

**Conclusion:** This is the first study to investigate whether an exercise program applied via telerehabilitation is effective in reducing pain, disability, and psychosocial symptoms in individuals with chronic neck pain when compared to the same exercise program applied face-to-face.

**Implications:** The results of this study may contribute to a better understanding of the efficacy of telerehabilitation in biopsychosocial outcomes, as well as support future remote intervention research to reduce physical, temporal, financial and treatment adherence barriers that professionals face. In addition, remote treatment may also be able to reduce waiting lists and public spending on chronic neck pain.

**Keywords:** Neck Pain, Telerehabilitation, Therapeutic Exercise

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## QUANTITATIVE SENSORY TESTS AS OUTCOME OF CLINICAL TRIALS WITH THERAPEUTIC EXERCISES FOR CHRONIC NECK PAIN: A SCOPING REVIEW

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**Background:** As the ninth most cause of disability health condition among women, chronic neck pain can also alter pain processing. These individuals have local and remote hyperalgesia, higher temporal summation (TS) and lower efficiency in conditioned pain modulation (CPM), reinforcing the need to evaluate these outcomes since they are predictors of poor prognosis (greater pain and disability). Quantitative sensory tests (QST) represent an important tool in assessing the processing of sensory stimuli. In addition, therapeutic exercise is consolidated as the first line of treatment, capable of modulating neurophysiological responses to pain. Given the prognostic potential of QSTs and that they can be altered by exercise, it is necessary to investigate how they are used in the literature as well as the existing gaps in their use, to provide relevant information for researchers and clinicians to improve their prescription of therapeutic exercises for this population.

**Objectives:** To synthesize the evidence on the use of QSTs as outcome of interventions with therapeutic exercises in chronic neck pain.

**Methods:** A scoping review that followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR) guidelines and was filed with PROSPERO (CRD42022298811). PubMed, EMBASE, CINAHL, PEDro, SportDiscus and CENTRAL databases were consulted until December 2021. Titles, abstracts, and full text were independently selected by two researchers. Randomized clinical trials of non-specific chronic neck pain that used therapeutic exercise as one of the interventions were included. Data on location, year of publication, participants, outcomes, evaluated points and methodologies were extracted.

**Results:** 2909 articles were found. Of these, 27 articles were included with a total of 1585 participants (97% women). Studies were concentrated in the Nordic countries (40%) and Spain (25%)

and the majority (14 articles) were published from 2015 onwards, which demonstrates a growing interest in the area in the last decade. Pressure pain threshold (PPT) was the most evaluated outcome (100% of the studies), however thermal pain threshold, vibratory threshold, TS and CPM were evaluated in only 1 study each. The most evaluated local points were the upper trapezius muscle (74%) and scapula elevator (29%); and remotely, the tibialis anterior (29%). Regarding the methodology, the PPT is more standardized in the literature, using the average of 3 measurements for the analyses.

**Conclusion:** The use of QSTs in clinical trials in the field of neck pain is still very limited and little explored, but an increase in publications has been observed in recent years. Furthermore, only the PPT was better investigated with an established methodology, highlighting the gap with other QSTs.

**Implications:** This scope review carried out a relevant survey of the literature considering neck pain as an important public health problem and the influence of pain processing on chronification processes and success of interventions with exercise therapies. More studies on this review topic are still needed to improve the understanding of pain processing when an individual is submitted to therapeutic exercises.

**Keywords:** Neck pain, Exercise Therapy, Hyperalgesia

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## EVALUATION OF RANGE OF MOTION AND MUSCLE STRENGTH OF THE ANKLE OF CLASSICAL DANCERS FROM CURITIBA

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**Background:** Classical ballet requires high performance and technical level in anti-anatomical positions, inducing misalignment of joint structures. Classical dance requires intense and hard training and aims to achieve perfection, disregarding factors such as age or individual characteristics. The masterful execution of several steps of classical ballet demands the use of muscle strength to sustain the movement in large amplitudes. However, the uneven muscle activation during the ballet performances increases muscle disequilibrium and the risk of injury.

**Objectives:** We aimed to evaluate the range of motion and muscle strength of the ankle of classical ballet dancers from Curitiba.

**Methods:** This cross-sectional study included women aged 20 to 29 years, who live in Curitiba and have been practicing classical ballet for at least one year. Measurement of ankle dorsiflexion, plantar flexion, inversion and eversion amplitudes was assessed by a goniometer. Isometric strength of the ankle dorsiflexors, plantar flexors, inverters and evertors was measured using a Lafayette manual dynamometer. The values found in this study were compared with the literature.

**Results:** Nine dancers with an average of 22.3±1.32 years and 11±5.29 years of practice of classical ballet were evaluated. The plantar flexion movement presented range of motion values 40% greater than those previously reported in the literature. For ankle eversion, the values found were 38% higher. The results of the ankle

dorsiflexion and inversion range of motion were close to those described in studies that evaluated adult women. In muscle strength findings, the ballet dancers showed a significant reduction of up to 50% in ankle dorsiflexors, inverters and evertors. However, an increase of 97.96% was observed in the muscle strength of the plantar flexors compared to the values described in the literature.

