

The Effects of Intensity on Exercise-Induced Hypoalgesia During a Knee Extension Exercise

NCT05561582

5/31/2024

STUDY PROTOCOL

This study was a randomized controlled trial of healthy participants. After providing written informed consent, participants were screened for eligibility criteria. Eligible participants then underwent Quantitative Sensory Testing procedures that included Heat Pain Threshold (HPT), Temporal Summation (TS), Pressure Pain Threshold (PPT), and Conditioned Pain Modulation (CPM).

During HPT, participants were provided a thermode attached to a TCS-II (QST.Lab, Strasbourg, France). The thermode increased from a baseline of 32 degrees Celsius at 1 degree C/second to a maximum of 50 degrees Celsius. Participants were instructed to indicate when the sensation first changed from warmth to pain (pain threshold) by pressing a button. Once the button was pressed, the temperature stopped increasing and quickly returned to a baseline temperature of 32 degrees Celsius. Two trials were completed at the dominant quadriceps and ipsilateral upper trapezius.

During TS, participants placed the thermode on the palmar surface of the hand. Participants rated the pain intensity during a train of 10 heat pulses that were delivered to the skin with temperatures peaking at 49°C at a rate to maintain the desired inter-stimulus interval.

For PPT, a computerized pressure algometer (AlgoMed, Ramat Yishai, Israel) with a 1 cm diameter rubber tip was applied at a constant rate. Participants were instructed to press a response button connected to the algometer when the sensation first changed from pressure to pain (pain threshold). Two trials were performed at the dominant quadriceps and ipsilateral upper trapezius.

For CPM, PPT was applied to the web space of the non-dominant foot. Participants then immersed the dominant hand into water cooled by a refrigeration unit (ARCTIC Series Refrigerated Bath Circulator, ThermoFisher Scientific, Massachusetts, USA) that circulated water continuously to maintain a constant temperature of 12° Celsius for 60 seconds. PPT measurement was then repeated.

After Quantitative Sensory Testing, participants completed a 1-repetition maximum test for a leg extension exercise with the dominant lower extremity.

Participants were then randomly assigned to either the high intensity exercise, low intensity exercise, or quiet rest intervention. For participants assigned to the exercise interventions, individuals completed a single leg knee extension exercise for 3 sets, 10 repetitions on the dominant leg. A weight corresponding to either 30% or 75% of the participants 1-repetition maximum was added for the low intensity or high intensity group, respectively. For individuals assigned to the quiet rest intervention, participants sat quietly for two minutes three sets. Between each set or exercise or quiet rest, PPT was measured on the dominant quadriceps and upper trapezius.

After exercise, CPM was repeated.

STATISTICAL ANALYSIS

To examine the immediate changes in PPT by group, a mixed model ANOVA was conducted. Simple effects decomposition with Bonferroni correction were completed. Our a priori alpha level is <0.05.

A Pearson correlation examined for the association of HPT, TS, baseline PPT with Exercise-Induced Hypoalgesia.

To examine if CPM efficiency changes by group, a mixed model ANOVA was conducted.