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30

INFLUENCE OF PHOTOBIMODULATION ON CELL VIABILITY OF MULTIPOTENT MESENCHYMAL STEM CELLS FROM ADIPOSE TISSUE IN VITRO

Ana Paula Ferro¹, Flávia Belavenuto Rangon¹, Carolina Fernandes Mestriner¹, Catarina Clapis Zordão¹, Elaine Caldeira de Oliveira Guirro¹

¹ Department of Health Sciences, Postgraduate Program in Rehabilitation and Functional Performance, Ribeirão Preto Medical School, University of São Paulo (USP-RP), Ribeirão Preto, São Paulo, Brazil

Background: The use of mesenchymal stem cells (MSCs) has been an alternative to conventional therapeutic modalities for wound healing, with recent advances in cellular and molecular biology to aid in tissue repair. The use of photobiomodulation (FBM) is used in the healing process by modulating cell metabolism through photochemical action, but many parameters and inappropriate use can disrupt this process, and there is no standardization for the application of the LASER to assist in the healing process.

Objective: to investigate the effect of different energies of LASER photobiomodulation on mesenchymal stem cells, which play a key role in the healing process.

Methods: Mesenchymal stem cells were cultured in α MEM medium with 10% FBS (Fetal bovine serum), penicillin, and streptomycin. Cells were incubated at 37 °C in an 80% humidified atmosphere containing 5% CO₂ in the dark, until reaching 90% confluence. The 3 groups with a wavelength of 830 nm were submitted to LASER applications: G1: 0.5 J, G2: 2 J and G3: 4 J, with irradiation at 24 and 48 hours. The cells were stained with markers for viable cells (Hoechst) and dead cells (Propidium iodide). The analysis of the plates with MSCs was performed with the MetaXpress® software at 48 and 72 hours, and the statistical analyses were performed with the software GraphPad Prism® 7.0.

Results: The results obtained in the experiments showed that irradiation with the 830 nm wavelength laser showed an increase in cell viability at 48 and 72 hours compared to the control group and showed a significant difference when using 2 J energy.

Conclusion: Photobiomodulation assists in increasing cell viability when using the correct parameters, capable of assisting in the process of tissue regeneration.

Implication: The use of appropriate parameters influences the cellular response and consequently the effectiveness of the treatment.

Keywords: Low-level laser therapy, Cell survival, Tissue healing

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31

RESPIRATORY MUSCLE TRAINING IN PEOPLE WITH COPD: A SYSTEMATIZED REVIEW

Ana Paula Machado Souza¹, Luara Moreira da Silva²

¹ Universidade Salvador (UNIFACS), Salvador, Bahia, Brasil

² Universidade Estadual do Sudoeste da Bahia (UESB), Salvador, Bahia, Brasil

Background: Chronic obstructive pulmonary disease (COPD) is characterized by progressive airflow obstruction and lung hyperinflation due to loss of elastic recoil and air trapping. These changes are related to an altered pattern of ventilatory muscle recruitment. Respiratory muscle training aims to alter respiratory muscle recruitment to reduce dyspnea, hyperinflation, improve respiratory muscle performance, and optimize thoracoabdominal movement.

Objectives: To analyze the effect of respiratory muscle training in people with Chronic Obstructive Pulmonary Disease at different stages.

Methods: This is a systematized integrative literature review, carried out in the PubMed, SciELO and Physiotherapy Evidence Database (PEDro) databases, using the following search strategy: “breathing exercises” AND “maximal respiratory pressures” AND “chronic obstructive pulmonary disease”. Searches were carried out limited to the years 2019 to 2023. The inclusion criteria were randomized controlled clinical trials, carried out in humans, in Portuguese and/or English, available in full and related to the proposed topic. The selection of studies was performed by two reviewers simultaneously and independently. The research was conducted following four stages: 1) reading of titles and abstracts; 2) analysis of duplicates; 3) reading the articles in full and 4) extracting the main information. The risk of bias in clinical trials was assessed using the Cochrane Risk of Bias Tool and the quality of evidence using the Grading of Recommendations Assessment, Development and Evaluation (GRADE).

Results: After searching the databases, 880 articles were found. Of these, 7 articles were selected to compose the present review because they met the objective and determined criteria. The respiratory muscle training protocols consisted of fast and deep breathing training with Voldyne, inspiratory and expiratory muscle training with Threshold, pursed lip breathing, respiratory muscle training with Powerbreathe, deep breathing and blowing straw in a glass of water. A total of 472 individuals, with mild to severe COPD, were analyzed. Intervention duration and weekly frequency ranged from 1 to 18 months, 3 to 7 days a week, respectively. All studies show that respiratory muscle training improved symptoms of dyspnea and fatigue, increased muscle strength, FEV1, FVC, functional capacity and improved quality of life ($p < 0.05$). About risk of bias, studies ranged from low to moderate and the quality of evidence ranged from moderate to very low.

Conclusion: It was observed that respiratory muscle training significantly contributed to improving symptoms of shortness of breath, fatigue and increased muscle strength, quality of life and functional capacity.

Implications: Respiratory muscle training seems to be a good treatment for patients in different stages of COPD and at any level of care, whether at home, outpatient, or hospital, in addition to improving the symptoms of the disease and the patient's quality of life.

Keywords: Chronic obstructive pulmonary disease, Breathing exercises, Physical Therapy Modalities

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