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NEUROMUSCULAR ELECTRICAL STIMULATION AND PHOTOBIOMODULATION IN THE FUNCTIONAL RECOVERY OF SARCOPENIA

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Background: Sarcopenia is a musculoskeletal disorder characterized by reduced strength and muscle mass in aging. Photobiomodulation through LED Therapy (LEDT, acronym for Light Emitting Diode Therapy) can influence the components of the mitochondrial respiratory pathway by converting electromagnetic energy into biochemistry, with increased synthesis of adenosine triphosphate (ATP) and growth factors. On the other hand, Neuromuscular Electrical Stimulation (NMES, acronym for Neuromuscular Electrical Stimulation), provides artificial muscle stimuli to replace voluntary stimuli in physical exercise, with muscle hypertrophy responses.

Objectives: To analyze therapeutic responses in muscle thickness and functional tests in elderly women with the simultaneous association of NMES to photobiomodulation through LEDT during a four-week program aimed at the prevention and treatment of sarcopenia.

Methods: The study participants were selected and comprised of 20 sedentary women with an average age of 60 years. The participants were randomly distributed into two groups (G1 and G2). In G1, the participants were treated with NMES (carrier frequency of 2500 Hz; 3 channels and electrodes with a diameter of 7 cm; frequency of 50 Hz, on/off time of 6/18 s in the first week, evolving to 10/30 s in the second week, 12/30 s in the third week and 15/30 s in the fourth week; with 20 minutes of therapy per session). G2 simultaneously associated NMES (similar parameters) and LEDT (set of 10 LEDs coupled to each NMES electrode, totaling 60 LEDs, power of 30 mW/LED, with a wavelength of 830 nm, application time of 180 s and total energy of 324 J in the quadriceps femoris muscle). The electrophotostimulated muscles were the vastus lateralis, vastus medialis and rectus femoris, with a stimulation frequency of three times a week. The analysis of ultrasound scans of the quadriceps femoris and functional tests such as the time up and go (TUG), walking speed and the sit-to-reach test were performed before and at the end of the therapeutic intervention.

Results: Therapeutic interventions through NMES alone or associated with LEDT demonstrated a significant increase in muscle thickness after one month of therapy in all quadriceps femoris muscles. The NMES promoted an increase in the flexibility of the hamstring muscles of the volunteers, observed in the sit and reach test. Neuromuscular electrical stimulation demonstrated a significant increase in TUG tests and gait speed. G2 showed no significant difference in responses to optimize the increase in muscle thickness and muscle functions through the TUG tests and gait speed in relation to the isolated use of NMES.

Conclusion: Electrophototherapy promoted an increase in quadriceps femoris muscle thickness and significant improvements in

functional tests. However, the simultaneous association of NMES to LEDT did not demonstrate a significant difference in the supplementation of muscle functions during physical exertion in relation to the isolated use of NMES.

Implications: NMES may prevent and rehabilitate sarcopenia by increasing muscle thickness, improving gait speed and neuromuscular coordination.

Keywords: Photobiomodulation, Electrostimulation, Sarcopenia

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PREVALENCE OF MUSCULOSKELETAL DISORDERS IN RESISTANCE TRAINING PRACTITIONERS IN BRASÍLIA/DF, BRAZIL: A CROSS-CROSS STUDY

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Background: Musculoskeletal disorders (MD) in weightlifting sports are a major health hazard and can significantly affect the quality of life of practitioners. Most studies on the prevalence of MD in sports were carried out in high-income countries, with different characteristics from middle- and low-income countries. In Brazil, few high-quality data are investigating the prevalence of MD in resistance training (RT) practitioners in the country.

Objectives: To investigate the prevalence of MD in RT practitioners in the city of Brasília/DF, Brazil

Methods: A cross-sectional study that recruited 730 RT practitioners of both sexes, aged 18 years or older, regular RT practitioners, who trained at a gym in Brasília/DF registered with the CREF-7, who had not undergone musculoskeletal system surgery in the last 6 (six) months and had not fractured at the time of data collection. The collection was carried out in Brasília-DF, in four gyms that authorized the research to be carried out on their premises. From May to December 2022, participants were invited to participate in the study according to the arrival or departure flow at the gyms. Interviews and self-administered questions were used to estimate the prevalence of pain or injury (PI) in the last 30 days and last 12 months. In addition, sociodemographic information, the anatomical regions affected and the exercises that possibly triggered PI were collected.

Results: The estimate of punctual prevalence of pain was 20.3% and injury 7.4%, prevalence in the last 30 days for pain was 37.7% and injury 12.8%, and prevalence in the last 12 months for pain 42% and injury 79.7%. The anatomical regions with the highest indications of pain involvement were the lumbosacral spine (34.3%), shoulder (33%) and knee (32.7%). The anatomical regions affected by injury show, in particular, the shoulder regions (31.1%), lumbosacral spine