arthroplasty and on muscle function in coxarthrosis patients, comparing them to a group without laser application. Following statistical analysis, 36 patients were homogenized and divided into two groups. The dosimetric parameters are detailed in Table 1. Group 1 received LLLT applied to the hip joint tendon to facilitate recovery, both during surgery throughout the entire area of the joint tendon with a 2 cm distance between each point and through a skin incision with the same 2 cm distance between each point in the immediate postoperative period and 24 hours postoperatively. Group 2 served as the control. Evaluation included the assessment of quality and healing time through photographic images and the POSAS instrument, bone healing through objective X-ray metrics at IPO, 3rd, and 6th weeks, pain levels using a one-dimensional verbal numerical scale, and the function and strength of the hip abductor muscle group through the Extremity Functional Scale, Lequense Index, and MRC Scale. CONCLUSION: Low-level laser therapy, using the specified parameters, promoted the regeneration of the hip joint tendon, improved tissue reorganization and the healing of the skin and subcutaneous tissue, enhanced muscle strength, and consequently, improved claudication and early analgesia compared to the control group.

Key words: photobiomodulation, laser, coxarthrosis

Study type: Ensaio Clínico (Clinical Trial)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Bichectomy and impacts on clinical parameters, satisfaction with facial aesthetics and health-related quality of life: literature review

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Abstract

Introduction: Bichectomy surgery consists of excision of the buccal fat pads, being a functional and aesthetic surgery that improves facial harmony by limiting recurrent trauma to the buccal mucosa. Objectives: Present indications, contraindications, analyze clinical parameters and impacts on quality of life (OHIP-14) and facial aesthetic satisfaction (FACE-Q) of patients after surgery. Methodology: A narrative review of the literature was carried out from the Virtual Health Library (VHL) and MEDLINE (PubMed) databases using the descriptors “adipose tissue”, “laser therapy” and “oral surgery”. In total, 20 articles published in the last 10 years were analyzed, only 4 of which were used for this review. Articles outside the established theme were discarded. Literature review: Studies indicate that bichectomy is a safe, elective surgical procedure and is indicated for normoactive patients without serious medical complications, who desire a more defined facial shape and/or have chronic chewing trauma to the cheeks (morsicatio buccarum), causing recurrent injuries that lead to ulcerations and bleeding. Regarding inflammatory clinical parameters, the peak of pain and trismus normally occurs in the first 24 hours after the procedure, returning to baseline levels over the days. In relation to the OHIP-14 and FACE-Q scores, the authors observed greater interference in quality of life in the first 24 hours after surgery, in the items difficulty in “chewing”, “opening the mouth” and “eating”. Showing a significant improvement in quality of life and facial aesthetic satisfaction after 1 to 3 months of the procedure. Conclusion: In this sense, the removal of fat pads reduces facial volume, improving the appearance of the middle and lower third of the face, thus providing a safe facial recontour and limiting recurrent trauma to the buccal mucosa, having a positive impact on the patient's self-esteem and confidence. . However, the risks and complications must be presented to the patient, and the professional must be able to adequately evaluate and diagnose each case, taking into account the indications and contraindications.

Key words: Adipose Tissue, Laser Therapy, Surgery.

Study type: Revisão (Review)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Investigating the Impact of the Pompage Technique, Alone or With LED Photobiomodulation, on Chronic Neck Pain and Disability: Study Protocol

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Abstract

Persistent neck pain is a lasting condition that affects the spinal region, causing discomfort and limitations in mobility. Managing neck pain typically involves a range of manual therapies, encompassing both passive and active interventions, with the aim of relieving pain, enhancing function, improving mobility, motor control, and reducing inflammation. This type of pain typically lasts for a minimum of three months and is considered non-specific when it is not associated with any specific underlying condition, such as inflammatory rheumatic disease, osteoporosis, cancer, or radiculopathy. The use of lasers and LEDs for photobiomodulation (PBM) represents an advantageous approach to treating neck pain, given their demonstrated therapeutic efficacy in the literature. Moreover, these resources are non-invasive and easy to apply, making them an attractive option for both patients and healthcare professionals. Therefore, the aim of this study is to evaluate the effects of Pompage associated or not with PBM, using a cluster of LEDs, on pain and neck disability. This controlled, randomized, and blinded clinical study includes participants of both genders, aged 18 to 45, with non-specific chronic neck pain will be included. Participants will be randomized into two groups: (1) Pompage (n=28) focusing only on manual therapy through Pompage technique and (2) Pompage + PBM Group (n=28) involving the same procedures as the first group, followed by PBM with a LED cluster applied for 10 minutes to the neck region. The treatment protocol consists of 10 sessions, three times per week, excluding weekends. For PBM, a cluster comprising 264 LEDs (8 mW; 4.89J; 9.6 J/cm²; 16 mW/cm² per LED) will be used, with 132 red (660nm) and 132 infrared (850nm) LEDs. Pain and functional disability will be assessed using the visual analog scale (VAS) and Neck Pain Disability Index before and after the intervention. The resulting data will be submitted to statistical analysis considering α=0.05.

