Abstract

Background: Although a number of studies have compared the influence of different electrical pulse parameters on maximum electrically induced torque (MEIT) and discomfort, the role of phase duration has been poorly investigated. Objective: To examine the variation in muscle torque and discomfort produced when electrically stimulating quadriceps femoris using pulsed current with three different phase durations in order to establish whether there are any advantages or disadvantages in varying the phase duration over the range examined. Method: This is a two repeated- measures, within-subject study conducted in a research laboratory. The study was divided into 2 parts with 19 healthy young adults in each part. In part 1, MEIT was determined for each phase duration (400, 700, and 1000 s), using a biphasic pulsed current at a frequency of 50 Hz. In part 2, stimulus amplitude was increased until the contractions reached 40% of maximum voluntary isometric contraction (MVIC) and the associated discomfort produced by each phase duration was measured. Results: In part 1 of the study, we found that the average MEITs generated with each phase duration (400, 700, and 1000 s) were 55.0, 56.3, and 58.0% of MVIC respectively, but the differences were not statistically significant (p=.45). In part 2, we found a statistically significant increase in discomfort over the same range of phase durations. The results indicate that, for a given level of torque production, discomfort increases with increasing phase duration (p=.008). Conclusions: Greater muscle torque cannot be produced by increasing the stimulus phase duration over the range examined. Greater discomfort is produced by increasing the stimulus phase duration.

Keywords
Electric stimulation, torque, quadriceps muscle, physical therapy.