**Conclusion:** The ballet dancers showed above-average range of motion values for plantar flexion and eversion movements and muscle strength for plantar flexors muscles. However, in the other evaluations, the results were similar or lower than those reported in the literature for range of motion and muscle strength.

**Implications:** Describing the changes in the range of motion and muscle strength of the dancers improves the knowledge of the relationship between the performance and the physical characteristics of the participants. Thus, they can understand the functioning of their body structure and map the risk of injuries, improving the execution of the dance.

**Keywords:** Classical ballet, Range of motion, Muscle strength

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### ACUTE EFFECT OF WHOLE-BODY PHOTOBIMODULATION ON AGILITY TEST IN TRAINED AND HEALTHY INDIVIDUALS: PRELIMINARY STUDY

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**Background:** Whole-body photobiomodulation (PBM) emitted by LEDs (Light-Emitting Diodes) has been applied for sports performance. However, there are no studies with the use of whole-body PBM in trained and healthy individuals with performance evaluation in an agility test (Illinois Agility Test).

**Objectives:** To evaluate the effects of whole-body PBM on the performance of trained and healthy individuals through the agility test. **Methods:** Randomized, double-blind, crossover and placebo-controlled clinical trial with 10 young (22.60±3.27 years) trained (33.6±7 months of resistance training) and healthy (25.42±2.13 kg/m<sup>2</sup>), randomly allocated into two crossed arms: effective PBM (13.85J/cm<sup>2</sup>; 46.17mW/cm<sup>2</sup>) and placebo PBM (0J; 0mW), applied according to randomization. Participants received both treatments, with a 7-day washout between each therapy. The effective PBM was applied for 10 minutes, respecting a time of 6 hours and 5 minutes before the assessment of the agility test (2 sessions of irradiation). The agility test was performed according to its validation, which consisted of an area of 4 external cones (9.2 m long and 3.6 m wide) and 4 internal cones (3.1 m apart). Before starting the official test, a familiarization was performed (2 attempts). Thus, the participants were instructed to perform 3 maximum running attempts (180 seconds of rest between them) running from the starting line (1<sup>st</sup> cone to 2<sup>nd</sup> cone - 9.2 m), deviating from 4 central cones (twice) and a distance of 9.2 m to the finish line. The evaluations were carried out in three moments [baseline (BL) – 1<sup>st</sup> day; Effective PBM or placebo, according to randomization at the time of 24h-post BL; and after 7 days of washout]. The evaluations were standardized in the same period of the day and place of the BL. Data were analyzed for

normality using the Kolmogorov-Smirnov test. For comparison purposes, the paired t test, mean, standard deviation and 95% confidence interval (CI) were used, considering a significance level of 5%. **Results:** On average, there was no significant difference (p=0.963) between effective PBM [0.01±0.73; t(9) = -0.048, 95% CI -0.53 to 0.51] and placebo PBM. The time in seconds was lower in effective PBM [0.37±0.43; t(9) = 2.753, p=0.022, 95% CI 0.06 to 0.69] compared to BL. There was no significant difference for placebo PBM [0.36±0.55; t(9) = 2.095, p=0.066, 95% CI -0.02 to 0.76] compared to BL.

**Conclusion:** Whole-body PBM was not able to increase agility test performance (Illinois Agility Test) in trained and healthy individuals. However, is a preliminary study, there is a need for a larger sample size (n=40, calculated by paired t-test, two-tailed, considering a mean effect of 0.5,  $\alpha$  of 5% and statistical power=80%) to clarify the results.

**Implications:** Although the findings do not confirm the hypothesis, it is necessary to investigate the use of whole-body photobiomodulation in trained people to improve performance in agility tests, as it is an innovative resource that could benefit the sports and/or clinical environment.

**Keywords:** Low-level Light Therapy, Running, Physical Functional Performance

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### CLINICAL CHARACTERISTICS OF INDIVIDUALS WITH TRAUMATIC PATELLOFEMORAL PAIN: A CROSS-SECTIONAL STUDY

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**Background:** Patellofemoral pain (PFP) is defined as retro- or peripatellar pain, exacerbated by activities that overload the patellofemoral joint. PFP is one of the most common musculoskeletal disorders of the lower limbs and is associated with several clinical alterations (e.g., reduced subjective function, quality of life and knee muscle strength). The development of PFP is commonly associated with an insidious onset. However, recent evidence demonstrates a high prevalence of PFP after traumas to the knee joint (e.g., injuries and/or surgery). Seven out of 10 individuals report symptoms of PFP after traumas to the knee. Nevertheless, most studies are carried out in individuals with insidious PFP, whereas little is known about which alterations may be present in individuals with PFP of traumatic origin; and even if they are the same as those presented by individuals with insidious PFP.

**Objective:** To compare clinical features of individuals with traumatic, insidious PFP and asymptomatic individuals with or without a history of knee trauma.

**Methods:** Thirty-nine subjects with traumatic PFP, 38 subjects with insidious PFP, 40 asymptomatic subjects with no history of trauma, and 18 asymptomatic subjects with a history of trauma aged 18 to 35 years were enrolled (Ethics Committee Number: 5,110,075). Variables of interest included duration of symptoms, worst level of pain