Key words: neck pain, photobiomodulation, LED, Pompage technique, manual therapy.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)

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PHOTOBIOMODULATION THERAPY, COMBINED WITH NANOSILVER CARBON COMPOSITE, ON INFECTION CONTROL AND REPAIR IN BONE INJURY MODEL

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Abstract

Osteomolecular surgeries are common worldwide, causing a socioeconomic impact on the country. The use of external agents such as composite biomaterials is crucial to expedite bone repair and control potential infections, thus advancing patient rehabilitation. The study of photobiomodulation therapy associated with the use of non-scarce carbon biomaterials is significant. OBJECTIVE: To evaluate the effect of Photobiomodulation Therapy associated with carbon material impregnated with silver nanoparticles on bacterial control, cell growth, and the bone repair process in an experimental model of bone injury in rat tibia. MATERIALS AND METHODS: Wistar rats were randomly distributed into groups: G1 (healthy rats); BF (bone defect); BF NT (BF without treatment); BF+C (BF with carbon material); BF+CNP (BF with carbon material associated with silver nanoparticles) BF+CNP+PBM (BF with carbon material associated with silver nanoparticles and photobiomodulation); Local PBM (808nm photobiomodulation, 100mW, 6J, 60s). The animals will be euthanized at 30-60-90 days after the injury. Blood and tibia samples will be collected for biochemical (alkaline and acid phosphatase) and morphological (histological) analyses. Functional study will include biomechanical tests (shear, resistance, and flexibility).

Keywords: Photobiomodulation Therapy (PBM), Carbon, Silver nanoparticles, Staphylococcus aureus, Mechanical properties.

Study type: Estudo experimental em animais (Experimental study in animals)

9º Fórum Internacional de Biofotônica (FIB)/ - 9th Biophotonics International Forum (BIF) 2023.

Impact of Photodynamic Therapy on Wound Healing and Tissue Quality in Diabetic Foot Ulcers: A Double-Blind Randomized Controlled Clinical Trial Protocol

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Abstract

Diabetic Foot Ulcers (DFUs) affect 10.5% of the world's population, significantly impacting the quality of life for these patients and imposing a considerable strain on the public healthcare system. Research suggests that antimicrobial photodynamic therapy (aPDT) may accelerate the healing process, the available data is currently insufficient to guide clinical decision-making. Controlled and randomized clinical studies are required to increase the level of evidence on this subject, thereby promoting an improvement in the quality of life for people affected by diabetic foot ulcers. The objective of this study is to analyze the effect of antimicrobial photodynamic therapy on wound quality and the tissue repair process using the Bates–Jensen scale (BJ) in people affected by DFUs. A clinical, controlled, randomized, and double-blind study will be conducted. Patients will be randomized into two groups: (1) experimental (n=45) - receiving standard care from the Polyclinic wound sector along with aPDT, and (2) control (n=45) - receiving standard care with a simulated use of aPDT with the equipment turned off. Each patient will receive three weekly sessions, for a total of 10 aPDT sessions or simulations, all administered by the same operator. A cluster with 4 lasers with an average radiant power of 100 mW will be used, with a radiant exposure of 6 J/cm², wavelength of 660 nm and exposure time of 60s and a total energy of 240J per treatment session. This research will be conducted at a Municipal Health Center in Rio de Janeiro, Brazil, and will include patients affected by neuropathic wounds of the diabetic foot. The initial assessment will involve gathering data from medical records to establish the sociodemographic and clinical profiles of patients affected by DFUs. The primary outcome will involve the assessment of wound quality using the Bates–Jensen scale (BJ). This scale evaluates the wound characteristics, including size, depth, edges, detachment, type of necrotic tissue, amount of necrotic tissue, type of exudate, amount of exudate, skin color around the wound, perilesional tissue edema, perilesional tissue hardening, presence of granulation tissue, and epithelialization. Secondary outcomes will encompass assessing foot sensitivity through neurological assessments with a tuning fork and monofilament, evaluating quality of life using the Diabetes-21 instrument, assessing wound severity using the Wagner Scale, determining the degree of ischemia using the Fontaine and Rutherford scales, and employing the WiFi and NOC scale to evaluate skin integrity.

Keywords: diabetic foot, antimicrobial photodynamic therapy, wound, infection, contamination, Bates-Jensen.

Study type: Protocolo clínico ou experimental (Clinical or experimental protocol)