Comparison of Treatments for Delayed Onset Muscle Soreness (DOMS)

Authors: Kathleen Palladino, Sabrina Garcia, Sandeep Moses, and Luis Anaya

KINE 3325 – Undergraduate Research Methods (Dr. Caçola)

Department of Kinesiology - The University of Texas at Arlington

Abstract

INTRODUCTION: Delayed onset muscle soreness (DOMS) is related to pain that follows an unfamiliar eccentric exercise that causes damage to the skeletal muscle (Hilbert, et al. 2003). The pain typically appears within the first 24 hours and starts to peak between 48-72 hours post exercise. Symptoms include the feeling of stiffness, pain, and inflammation. Some common forms of treatment for DOMS are ice packs, hot packs, and topical analgesics. **PURPOSE:** The purpose of this study was to investigate the effects that ice packs, hot packs, and peppermint oil have for treating delayed onset muscle soreness (DOMS) in order to see which one would elicit the best results for reducing pain. **METHODS:** A sample of 20 subjects (15 females and 5 males) between the ages of 18-24 years old was chosen for this experiment. Subjects' criterion was narrowed to those who did not use resistance training in the upper body. Participants were randomly assigned to either one of the three treatment groups or to the control group. For the exercise protocol subjects completed 4 sets of 10 repetitions of seated concentration curls (maximal concentric/eccentric elbow flexion/extension movements) taking 8 seconds to lower the weight. They were given a three-minute rest period after completion of each set. Participants used a specific free weight (dumbbell) in accordance with their one-repetition max (1-RM). Treatment was then administered to those receiving an ice pack, hot pack, or peppermint oil for a time period of 20 minutes. After a total time of 30 minutes had elapsed, participants filled out a Neuropathy Pain Scale (NCP). The control group filled out the NCP immediately following the exercise. All participants returned again approximately 24, 48, and 72 hours after to receive treatment (besides control group) as well as to fill out an NCP. **RESULTS:** The One-way ANOVA demonstrated no significant different ($p > 0.05$) between groups over time (pre-test, day 1, day 2, day 3, and day 4). A repeated measurements test was conducted to analyze the pain level measures over time within each group. There was no significant differences seen in group 1 (cold) or group 2 (hot) ($p > 0.05$). However, within group 3 (oil) a significant difference ($p < 0.05$) was found. A dependent t-test found that the significant differences ($p < 0.05$) to be between days 1 and 4, and between days 3 and 4. **CONCLUSION:** This present study found that there are no differences between using ice packs, hot packs, or application of peppermint oil for treatment of DOMS in the non-dominant arm over time (i.e., day 1, 24, 48, and 72 hours). While pain levels measured individually over time for groups receiving ice packs or hot packs revealed no significant improvements, the group receiving peppermint oil treatment did show improvements over time between days one and four, as well as between days three and four. We conclude that the application of peppermint oil showed to be an effective form of treatment for DOMS in the biceps brachii.

BACKGROUND & PURPOSE

Background

- Delayed onset muscle soreness (DOMS) is related to pain that follows an unfamiliar eccentric exercise that causes damage to the skeletal muscle (Hilbert, et al. 2003).
- Pain appears within 24 hours post exercise
- Symptoms: stiffness, pain, and inflammation
- The purpose of this study was to investigate the effects that ice packs, hot packs, and peppermint oil have for treating delayed onset muscle soreness (DOMS) in order to see which one elicited the best results for reducing pain.

METHODS

Subjects

- 20 (15 females and 5 males)
- 18 – 24 years old
- No upper body resistance training
- Left handed non-dominant arm
- Randomly assigned to a group (cold, hot, oil, or control)
- Instructions given to subject:
  Not to take any pain relief medications
  Not to use any post treatment (massage, creams, oils, hot, cold, etc)

Protocol

❑ 4 sessions

During first day:

- Pre-test Neuropathy Pain Scale collected
- 4 sets of 10 repetitions of seated concentration curls
  Slow lowering (8 secs) eccentric
- 3 minutes rest periods between sets
- 20 minutes treatment (cold, hot, oil) place on the bicep area
- Neuropathy Pain Scale (NCP) collected
  30 minutes post treatment

Return back within 24, 48, and 72 hours:

- 20 minutes treatment (cold, hot, oil) place on the bicep area
- Neuropathy Pain Scale (NCP) collected
  30 minutes post treatment

Control group did not get any treatment

RESULTS

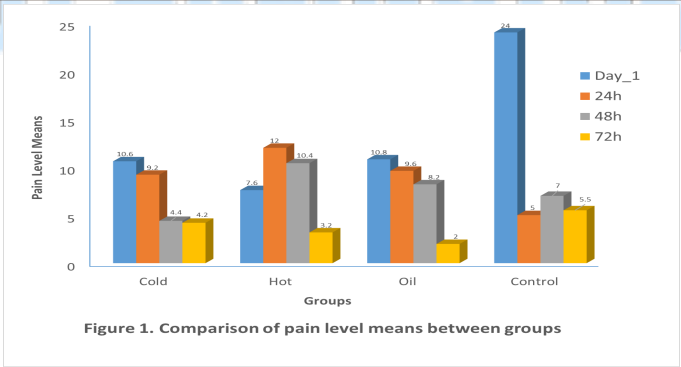

Figure 1. Comparison of pain level means between groups

RESULTS

Tests

One-way ANOVA	Repeated Measures Test		Dependent T-test	
P>0.05	P>0.05	P<0.05	P>0.05	P<0.05
Pre-test	Group 1(cold)	Group 3(oil)	Between Days	
Day 1	Group 2(hot)		1 and 3	1 and 4
Day 2			2 and 3	3 and 4
Day 3			2 and 4	
Day 4				

The test results for the One-way ANOVA, Repeated Measures Test, and Dependent T-test

DISCUSSION & CONCLUSION

- Based on previous studies, our expectations were that ice packs would work best for reducing pain.
- This present study found that there are no differences between using cold packs, hot packs, or application of peppermint oil for treatment of DOMS in the non-dominant arm over time (i.e., day 1, 24, 48, and 72 hours).
- While pain levels measured individually over time for groups receiving cold packs or hot packs revealed no significant improvements, the group receiving peppermint oil treatment did show improvements over time between days one and four, as well as between days three and four.
- We conclude that the application of peppermint oil showed to be an effective form of treatment for DOMS in the biceps brachii.

REFERENCES

- Allen, D.G. (2001). Eccentric Muscle Damage: Mechanics of Early Reduction of Force. Acta Physiol Scan, 171, 311-319.
- Galer, B.S. & Jensen, M. P. (1997). Development and Preliminary Validation of a Pain Measure Specific to Neuropathic Pain: The Neuropathic Pain Scale. Neurology, 48, 332-338.
- Howell, J. N., Chleboun, G., & Conatser, R. (1993). Muscle Stiffness, Strength Loss, Swelling and Soreness Following Exercise-Induced Injury in Humans. Journal of Physiology, 464, 183-196.
- Personal statement by Dr. Mark Ricard, March, 2015.